Draft Statewide Waste and Resource Recovery Infrastructure Plan 2013–2043 | Victoria

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State Government Victoria

Draft Statewide Waste and Resource Recovery Infrastructure Plan 2013–2043

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Foreword

Getting Full Value: the Victorian Waste and Resource Recovery Policy (Getting Full Value) sets out a vision and approach to position Victoria as a national leader in resource recovery. It provides the foundation for facilitating an integrated waste and resource recovery system that marries environmental protection with economic prosperity. The draft *Statewide Waste and Resource Recovery Infrastructures Plan (SWRRIP)* provides the evidence base to inform planning and investment to realise this vision.

The release of the draft *SWRRIP* is a key milestone in the journey the Victorian Government has been undertaking to develop the right conditions for resource recovery markets to grow and mature in Victoria.

Getting Full Value established the vision, the Victorian government's response to the Ministerial Advisory Committee on Waste and Resource Recovery Governance Reform put in place the institutional and governance framework and now the draft *SWRRIP* provides the background and evidence to support planning, at a statewide level to create the environment in which industry can invest with certainty.

Consistent with *Getting Full Value,* the draft *SWRRIP* recognises that current thinking about waste management is moving away from seeing waste as 'something to be thrown away', and moving instead towards seeing waste as a resource from which maximum value should be extracted.

To realise the productive value of waste, we need an accurate and comprehensive picture of our current waste and resource recovery infrastructure system and to understand, through consultation with all stakeholders, where the gaps are, now and in the future. We also need to work with stakeholders to develop best practice innovative solutions to address these gaps, so that together, we can meet the current and future needs of a growing population and economy and reduce risks to our environment.

Governments have a role to play by providing the foundations for the protection of the environment and public health, by being clear on the standards we require and sending the right market signals.

Within those boundaries, we also want to ensure businesses are able to work without unnecessary burdens to investment in and grow our waste and resource recovery industries. Victoria's waste and resource recovery industry already has an estimated annual turnover of $2.2 billion and employs some 8,000 people*. We want to help them function efficiently and effectively, to the economic advantage of all Victorians.

It is with great pleasure that I release the draft *SWRRIP* for consultation. Your input and feedback is critical to informing and strengthening the final document. We need to know that it provides the right level of information to inform your decision making and what further work needs to be undertaken to develop a robust and useful document. The development of the draft *SWRRIP* has highlighted the complex nature of the waste and resource recovery sector and the critical role of industry, local government and waste management groups as part of the solution.

I thank all who have worked on bringing this landmark document together. In particular I thank the metropolitan and regional waste management groups and Sustainability Victoria's Industry Expert Reference Group for their invaluable input towards the development of this consultation paper.

The Hon. Ryan Smith MP
Minister for Environment and Climate Change

* Victorian Government, *Getting Full Value: the Victorian Waste and Resource Recovery Policy*, 2013

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The investment roadmap

The amount of waste generated by Victorian households, businesses and industry has been increasing by around 4% for the last decade. In 2010–11 around 3.8 million tonnes of waste was sent to landfill. If current trends continue the amount of waste sent to landfill is projected to increase to nearly five million tonnes by 2041–42.

The waste we send to landfill contains valuable resources but it also costs the community and poses environmental risks if it is not properly managed. Increasing resource recovery represents economic opportunities for the whole of the state. The future challenge is to effectively manage the expected mix and volume of waste by supporting a viable resource recovery industry which reduces the amount of valuable materials going to landfill and captures the opportunities that the sector provides the Victorian economy.

Victoria has one of the most accessible kerbside recycling systems in the world; this means we should have world class infrastructure and technologies for treating and processing waste.

Victoria's waste and resource recovery system employs around 8,000 people, has an estimated annual turnover of $2 billion per year and manages over 12.3 million tonnes of solid waste per year.[1] The draft *Statewide Waste and Resource Recovery Infrastructure Plan (SWRRIP)* is intended to provide the framework to inform and guide planning and investment that supports the mix of infrastructure that will effectively manage our waste through maximising resource recovery.

The draft SWRRIP vision

'To provide Victoria with the roadmap to guide future investment in waste management and resource recovery infrastructure that effectively manages the expected mix and volumes of waste, supports a viable resource recovery industry and reduces the amount of valuable materials going to landfill.'

1 Victorian Government, *Getting Full Value: the Victorian Waste and Resource Recovery Policy,* 2013.

For the first time, the draft *SWRRIP* brings together all the available information and data relating to waste and resource recovery management from industry, local government, waste management groups (WMG) and other government agencies. It maps all major current waste and resource recovery infrastructure, identifies gaps and opportunities and provides intelligence to industry to inform their investment decisions.

Developing the *SWRRIP* will provide the evidence base to enable integrated planning for waste and resource recovery needs across the state. It will be the portal to facilitating investment and supporting planning and best practice procurement. Once completed it will:

- provide an analysis of current and anticipated trends in the sources of waste, composition of waste streams and levels of resource recovery
- provide an analysis of the current infrastructure for waste treatment and resource recovery and anticipated future processing needs
- provide a strategic economic assessment of the options for waste and resource recovery infrastructure across Victoria and identify gaps in infrastructure capacity and priority areas for development and investment
- investigate and encourage co-location of new waste and resource recovery infrastructure with similar activities such as waste water treatment and other industrial precincts
- consider of transport impacts arising from the movement of waste and materials
- provide information regarding key infrastructure that requires protection from encroachment
- provide clear guidance to local governments, WMGs, the waste industry and relevant Victorian Government agencies regarding the above
- provides an evidence base for future targeting of government funding and investments.

Importantly, the draft *SWRRIP* has been developed to invite feedback and encourage comment from those working in the waste and resource recovery sector to ensure the final document provides the right detail of information to inform decision making and identify what further work needs to be undertaken to develop a robust and useful document.

Feedback received during the consultation process will be used to develop the final *SWRRIP* in 2014.

Policy context

In April 2013 the Victorian Government released *Getting Full Value: the Victorian Waste and Resource Recovery Policy (Getting Full Value)*. The policy sets a 30 year vision for an integrated, statewide waste management and resource recovery system that provides an essential community service by protecting the environment and public health, maximising the productive value of resources, and minimising long term costs to households, industry and government.

The development of the *SWRRIP* is a key initiative under *Getting Full Value*. Its purpose is to provide strategic direction for waste and resource recovery planning for the next 30 years with an immediate focus on the next five years. It will provide direction to the development of the *metropolitan and regional* waste and resource recovery implementation plans (*WRRIP*) to ensure a consistent integrated approach across all levels of planning. This will ensure that planning at the state and regional levels are actively integrated, aligning state directions with regional priorities.

Consistent with *Getting Full Value*, the draft *SWRRIP* recognises that current thinking about waste management is moving away from seeing waste as 'something to be thrown away' and towards seeing waste as a resource. Supporting this, *Getting Full Value* has defined the long purpose of landfills to be for only receiving treated residual waste[2] that has had all materials with an economic value extracted. To progress this, the draft *SWRRIP* proposes mechanisms that will strength the ability of our resource recovery industry to increase the removal of economically viable materials including food and garden organics, timber, paper and glass.

In early 2013 the Victorian Government established the Ministerial Advisory Committee on Waste and Resource Recovery Governance Reform (MAC). MAC was established on the request of the Minister for Environment and Climate Change (Minister), the Hon. Ryan Smith MP, to consult with the sector and provide recommendations on the institutional and governance arrangements to best deliver on the objectives of *Getting Full Value*.

Following the release of the MAC recommendations the Minister announced a number of institutional changes. The full report detailing the government's response released in August 2013 can be found on the Department of Environment and Primary Industries (DEPI) website **www.depi.vic.gov.au/environment-and-wildlife/sustainability/waste-management-and-resource-recovery.**

The Victorian Government will work closely with local government, industry and across state government to implement these actions. A transition process will be developed which will include the drafting of the required legislative changes. This process has yet to be fully defined and the relevant components will be detailed in the interim *SWRRIP*.

The draft *SWRRIP* plays an important role in the transition process. The proposed WMG areas have been used in the draft *SWRRIP* analysis to set the framework for developing the*metropolitan and regional WRRIPs*.

Goals

The draft *SWRRIPs* goals are to:

- facilitate efficient markets by consolidating material streams to establish economies of scale that attract industry investment
- maximise the recovery of valuable resources from waste streams
- support the *Getting Full Value* action to facilitate the long term purpose of landfills to only receive treated residual waste
- provide industry, local government, metropolitan and regional WMGs and other government agencies with the information and guidance to inform planning at the state, regional and local levels.

2 Treated residual wastes are materials that have been through a process to extract materials of economic value or have been stabilised to reduce their environmental impact.

Draft SWRRIP analysis

Key recommendations of the MAC relating to the development and delivery of the SWRRIP

- Sustainability Victoria will have the responsibility to develop the *SWRRIP* which will be a statutory plan.
- The *SWRRIP* will provide a clear framework for the planning of Victoria's waste system and facilitates integration and alignment of regional and metropolitan plans.
- The twelve regional waste management groups (RWMG) will be amalgamated into six RWMGs and one Metropolitan WMG and will be established as statutory bodies under the *Environment Protection Act 1970*.
- The metropolitan and regional WMGs will be responsible for planning for all waste streams, including construction and demolition and commercial and industrial, consistent with the *SWRRIP*.
- The metropolitan and proposed regional WMGs will develop *waste and resource recovery implementation plans* that will:
  - be guided by and be consistent with the directions in the draft *SWRRIP*
  - each include a Draft Infrastructure Schedule (including a landfill schedule)
  - include cross regional boundary planning
  - be referenced in Victoria Planning Provisions clause 19.03-5 Waste and Resource Recovery. These plans must then be considered where relevant in all planning decisions relating to the use and development of land
  - be developed through an integration process with SV to ensure that infrastructure schedules are coordinated and integrated with statewide objectives and regional needs.

For the first time in Victoria the draft *SWRRIP* brings together all the available information from industry, local government WMGs and other government agencies relating to waste and resource recovery infrastructure. This analysis provides the evidence base to inform planning decisions for 30 years with a focus on the next five years.

Importantly, we are pleased to have had the cooperation from industry. Much of the data was supplied voluntarily by industry reflecting the value placed by them on access to reliable statewide data and trend analysis. This data set will be refined and built upon over the life of the *SWRRIP* and made available through Sustainability Victoria's (SV) website. Annual data surveys will also be released. For instance, in future we would like to make data available using online GIS capability and including information regarding logistics. An important component of the consultation process is to ensure that the data and information provided is both accurate and useful to the end users.

The draft *SWRRIP* analysis includes mapping of over 500 major facilities across the state that collect, sort, transfer, reprocess, reuse and dispose of our waste materials that together form Victoria's current waste management system. These include landfills, transfer stations, resource recovery centres, material recovery facilities and major reprocessors. Wastewater treatment facilities have also been included recognising the future potential for the co-location of infrastructure. Consistent with its statewide focus, it does not include waste infrastructure planned at the local level (such as litter infrastructure and kerbside collection). Some of these maps have been included in the draft *SWRRIP* and all are available at www.sustainability.vic.gov.au/www/html/3696-maps-for-the-draft-swrrip.asp?intSiteID=4.

To develop an integrated system it is important that the *SWRRIP* provides the evidence and guidance to ensure the adequate provision of suitably located sites for waste and resource recovery activities. The draft *SWRRIP* supports the 'hubs and spokes' model proposed in *Getting Full Value* by identifying existing hubs important to the state system and by identifying where gaps may eventuate over the next 30 years, with a focus on the first five years.

Findings

The draft *SWRRIP* identifies major opportunities to increase the recovery of valuable materials from the waste stream. These include:

- increased recovery of garden and food organics
- improved source separation to increase recovery rates of paper, cardboard and timber
- increased recovery of glass (to reduce glass fines) and tyres
- smaller scale recovery of construction and demolition waste in regional areas
- increased recovery of shredder flock (which accounts for some 10% of residual waste sent to landfill from the commercial and industrial (C&I) sector) and plastics (particularly film plastics).

Hubs and spokes

To enable efficient 'hubs and spokes' the draft *SWRRIP* identifies that in order to improve efficiency and the environmental performance of Victoria's waste management system, the system will continue to consolidate smaller infrastructure into larger regional hubs and infrastructure that is well run, compliant and capable of meeting future growth and environmental standards.

Fundamental to the establishment of the 'hubs and spokes' network is a market for the products made from recovered resources. The draft *SWRRIP* identified a number of major opportunities to support markets by:

- providing data and information that can be used by industry and local governments to guide investment decisions
- supporting industry to reduce the level of contamination by improving source separation capacity through investment in infrastructure and education campaigns with generators
- encouraging best practise management of resource recovery infrastructure and facilities
- facilitating collective procurements between local governments to consolidate individual material streams collected through kerbside systems, to achieve volumes that attract industry investments in resource recovery (industry can use these volumes as base loads and supplement them with stream for other sources such as the C&I sectors).

The development of the 'hubs and spokes' systems also relies on the long term provision of enough suitably located land for waste and resource recovery activities. A balance is required between providing surety to industry and meeting the expectation of the community around land use activities that do not impact on their amenity.

The *SWRRIP* identifies where future land requirements may occur and where there are existing hubs of importance to the statewide system. If the ability to perform the current activities occurring at these hubs was reduced then planning at the region and local level would need to occur to ensure future needs were met. This will be undertaken through the development of the *WRRIPs*.

Landfills

Whilst landfills are important to the waste and resource recovery system, the costs of design, building management and ultimately closing them has been steadily increasing. As a result there has been a shift away from smaller landfills to larger regional landfills.

The draft *SWRRIP* analysis identifies that landfills with a shallow cell depth, accepting less than 25,000 tonnes of waste per year, and servicing only their local community, are likely to be more costly to operate in the long term. These are mainly owned by local government. Investigations into the future of these landfills may identify options that will improve the outcomes to the council and community. It is likely that these options would include transitioning the sites to transfer stations and resource recovery activities prior to the transport of the consolidated residual waste to a larger regional landfill.

The draft *SWRRIP* has identified priority actions for government, including the DEPI, SV, the Environment Protection Agency Victoria and the metropolitan and regional WMGs, that should be either completed or well underway in the next five years to meet the vision and goals of the *SWRRIP*. These are shown in the following table.

Draft SWRRIP Goals and Priority Actions

Goal 1. Facilitate efficient markets by consolidating material streams to establish economies of scale that attract industry investment

1.1 Facilitate the cross regional movement of material streams to consolidate volumes, to establish economies of scale to attract industry investment.

1.2 Work with local government to build the capacity of local government procurement processes to increase resource recovery.

1.3 Explore options for cross regional processing of garden organics from Geelong, Ballarat, Bendigo and potentially Shepparton.

1.4 Achieve South Eastern Organics Tender objectives.

1.5 Develop options for processing garden organics from the eastern metropolitan Melbourne local government cluster.

1.6 Explore options for processing food waste in larger regional centres, including Geelong, Ballarat, Shepparton, Echuca, Latrobe Valley, Wangaratta, Wodonga and Warrnambool.

Goal 2. Maximise the recovery of valuable resources from waste streams

2.1 Develop partnerships with industry to reduce contamination in material streams for reprocessing.

2.2 In partnership with industry and local governments, establish mechanisms to increase the amount of food waste recovered from household waste.

2.3 Facilitate partnerships between industry and local governments to investigate and develop mechanisms that will increase the amount of food waste recovered from manufacturers and other businesses.

2.4 Facilitate partnerships between industry and local governments to investigate and develop mechanisms that will increase the amount of materials recovered from the commingled stream.

2.5 Develop partnerships with industry that facilitate an increase in their ability to recover film plastics.

2.6 Develop partnerships with industry that facilitate an increase in their ability to recover more tyres.

Goal 3. Support the *Getting Full Value* action to facilitate the long term purpose of landfills to only receive treated residual waste

3.1 Explore ways to manage residual waste streams currently going to landfills with limited remaining airspace in the south east metropolitan area and on the Mornington Peninsula.

3.2 Explore ways to manage residual waste streams currently going to landfills with limited remaining airspace in Bendigo.

3.3 Explore ways to manage residual waste streams currently going to landfills with limited remaining airspace in Anglesea.

Goal 4. Provide industry, local government, metropolitan and regional WMGs and other government agencies with information and guidance to inform planning at the state, regional and local levels

4.1 In partnership with local governments facilitate a rationalisation of landfills so, in the long term, they are:

- economically viable
- able to meet current and future compliance requirements (including post closure rehabilitation requirements)
- able to provide the optimal outcomes for the council and community in the long term.

4.2 Support local governments with in regional areas with small local landfills to investigate options to move to alternative waste management and resource recovery options where these are economically feasible.

4.3 Inform land use planning so that it balances the need for adequate provision of land for waste and resource recovery activities with the need to preserve the amenity of surrounding land uses.

4.4 Inform planning process to facilitate the adequate provision of resource recovery infrastructure to service new growth areas (particularly Geelong/Armstrong Creek/Torquay, Mitchell Shire, Casey/Cardinia and Wyndham/Melton/Hume/Whittlesea).

4.5 Align planning at the regional and local level with the *SWRRIP*.

How the draft SWRRIP will be used

Planning for waste and resource recovery infrastructure is undertaken by industry, state and local government. When completed, the *SWRRIP* will provide one document with the evidence base to inform these planning and investment decisions. It will:

- support industry to:
  - identify resource recovery opportunities such as garden and food organics and timber and tyres
  - gain long term access to suitable land for waste and resource recovery activities. This will be achieved by using land use planning processes to ensure future land is set aside for waste and resource recovery activities and the functionality of existing hubs of state importance is maintained where deemed necessary through the preservation of buffers
  - plan and invest with greater certainty and develop a hubs and spokes model of infrastructure to achieve economically viable volumes of waste derived feedstocks
- provide information and guidance for the development of the *metropolitan and regional WRRIPs* which will detail infrastructure planning and implementation at the local and regional levels across the state
- enable local governments to utilise information and data from the *SWRRIP* to make informed planning and investment decisions that increase resource recovery and outcomes for their local communities.
- outline strategic directions for integrating waste and resource recovery infrastructure requirements into transport and land use planning across government

Consultation

To ensure the interim and final *SWRRIP* meet the needs and expectations of the waste and resource recovery sector we now need your feedback.

Consultation is an essential part of the process to develop the final *SWRRIP*. This draft *SWRRIP* is Victoria's first effort to bring together the information required to plan for waste management and resource recovery infrastructure for the next 30 years.

The input of stakeholders is essential to ensure the interim and final *SWRRIP* is relevant to industry, local government and the community and that it will assist industry and all levels of government with their waste and recovery planning into the future.

To assist this ongoing consultation process, SV will be conducting a series of regional and metropolitan workshops and engagement sessions to provide opportunities for feedback from right across Victoria. For further information on these sessions and how to lodge written submissions go to www.sustainability.vic.gov.au/ww/html/3694-statewide-waste-and-resource-recovery-infrastructure-plan.asp?intSiteID=4.

What we need to know

- Does the draft *SWRRIP* provide a true representation of existing waste and resource recovery systems in your area?
  - If not, what is missing and needs to be included?
- Does the information provided in the draft *SWRRIP* provide sufficient information to inform your decision making process?
  - If not, what further information do you need?
- Does the draft *SWRRIP* provide sufficient clarity on government priorities and direction?
  - If not, what do you need?
- Does the draft *SWRRIP* articulate opportunities for investment in a future integrated waste and resource recovery system?
  - If not what should be included?
  - Are there emerging opportunities/issues we have missed?
- Overall, how will you use the draft *SWRRIP* and what can be done to make it a more useful document?
  - What can be done to make it more user friendly?

1. About the draft SWRRIP

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1.1 Introduction

In April 2013, the Victorian Government released *Getting Full Value: the Victorian Waste and Resource Recovery Policy (Getting Full Value)*, which sets a new approach to waste management and resource recovery in Victoria. The development of a *Statewide Waste and Resource Recovery Infrastructure Plan (SWRRIP)* is a key initiative under *Getting Full Value*.

Victoria's waste and resource recovery system manages over 12.3 million tonnes of solid waste each year. It includes some 590 businesses employing around 8,000 people, and has an annual turnover of $2 billion.[3]

The system covers the generation, collection and drop-off, sorting, transfer, reprocessing, export, reuse and disposal of our waste materials. These activities occur across all sectors of the economy, including households, businesses, industry and government.

When completed the final *SWRRIP* will provide a roadmap for the future investment Victoria needs to effectively manage the expected mix and increasing volumes of waste generated by households, businesses and industry. Importantly, the *SWRRIP* will guide planning and decision making by providing data, knowledge and guidance to relevant industries, businesses and public sector agencies. It will enable better facilitation and brokering of partnerships between the private and public sectors and in particular local governments and environment portfolio agencies including:

- Department of Environment and Primary Industries (DEPI)
- Environment Protection Authority Victoria (EPA)
- Sustainability Victoria (SV)
- Metropolitan Waste Management Group (WMG) and Victoria's regional waste management groups (RWMG).

3 Waste Management and Environment, *Inside Waste Industry Report,* p.90, 2011–12

The *SWRRIP* will also influence policy and regulation around land use and transport planning by local governments and Victorian government agencies, including the Department of Transport, Planning and Local Infrastructure.

For the first time, the draft *SWRRIP* has bought together all the available waste management and resource recovery infrastructure information and data for Victoria. SV, in consultation with Victorian government departments and agencies, metropolitan and regional WMGs, local governments, industry and businesses (including waste management and reprocessing companies) developed this draft, to support a statewide approach to planning future infrastructure needs.

Following the recommendations and governments response to the recent Ministerial Advisory Committee on Waste and Resource Recovery Reform (MAC), it is the intent to use the feedback from the draft *SWRRIP* consultation process to develop a final *SWRRIP* for ministerial approval in 2014.

The draft SWRRIPs vision

To provide Victoria with the roadmap to guide future investment in waste management and resource recovery infrastructure that effectively manages the expected mix and volumes of waste, supports a viable resource recovery industry and reduces the amount of valuable materials going to landfill.

Getting Full Value recognises the important role the market plays in driving the waste and resource recovery industry. Demand and markets for some recycled materials such as paper and metals is now well established. However, much more can be done to keep waste out of landfills and to maximise the economic gains that can be realised by establishing viable reprocessing of more types and greater amounts of recovered materials.

While addressing the next 30 years, the primary focus of the final *SWRRIP* will be for the next five years. It will improve the coordination of, and environmental outcomes and operating standards for, waste related infrastructure. It will also maximise resource recovery opportunities across the state. The final *SWRRIP* will be an evolving document, to be revised by SV every five years, to ensure it remains up-to-date and relevant. All *SWRRIP* data and information will be regularly reviewed and updated and made available via the SV website.

To achieve the vision of the draft *SWRRIP*, four goals are proposed.

1. Facilitate efficient markets by consolidating material streams to establish economies of scale that will attract industry investment.
2. Maximise the recovery of valuable resources from waste streams.
3. Support the *Getting Full Value* action to facilitate the long term purpose of landfills to only receive treated residual waste.
4. Provide industry, local government, the metropolitan and regional WMGs and other government agencies with the information and guidance to inform planning at the state, regional and local levels.

Table 1.1 shows what the draft *SWRRIP* aims to facilitate, for each goal.

1.2 Scope

The *SWRRIP* will be a statewide plan and will consider infrastructure that needs state level planning. The statewide view will then inform the metropolitan and regional waste and resource recovery implementation plans (WRRIP), and local government planning.

The draft *SWRRIP:*

- identifies and maps all major state and regional waste management and resource recovery infrastructure
- assesses the handling capacities of the major landfill and reprocessing facilities
- analyses the flow of major material streams at the state level and, where appropriate, at the regional level
- models the future generation of waste and materials at the state level and, where available, at the regional level, over a 30 year timeframe
- identifies potential waste management and resource recovery infrastructure gaps, opportunities and priorities at the state level.

1.2.1 Infrastructure

Over the years, the public and private sectors have made significant investments in waste and resource recovery infrastructure in Victoria. Table 1.2 shows the different types of infrastructure currently in use in Victoria.

TABLE 1.1
WHAT THE DRAFT SWRRIP AIMS TO FACILITATE

Goal	What the Draft SWRRIP Aims to Facilitate
1. Facilitate efficient markets by consolidating material streams to establish economies of scale that will attract industry investment.	› Greater consolidation of waste into individual material streams to achieve volumes that will attract industry investment. › Investment in a hub and spokes model of infrastructure.[1] › Individual material stream flows around the state to locations where they can be most economically reprocessed. › Planning that changes thinking from managing waste as sector streams to managing individual material streams.
2. Maximise the recovery of valuable resources from waste streams.	› Develop, in the next five years, solutions for managing residual waste from south east metropolitan Melbourne, Mornington, Anglesea and Bendigo that maximise recovery opportunities. › More reprocessing of organic material, and less going to landfill. › More and better quality products and feedstocks made from recovered and reprocessed materials.
3. Support the *Getting Full Value* action to facilitate the long term purpose of landfills to only receive treated residual waste.	› The managed closure of landfills with identified options that improve the outcomes for the operating councils and communities including improved economic return, reduced environmental risk and increased resource recovery. › All operational licensed landfills meeting best environmental practice requirements and are able to meet future regulatory requirements, including for closure and rehabilitation.
4. Provide industry, local government, the metropolitan and regional WMGs and other government agencies with the information and guidance to inform planning at the state, regional and local levels.	› Adequate provision of suitably located land for current and future waste and resource recovery related activities, including sites of state importance being protected by land use and transport planning schemes. › A data and knowledge collection, management and monitoring system that informs the public and private sector of waste management and resource recovery planning and investment decisions at the local, regional and state levels.

Note

1 Hubs are major facilities that process or contain significant quantities of waste, or provide specialised processing capacity for smaller quantities. Spokes are the activities (such as collecting, transferring and sorting) that move materials from waste generators to and from hubs.

TABLE 1.2
INFRASTRUCTURE TYPES, ACTIVITIES AND DEFINITIONS

Type	Activities	Characteristics
Collection infrastructure — infrastructure to collect and transfer waste materials at the point of generation		
Kerbside bins and collection*	Collection	› Collections from households of residual waste, garden organics and commingled recyclables; hard waste collections; and kerbside collection from businesses and other commercial premises. › Includes services provided by local governments and their service and commercial providers.
Skip bin*	Collection	› Large bin provided by a private contractor to collect and remove bulk waste from households, businesses, schools, commercial premises and hospitals.
Tip truck*	Collection	› Truck used to remove large amounts of mainly commercial and industrial waste.
Recovery infrastructure — infrastructure to facilitate the recovery of materials and resources		
Transfer station	Collection, consolidation, transfer	› Receives hard, organic and residual waste and commingled recyclables. › Separates waste and sends it to materials recovery facilities or processing facilities, or for disposal to landfill. › Mainly handles municipal solid waste. › Accepts local government and private collections and householder drop-offs. › Can be publicly or privately owned. › Can be combined with a resource recovery centre and may include a resale centre. › Does not undertake reprocessing activities.
Resource recovery centre	Sorting, consolidation, transfer	› Receives and/or recovers re-usable and recyclable materials that would otherwise be destined for disposal. › Can be combined with a transfer station. › May include a resale centre.
Drop-off facility	Collection, consolidation, transfer, resale	› Receives selected materials and household items dropped off by householders for recycling and reuse.
Materials recovery facility	Sorting, consolidation, transfer	› Receives and sorts household and businesses commingled recyclables. › Compacts and bales, or consolidates, materials and sends to processing facilities. › May include a resale centre.
Reprocessing infrastructure — infrastructure to recover materials and resources		
Composting facilities	Processing	A facility that biologically processes organic matter, yielding a variety of products including, stabilised organic residues for use as a soil additive, heat and renewable energy.
Waste-to-energy facilities	Processing	A facility that uses waste as a feedstock to produce a useful end product with market value, such as heat, electricity and process derived fuels; technologies can include anaerobic digestion and heat processing such as pyrolysis and gasification.
Other reprocessors	Sorting, processing	A facility that changes the physical structure and properties of a waste material that would otherwise be sent to landfill, to add financial value to the processed material; without reprocessing, the beneficial use of the material would be lost.
Disposal infrastructure — infrastructure established as the final repository of waste materials		
Landfill	Disposal to land	› A site for the disposal of waste into the ground.
Incinerators*	Disposal by burning	› A site that disposes of waste by burning it, without producing a useful end product.

Note

These definitions are not intended to replace definitions in the *Planning and Environment Act 1987* and associated planning schemes. Infrastructure outside the scope of the draft *Statewide Waste and Resource Recovery Infrastructure Plan* is marked with an asterisk (*).

Sections 5 to 7 provide more detail on the distribution and capacity of these types of waste and resource recovery infrastructure across the state.

Many facilities conduct multiple waste management and resource recovery activities and house more than one type of infrastructure. Most transfer stations in metropolitan Melbourne, for example, also carry out some form of resource recovery. Many regional landfills also undertake basic resource recovery and may include a 'tip shop' or resale centre.

Consistent with its statewide focus, the final *SWRRIP* will not include planning for waste infrastructure at the regional and local levels (such as litter infrastructure, planning for emergency events, kerbside or public place collection and transport). This infrastructure will be addressed in the *metropolitan and regional WRRIPs* and by local government planning.

The draft *SWRRIP* also includes discussion around the potential role of water and wastewater treatment facilities to exchange waste streams, and as potential sites for the co-location of waste and resource recovery facilities.

Table 1.3 shows the location and type of Victoria's 515 major items of waste and resource recovery infrastructure in each of the proposed[4] WMGs areas.

Waste and resource recovery infrastructure is unevenly spread across the state. While landfill locations are broadly consistent with regional waste generation rates and disposal needs, reprocessing infrastructure is largely concentrated in metropolitan Melbourne.

Resource recovery facilities tend to be located on transport routes and in locations where they can access feedstock in sufficient quantities and of sufficient value to ensure the margin of return on their end products is greater than the cost of transport. As an example, because it is cost effective to transport high value materials (such as metals) further, Melbourne is the reprocessing hub for metals in Victoria. Concrete and aggregate, on the other hand, have a lower margin of return, so reprocessors are more evenly distributed across the state.

4 The recent Ministerial Advisory Committee on Waste and Resource Recovery Governance Reform recommended the existing 12 regional waste management groups be reduced to six larger regional and one metropolitan waste management groups. This is discussed further in Section 1.4.

TABLE 1.3
WASTE AND RESOURCE RECOVERY INFRASTRUCTURE, BY PROPOSED WMG AREAS, AT MARCH 2013

WMG area	TS/RRC	Drop-off centres	MRFs	Reprocessors	Landfills exempt from licences	Licensed landfill	Total
Metropolitan Melbourne	38	4	7	79	0	18	146
Barwon South West	38	4	2	9	5	7	65
Gippsland	37	15	3	10	7	7	79
Goulburn Valley	31	3	0	4	0	5	43
Grampians Central West	56	6	3	8	9	5	87
Loddon Mallee	33	0	2	6	14	5	60
North East	22	1	2	5	1	4	35
Total	**255**	**33**	**19**	**121**	**36**	**51**	**515**

Source: Sustainability Victoria, *Statewide Waste and Resource Recovery Infrastructure Plan,* data set (unpublished), 2013

1.2.2 Waste

For the purpose of this document waste is categorised as:

- solid waste (which is either putrescible or inert)[5]
- prescribed industrial waste (PIW)—also known as hazardous waste—which is typically generated as part of commercial, industrial or trade activities, regulated by EPA, and needs to be managed at specialised facilities
- other waste (including waste emissions to air and water, and liquid [trade] waste.

The draft *SWRRIP* addresses solid waste only. PIW and the other wastes described above are outside the scope of *Getting Full Value*.

As shown in Table 1.4, solid waste in the past has been categorised into two groups based on where they have been generated; municipal solid waste (MSW) and solid industrial waste (SIW). SIW is further split based on source into commercial and industrial (C&I) and construction and demolition (C&D).

1.2.3 Materials

Increasingly, waste management and Victorian government policy are focused on extracting the maximum value from waste. Current thinking is moving away from seeing waste as 'something to be thrown away' and is moving instead towards seeing waste as a stream of materials that can be collected, sorted, consolidated, transported and reprocessed into saleable end products. As resource recovery technology improves, and as public and private sector investment provides the facilities, eventually a smaller and smaller fraction will remain for disposal.

This approach to waste management is already consistent with how the resource recovery industry is organised: to recover particular material streams (such as paper, glass or metal) from all generating sources.

Accordingly, *Getting Full Value* identifies the need to shift the focus of future planning about waste and resource recovery from the sector generation approach to a material stream approach.

Table 1.5 shows the major material streams included in the draft *SWRRIP* analysis and the sectors that mainly generate them.

The shift away from a generating sector approach to waste and resource recovery is central to increasing the aggregation of material streams to achieve the economies of scale needed to support investment in viable reprocessing facilities. It will take some time, however, to change data collection and management practices to focus on material streams. The draft *SWRRIP* therefore considers waste streams by generating sectors and by material stream.

Although difficulties classifying and tracking the management and disposal of clean fill put it outside the scope of the final *SWRRIP*, both clean fill and hazardous waste have been included in the draft *SWRRIP* modelling[6] as both having an impact on available landfill airspace and filling schedules.

5 Putrescible waste readily decomposes, inert waste does not.

6 More information on the modelling can be found in Section 1.8.

TABLE 1.4
MAIN WASTE GENERATORS, BY TYPE OF WASTE

Type		Waste Generated By:
MSW		› Households, including hard waste, recyclables, organics and residual waste (which is also known as garbage). › Local government activities, such as emptying litter bins, sweeping streets and maintaining parks, as well as municipal C&D work.
SIW	C&I	› Food, beverage and tobacco enterprises; food retailers; accommodation providers, cafes and restaurants; property and business service enterprises; public sector agencies; education institutions, manufacturers and industry.
	C&D	› Residential, civil and commercial C&D enterprises.

TABLE 1.5
MAJOR MATERIAL STREAMS AND SECTORS

Material		Predominant Generating Sectors
Organics	Food waste	MSW, C&I
	Garden organics	MSW, C&I
	Wood/timber	C&I, C&D
	Textiles	MSW, C&I
	Other organics[1]	C&I
Commingled recyclables	Paper/cardboard	MSW, C&I
	Glass	MSW
	Plastics (codes 1–3)[2]	MSW, C&I, C&D
	Other plastics	C&I, C&D
Tyres		C&I
Metals		MSW, C&I, C&D
Concrete/bricks/asphalt		C&D,
Other (including electrical and electronic waste, household goods, materials from office refurbishments, plasterboard)		MSW, C&I, C&D

Notes

1 Includes agricultural waste.

2 Does not include flexible plastics.

1.3 Who's who

1.3.1 Waste and resource recovery governance

In early 2013 the Victorian Government established the MAC, on request of the Minister for Environment and Climate Change (Minister), the Hon. Ryan Smith MP, to consult with the sector and provide recommendations on the institutional and governance arrangements to best deliver on the objectives of *Getting Full Value*.

Following the release of the MAC recommendations the Minister has announced a number of institutional changes. The full report detailing the Victorian Governments response, released in July 2013, can be found at www.depi.vic.gov.au/environment-and-wildlife/sustainability/waste-management-and-resource-recovery.

The major recommendations relating to the development and delivery of the *SWRRIP* are as follows.

- SV will have the responsibility to develop the *SWRRIP* which will be a statutory plan.
- The *SWRRIP* will provide a clear framework for the planning of Victoria's waste system, and facilitate integration and alignment of regional and metropolitan plans
- The twelve RWMGs will be amalgamated into six RWMGs and one Metropolitan WMG and established as statutory bodies under the Environment Protection Act 1970 (EP Act).
- The metropolitan and regional WMGs will be responsible for planning for all waste streams, including C&D and C&I, consistent with the *SWRRIP*.
- The proposed metropolitan and regional WMGs will develop WRRIPs that will:
  - be guided by and be consistent with the directions in the draft *SWRRIP*
  - each include a Draft Infrastructure Schedule (including a landfill schedule)
  - include cross regional boundary planning
  - be referenced in Victoria Planning Provisions clause 19.03-5 Waste and Resource Recovery (these plans must then be considered where relevant in all planning decisions relating to the use and development of land).
  - be developed through an integration process with SV to ensure that infrastructure schedules are coordinated and integrated with statewide objectives and regional needs.

The Victorian Government will work closely with local government, industry and across state government to implement these actions. A transition process will be developed which will include the drafting of the required legislative changes. This process has yet to be fully defined and the relevant components will be detailed in the interim *SWRRIP*.

The draft *SWRRIP* will play an important role in the transition process. The proposed WMG areas have been used in the draft *SWRRIP* analysis to set the framework for developing the *metropolitan and regional WRRIPs*. These will be developed over the next three years.

1.3.2 Waste and resource recovery system stakeholders

The *SWRRIP* aims to influence planning and decision making by influencing the diverse range of stakeholders in Victoria's waste and resource recovery system. Table 1.6 shows the current role of the major stakeholders.

TABLE 1.6
WASTE AND RESOURCE RECOVERY SYSTEM DECISION MAKERS

Stakeholder	What They Do:
Department of Environment and Primary Industries (DEPI)[1]	› Provides policy planning, leadership, coordination and oversight of the environment portfolio. › Works with other government departments (particularly the Department of Transport, Planning and Local Infrastructure; the Department of Health; and the Department of State Development, Business and Innovation) to maximise investment and employment opportunities, and to address the environmental and public health problems that waste poses.
Environment Protection Authority Victoria (EPA)[1]	› Controls pollution by setting and enforcing environmental standards for business and industry to achieve clean air, healthy water, safe land and minimal disturbance by noise and odour.
Sustainability Victoria (SV)[1]	› Develops and implements strategies and programs to promote and facilitate the sustainable use of resources.
Metropolitan Waste Management Group[1]	› Plans for Melbourne's waste and resource recovery infrastructure including landfills. › Coordinates and facilitates procurement by metropolitan local governments of waste management and resource recovery services. › Coordinates and supports community education. › Helps local governments to reduce waste, maximise resource recovery and reduce environmental harm.
Regional waste management groups[1]	› Plan and coordinate the management of MSW for local governments within non-metropolitan waste management areas. › Coordinate and support community education. › Help local governments to reduce waste, maximise resource recovery and reduce environmental harm.
Local governments	› Provide—either directly or through contractors—waste and recycling collections, transport, reprocessing and/or disposal to landfill services for their communities. › Educate their communities not to litter. › Undertake strategic land use planning and assess development applications (including applications for waste and resource recovery facilities) under their planning schemes.
The waste and resource recovery industry	› Provide collection, transport, sorting and processing, trading and exporting, disposal and resource recovery infrastructure and services.
Businesses, industry and government	› Generate waste and recyclables as a consequence of providing goods and services.
Manufacturers	› Produce recyclables and residual waste, and use waste materials as raw inputs to manufacturing processes.
Federal Government	› Prepares and coordinates the *National Waste Policy*.

Note

1 These agencies comprise the environment portfolio. There will be some changes in roles based on the Ministerial Advisory Committee findings which will be documented in the final Statewide Waste and Resource Recovery Infrastructure Plan.

1.3.3 Waste management groups

Currently there are 13 geographically based WMGs in Victoria. The MAC recommended that the current WMGs be amalgamated to establish six large RWMGs and one Metropolitan WMG. The transition will occur after the appropriate legislative changes. Table 1.7 shows details on the proposed WMGs.

Figure 1.1 shows the proposed WMG areas. The local government areas contained within each proposed WMG area and maps of each WMG area can be found in section 9.

The WMGs are statutory body established under the *EP Act*. Table 1.8 shows their current roles and future roles proposed by the government based on the recommendations of the MAC and following the appropriate legislative changes.

TABLE 1.7
PROPOSED AND CURRENT WASTE MANAGEMENT GROUPS

Proposed WMGs	Current WMGs
Metropolitan WMG	Metropolitan WMG
	Mornington Peninsula RWMG
Barwon South West RWMG	Barwon RWMG
	South West RWMG
Gippsland RWMG	Gippsland RWMG
Goulburn Valley RWMG	Goulburn Valley RWMG
Grampians Central West RWMG	Desert Fringe RWMG
	Highlands RWMG
	Grampians RWMG
Loddon Mallee RWMG	Calder RWMG
	Central Murray RWMG
	Mildura RWMG
North East RWMG	North East RWMG

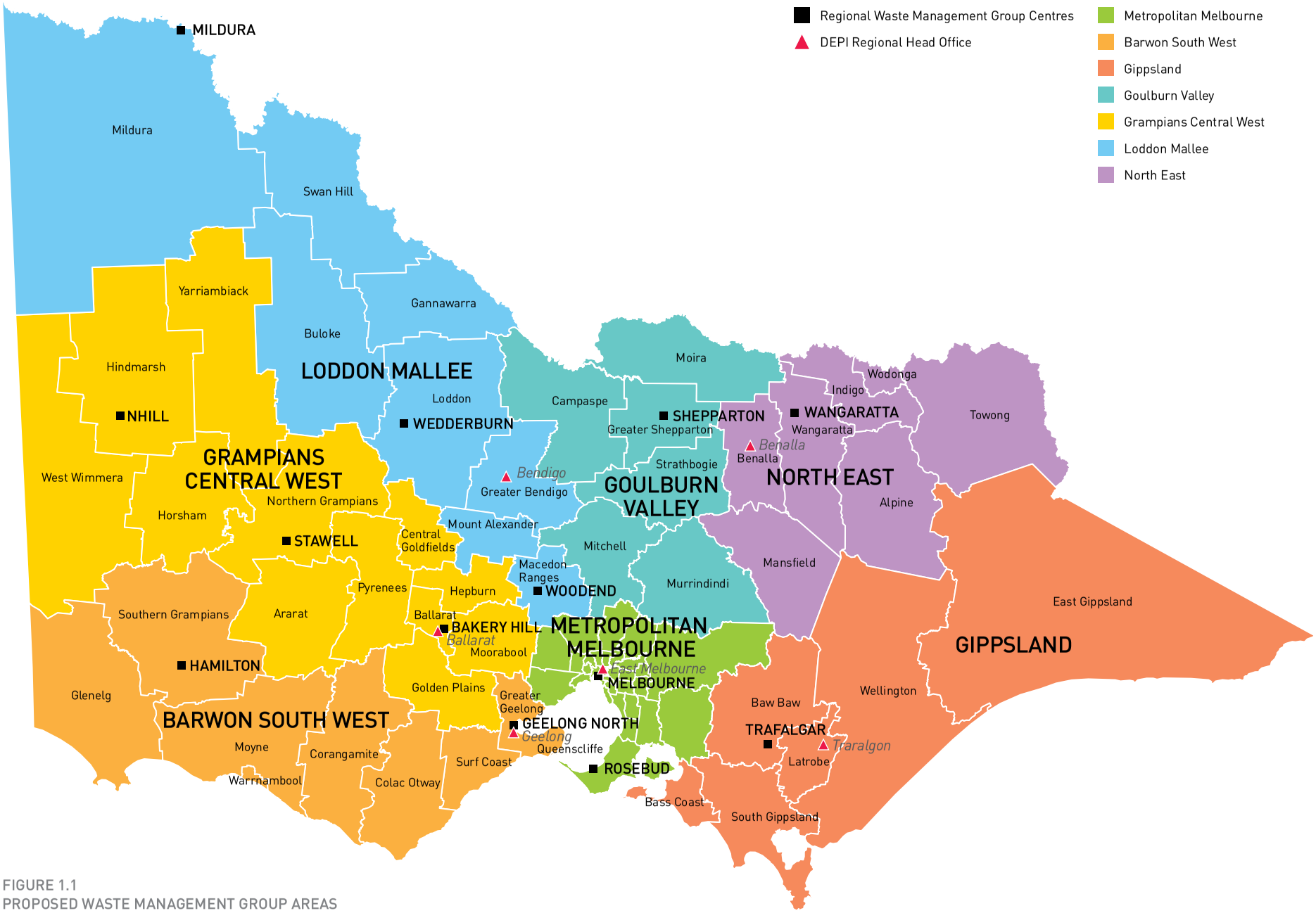


FIGURE 1.1
PROPOSED WASTE MANAGEMENT GROUP AREAS

TABLE 1.8
ROLES OF THE WASTE MANAGEMENT GROUPS

	Current Role	Future Role (as recommended by the MAC)[1]
Metropolitan Waste Management Group	Represents 30 councils to help them procure multi-council regional waste services. To do this, it must work with metropolitan councils, SV, EPA, industry, businesses and the community. Supports the Metropolitan Waste Management Forum and: › coordinates and facilitates procurement by metropolitan local governments of waste management and resource recovery services. › researches municipal waste management and resource efficiency › advises councils on municipal waste and resource efficiency best practice › promotes improved waste management and resource efficiency technologies › supports community education › plans municipal waste management infrastructure and metropolitan landfills. Develops the *Metropolitan Waste and Resource Recovery Strategic Plan*, required to be consistent with the *Solid Industrial Waste Management Plan.*	WMGs will be responsible for: › planning for all waste streams, including C&D and C&I, consistent with the statewide strategies developed by SV › developing *WRRIPs*, for integration in the *SWRRIP* › procurement facilitation on behalf of member councils › regionally tailored waste education and behaviour change, under the umbrella of SVs statewide coordination and oversight role › delivering specific projects as funded by SV or other organisations.
Regional Waste Management Groups	RWMGs, in partnership with their constituent local council plan for the management of municipal waste in their area. They develop and update a *Regional Waste Management Plan*, to be approved by EPA every five years. They are also required to submit a three year business plan, to be consistent with SVs business plan. Other RWMG duties include: › coordination of local activities that give effect to state policies and strategies that relate to waste, such as Towards Zero Waste *(TZW)* › fostering best practice in waste management › promoting and coordinating community education › providing local government perspectives on resource recovery in regional Victoria.	

Note

1 Victorian Government, *Report of the Ministerial Advisory Committee on Waste and Resource Recovery Governance Reform*, May 2013

1.4 Other waste management and resource recovery plans

1.4.1 Metropolitan and regional waste and resource recovery plans

The Metropolitan WMG is currently responsible under the *EP Act* for developing the *Metropolitan Waste and Resource Recovery Strategic Plan*. The plan informs metropolitan local governments and the waste industry about the strategic direction for future MSW, C&I and C&D management in Melbourne until 2030.

The current strategic plan was approved in 2009. Victorian Planning Provisions were amended in 2010 to require planning and responsible authorities to consider the strategic plan when making land use planning decisions.

The Metropolitan WMG is now developing the draft *Metropolitan Waste and Resource Recovery Strategic Plan* to meet their current statutory requirements. This will be released for consultation at the same time as the draft *SWRRIP*. It is expected that the will be finished under the current legislative arrangements. There will then be a transition of this plan to the new legislative arrangements.

RWMGs are currently responsible for the development and implementation of *regional waste management plans* as required under the *EP Act*. *Regional WMPs* provide strategic direction for waste policy in their area, as well as a regional landfill schedule. Many *regional waste management plans* are out of date.

The governance arrangements proposed in the response to the MAC recommendations will result in a change in the format and focus of waste and resource recovery planning. It notes that *WRRIPs* reflecting the broad direction of the *SWRRIP* would be developed for the metropolitan and regional WMG areas.

The government's response provided high level detail as discussed in Section 1.4.1. Further works to determine the legislative requirements, process and appropriate responsibilities is underway as part of the transition process to the new governance arrangements.

1.4.2 Solid industrial waste management plan

Under the *EP Act*, SV is required to prepare and submit to EPA a draft *Solid Industrial Waste Management Plan* that includes SVs objectives and priorities to manage SIW generated or disposed of in Victoria.

In July 2013, SV received direction from the Minister to develop the *SWRRIP* in place of the *Solid Industrial Waste Management Plan*.

1.5 Legislative context

1.5.1 Environment Protection Act 1970

Victoria's approach to waste management, environment protection and environmental management systems and practices is underpinned by the provisions of the *EP Act*. The *EP Act* includes statutory powers, instruments and measures to:

- manage environmental quality
- establish environmental standards and criteria
- regulate emissions, discharges and wastes
- prevent and clean up pollution
- impose and enforce environmental requirements.

1.5.2 Planning and Environment Act 1987

Planning is important for waste management: it identifies the location of existing and planned facilities, so they can be considered in all aspects of metropolitan and regional planning, and so that buffers around waste and resource recovery facilities can be defined, protected and maintained. Planning also aims to ensure that new sites and facilities safely and sustainably manage waste and maximise the opportunity for resource recovery, energy generation and marketable end products.

The *Planning and Environment Act 1987* sets out the objectives of planning in Victoria, which appear at the front of all planning schemes. The objectives relevant to waste management and resource recovery are to:

- provide for the fair, orderly, economic and sustainable use and development of land
- provide for the protection of natural and man-made resources and the maintenance of ecological processes and genetic diversity
- secure a pleasant, efficient and safe working, living and recreational environment for all Victorians and visitors to Victoria
- protect public utilities and other assets and enable the orderly provision and coordination of public utilities and other facilities for the benefit of the community
- facilitate development in accordance with the objectives set out in the points above
- balance the present and future interests of all Victorians.

The *Victorian State Planning Policy Framework* seeks to ensure that all responsible authorities work to achieve the objectives of the *Planning and Environment Act 1987*. Among other things, the framework requires authorities to integrate the range of policies relevant to the issue to be determined, and balance conflicting objectives, in favour of net community benefit and sustainable development for the benefit of present and future generations.

The framework also requires municipal planning authorities to identify potential regional impacts when making decisions, and to coordinate strategic planning with their neighbours and other public bodies to achieve sustainable development and effective and efficient use of resources.

The framework sets the objective for waste and resource recovery as, 'to avoid, minimise and generate less waste to reduce damage to the environment caused by waste, pollution, land degradation and unsustainable waste practices.'

The Victorian Planning Provisions, established under the *Planning and Environment Act 1987*, reference all buffers across the state. Establishing buffers and separation distances around waste and resource recovery facilities is the key planning tool for managing the impacts of these facilities. Authorities also use buffers and separation distances to manage other land uses that could encroach on waste and resource recovery facilities.

1.5.3 Transport Integration Act 2010

The *Transport Integration Act 2010* creates a framework for the provision of an integrated and sustainable transport system that contributes to an inclusive, prosperous and environmentally responsible state.

The *Transport Integration Act 2010* requires a planning authority (under the *Planning and Environment Act 1987*) to have regard for the vision, objectives and principles of the *Transport Integration Act 2010* when making a waste and resource recovery planning decision that is likely to have a significant impact on the transport system. Under the *Transport Integration Act 2010*, the Department of Transport, Planning and Local Infrastructure must prepare and periodically revise the *Victorian Transport Plan*, and local governments may also prepare transport plans.

1.5.4 Local Government Act 1989

The *Local Government Act 1989* establishes the powers and functions of local governments in Victoria. It states the primary objective of a council is to endeavour to achieve the best outcome for the local community. A council must ensure the most efficient and effective use of resources, and ensure that it provides services in accordance with best value principles. These principles must guide local waste and resource recovery services, as well as any decision to opt into collective infrastructure procurement.

Under the *Local Government Act 1989*, a council can pass local laws that reinforce land use planning and municipal waste and resource recovery strategies.

1.6 Policy context

1.6.1 Getting Full Value: the Victorian Waste and Resource Recovery Policy

In April 2013, the Victorian Government released its new waste policy, *Getting Full Value*. This policy replaced the former waste strategy, *TZW*. Unlike the former strategy, *Getting Full Value* recognises that managing waste and resource recovery together will maximise potential benefits for Victoria's communities, economy and environment.

Getting Full Value's vision

'Victoria has an integrated, statewide waste management and resource recovery system that provides an essential community service by protecting the environment and public health, maximising the productive value of resources, and minimising long term costs to households, industry and government.'

Getting Full Value recognises that an effective waste and resource recovery system needs investment in infrastructure to extract the maximum value from waste produced by our growing population, economy and industries. It sees market demand as a key determinant of Victoria's mix of infrastructure over the next 30 years.

Getting Full Value sets out six goals.

- Assist Victorians to reduce the waste they generate and save Victorian's money through efficient use of resources.
- Facilitate strong markets for recovered resources.
- Facilitate a Victorian waste and resource recovery system that maximises the economic value of waste.
- Reduce the environmental and public health risks of waste.
- Reduce illegal dumping and littering.
- Reform and strengthen the way institutions work and are governed to effectively implement waste policy.

Each goal in *Getting Full Value* has strategic directions, and each strategic direction has actions.

Table 1.9 shows the *Getting Full Value* goals and strategic directions that the *SWRRIP* will specifically address.

The *SWRRIP* implements Action 6.1.1 of *Getting Full Value*.

'Prepare a statewide waste and resource recovery infrastructure plan with a 30 year outlook, that is reviewed every five years.'

Getting Full Value requires the *SWRRIP* to include the following information.

- A comprehensive audit of existing infrastructure across the state, including current and future capacity, and current environmental performance.
- An analysis of current and projected waste volumes, mixes and origin-to-destination flows, and to identify likely 'regional waste catchments', based on the analysis and also informed by demographic and economic data.
- An assessment of the potential for, and opportunities from, co-locating new waste and resource recovery infrastructure with similar activities (such as waste water treatment and other industrial precincts).
- An identification of residential and industrial growth land use areas.
- Transport considerations (such as strategic freight corridors and logistics hubs).
- Statewide guidance on issues, risks and infrastructure gaps.

Although the draft *SWRRIP* goes a long way towards meeting the requirements of *Getting Full Value*, it does not address the following information.

- A comprehensive audit of existing infrastructure across the state, and an evaluation of current environmental performance.
- An assessment of the potential for, and opportunities from, co-locating new waste management and resource recovery infrastructure with similar activities (such as waste water treatment and relevant industrial processes).

To address these requirements, further research and data collection is needed. The interim *SWRRIP* therefore may not satisfy these requirements, but it will detail the process necessary to address research and data collection gaps so that future versions of the *SWRRIP* do meet these requirements.

1.6.2 Environmental Partnerships

In 2012, the Victorian Government established Environmental Partnerships, to bring governments, communities and businesses together to maintain a healthy environment. Environmental Partnerships aim to:

- value the environment and what it has to offer
- protect, conserve and maintain the environment
- enjoy the wide range of benefits of a healthy environment now and into the future.

Three of the eight Environmental Partnerships priorities relate to *Getting Full Value* and aim to:

- reduce pollution and improve waste management
- drive best practice environmental regulation and innovative market approaches
- ensure accountable and efficient environment agencies.

1.6.3 Securing Victoria's Economy: Planning, Building, Delivering

In December 2012, the Victorian Government released *Securing Victoria's Economy: Planning, Building, Delivering*. This economic strategy recognises the costs, and the benefits, of waste management to the Victorian economy. Section 4.4 Private Sector Investment and Employment identifies the need to, 'implement a new *Victorian Waste and Resource Recovery Policy* to reduce red tape and facilitate efficient allocation of waste between recycling facilities and landfill. This new approach will support job creation in the waste management industry while reducing costs associated with waste disposal.'

The draft *SWRRIP* identifies infrastructure needed to consolidate material streams in sufficient quantities and quality to support viable reprocessing industries. It also provides industry with information that may inform investment, boost innovation and create jobs.

TABLE 1.9
GETTING FULL VALUE GOALS AND STRATEGIC DIRECTIONS ADDRESSED BY THE SWRRIP

Goal	Strategic Directions
Facilitate strong markets for recovered resources.	5.1 Develop the right conditions for resource recovery markets to grow and mature in Victoria.
Facilitate a Victorian waste management and resource recovery system that maximises the economic value of waste.	6.1 Undertake planning that promotes a cost effective, statewide network of infrastructure capable of moving waste materials to where the highest economic value can be achieved. 6.2 Align waste and resource recovery planning and delivery with land use and transport requirements under the *Planning and Environment Act 1987* and *Transport Integration Act 2010*. 6.2 Foster investment in a diversified portfolio of infrastructure that can manage the projected mix and volumes of waste materials.
Reduce the environmental and public health risks of waste.	7.2 Prioritise actions that minimise the short and long term environmental impacts of organic waste. 7.3 Facilitate the long term purpose of landfills to be for receiving and treating residual waste, and ensure a range of support mechanisms for closed landfills.

1.6.4 Metropolitan Planning Strategy

The Victorian Government is currently consulting about the *Metropolitan Planning Strategy* for Melbourne. The strategy will be released in late 2013 and will guide Melbourne's planning over the next 30 to 40 years. Principle 5 of the strategy consultation paper was environmental resilience, which noted that Melbourne will need to use resources more efficiently and produce less waste.

1.6.5 Victorian Freight and Logistics Plan

The Victorian Freight and Logistics Plan examines long term freight forecasts up to 2050 and uses these to model freight network scenarios that can inform decision making about future projects. The plan will address transport logistics for waste and resource recovery, and particularly how improved networks can lower the cost of waste transport. Minimising transport costs is essential because material recovery is often a marginal, even unviable, business proposition and lower transport costs will increase and stabilise markets.

1.6.6 Conserve, Invest and Save

The Victorian Government's Conserve, Invest and Save package aims to conserve our valuable resources, invest in the state's environmental future and save money for all Victorians. Programs under the package aim to maximise the value of resources and help create new and sustainable employment across the state. Programs support investment in new recycling and waste processing infrastructure, the development of new and expanded markets for recycled products, and Victorian households and businesses to make smarter use of resources.

1.6.7 Victorian Litter Strategy

The *Victorian Litter Strategy 2012–14* outlines the Victorian Government's response to reduce the problem of littering throughout the state. SV led the development of the strategy in partnership with the Victorian Litter Action Alliance.

1.6.8 National Waste Policy: Less Waste and More Resources

The *National Waste Policy: Less Waste and More Resources* is a collaborative approach to managing waste across Australia. The policy, agreed to by all Australian environment ministers in November 2009, and endorsed by the Council of Australian Governments, sets Australia's waste management and resource recovery direction to 2020.

1.7 Data and modelling considerations

The final *SWRRIP* will be based on data from a variety of sources. Data sources are referenced throughout the draft *SWRRIP* where appropriate. Table 1.10 shows the major data sources.

Most data in this draft *SWRRIP* is rounded, for ease of reading. This may result in minor discrepancies between totals and line items. Non-rounded data has been used to generate graphs and charts, and for modelling. Any exceptions are referenced.

Accuracy of information and data depends on the source. SV has verified information and data where possible, but all data should be considered as indicative only and has been provided as a guide or estimate of true values, unless otherwise stated.

Much of the data has been collected from industry sources and cannot be attributed to a region. Where the analysis calls for regional data, SV calculated estimates using a combination of state totals, landfill audit compositions and Australian Bureau of Statistics population figures. Such estimates may conflict with actual figures and should only be used as a guide.

The availability of data is not evenly spread across the state, or available for all material streams. For example, there is more data for municipal organics—as it is collected, measured and reported by local governments—than for C&I organics (for which there is no formal data collection and reporting system). There is also some disparity between data available from metropolitan Melbourne and for regional Victoria.

We know there is scope to improve our understanding of material flows and recovery volumes, to form a clearer picture of waste management in Victoria. The process of developing this draft *SWRRIP* has highlighted gaps in waste infrastructure planning data, which the Victorian Government intends to improve on as part of *Getting Full Value*.

TABLE 1.10
DRAFT SWRRIP DATA SOURCES

Date Source	What It Is, and Comments
SVs *Victorian Local Government Annual Survey (VLGAS)*	› Annual data on materials collected through local government kerbside collection systems and published by SV. All 79 local governments in Victoria participate. The survey provides trending data on recyclables, organics, residual waste, hard waste and litter. › The draft *SWRRIP* uses survey data from 2010–11, which was unpublished at the time the draft *SWRRIP* was finalised. › SV publishes *VLGAS* on its website under 'Local Governments Data Collection'.
SVs *Victorian Recycling Industry Annual Survey (VRIAS)*	› An annual data collection measuring tonnages of materials diverted from landfill by major reprocessors in Victoria. › Used to measure progress against Victorian waste reduction targets, and trends in the recovery of waste materials. › The survey is voluntary and although the return rate is relatively constant, contributors can vary from year to year. › SV publishes *VRIAS* on its website under 'Annual Collection of Victorian Recycling Industries'. › There may be small disparities between the figures in the draft *SWRRIP* and other published data and caution is advised when comparing data.
EPAs landfill levy returns	› Unpublished (commercial-in-confidence) information provided by EPA Victoria.
Australian Bureau of Statistics (ABS) population data	› ABS *Catalogue Number 3101 – Australian Demographic Statistics, March 2012*.
SVs Victorian landfill audits	› SVs disposal-based waste survey, 2009. › A visual waste audit of eight metropolitan landfills, one regional landfill and one transfer station, covering 2,003 separate inbound loads.
EPA *Rural Landfill Risk Assessment 2013*	› Unpublished report provided by EPA Victoria.
SVs *Regional Waste and Resource Recovery Projection Model 2013*	› Modelling of trends in population growth, economic activity, waste generation and growth of resource recovery markets to project future waste generation and resource recovery trends. › Sources for the model are EPA landfill levy returns, *VRIAS* 2010–11, SVs disposal-based waste surveys for 2005 and 2009 and ABS population data. More information about the design and assumptions underpinning the model are in Appendix 8.1.
Mapping data	› SV 2013.
Metropolitan Landfill Schedule	› Part 3 of the 2009 *Metropolitan Waste and Resource Recovery Strategic Plan* › The plan schedules the location and sequence for filling and operating landfill sites in metropolitan Melbourne. › In 2010, the Victorian Planning Provisions were amended to require planning and responsible authorities to consider the *Metro WRRSP*, and the Metropolitan Landfill Schedule, when making land use planning decisions.

1.8 Consultation

To ensure the interim *SWRRIP* meets the needs and expectations of the waste and resource recovery sector we have developed this consultation paper to inform the development of the final document. We now need your feedback.

We need to know:

- Does the draft *SWRRIP* provide a true representation of the existing waste and resource recovery systems in your area?
  - If not, what is missing and needs to be included?
- Does the information provided in the draft *SWRRIP* provide sufficient information to inform your decision making process?
  - If not, what further information do you need?
- Does the draft *SWRRIP* provide sufficient clarity on government priorities and direction?
  - If not, what do you need?
- Does the draft *SWRRIP* articulate opportunities for investment in a future integrated waste and resource recovery system?
  - If not what should be included?
  - Are there emerging opportunities/ issues we have missed?
- Is the draft *SWRRIP* a useful document?
  - What can be done to make it more user friendly?

Consultation is an essential part of the process to develop the final *SWRRIP*. This draft *SWRRIP* is Victoria's first effort to bring together the information required to plan for waste management and resource recovery infrastructure for the next 30 years. The input of stakeholders is essential to ensure the interim and final *SWRRIP* is relevant to industry, local government and the community and that it will assist industry and all levels of government with their waste and recovery planning into the future.

To assist this ongoing consultation process, SV will be conducting a series of regional and metropolitan workshops and engagement sessions to provide opportunities for feedback. Further information on these sessions and how to lodge written submissions can be found at www.sustainability.vic.gov.au/www/html/3694-statewide-waste-and-resource-recovery-infrastructure-plan.asp?intSiteID=4

1.9 Implementation

As the draft *SWRRIP* is the first *SWRRIP* to be developed, there is, as yet, no blueprint to implementation. Implementation arrangements will be developed as part of the transition process to the new governance arrangements.

The interim *SWRRIP* will include an implementation section detailing roles, responsibilities, actions and timeframes for activities necessary to achieve the plan's objectives. This section will be in line with the statutory powers of the relevant agencies that will carry it out, as well as legislation identified in the *SWRRIP* and any other applicable legislation (such as the *Commonwealth Competition and Consumer Act 2010*).

In the meantime, the draft *SWRRIP* identifies priority actions for government, required in the next five years, to meet the goals of the *SWRRIP*. These priority actions are detailed in Section 3. The *SWRRIP* also begins the process to identify issues and considerations required to be addressed in the development of the *WRRIPs*. The feedback from the *SWRRIP* consultation process will assist SV and the WMGs in the development of these plans.

However, as Table 1.11 shows, some actions are already underway or planned that will contribute to those draft *SWRRIP* outcomes.

TABLE 1.11
CURRENT ACTIONS THAT CONTRIBUTE TO THE DRAFT SWRRIP OUTCOMES

Current Actions Planned or Underway	Responsible Agency
Metropolitan Waste and Resource Recovery Strategic Plan	Metropolitan WMG
North West Metropolitan Melbourne Organics Orocurement	Metropolitan WMG
South East Metropolitan Melbourne Organics Orocurement	Metropolitan WMG
Cross Portfolio Data Working Group: portfolio approach to collecting, storing, analysing, modelling and reporting data	(DEPI [as lead agency], SV, EPA, Metropolitan WMG)
Conserve, Invest and Save strategy projects: › Driving Investment for New Recycling › Resource Recovery Infrastructure › Building Victoria's Organics Recovery	SV
SV 2015 projects: › Increased C&I separation and recycling (Smarter Resources Smarter Buisness) › Transfer station upgrades › Household chemical recycling program (Detox your Home) › Statewide Organics Strategy › Statewide Market Development Strategy › Get it Right on Bin Night initiative	SV
Transitional funding support to local councils with landfills scheduled for closure (based on need)	SV, EPA
Guidelines for the assessment and regulation of energy from waste	EPA
VRIAS	SV
VLGAS	SV
Getting Full Value actions including: › 6.2.3 Ensure precinct plans developed by planning authorities, including the Growth Areas Authority and local government, provide sufficient waste and resource recovery infrastructure. › 6.2.4 Ensure ongoing reviews and amendments to the State Planning Policy Framework, Victoria Planning Provisions and planning schemes appropriately reference and facilitate waste and resource recovery infrastructure requirements.	Metropolitan WMG, DEPI DEPI
Working with appropriate agencies to protect separation distances of current sites and facilities from encroachment by unsuitable uses (such as residential development), including investigating options to ensure appropriate residential design and siting that protects communities.	DEPI

2. Key opportunities

Sustainability victoria
State Government Victoria

Many of the opportunities described in this section are for local government and industry. They focus on how to support the goals of *Getting Full Value: the Victorian Waste and Resource Recovery Policy (Getting Full Value)* by developing and facilitating an integrated waste and resource recovery infrastructure system based on market based solutions.

Attracting industry to invest in the most appropriate facilities and infrastructure requires certain conditions. The most critical condition is access to sufficient volumes and qualities of materials to support viable reprocessing options. *The Statewide Waste and Resource Recovery Infrastructure Plan* (*SWRRIP*) will play a key role in this by:

- encouraging planning to develop a hubs and spokes model of infrastructure that will establish economies of scale for individual material streams
- reiterating the importance of improving source separation and sorting capability to reduce contamination and produce recovered material streams that are attractive to reprocessors
- encouraging joint procurement processes, particularly between local councils for collection and recovery of material streams from the municipal sector.

Advancements in technology will also play a large role in providing solutions particularly improving sorting capability and treatment options. An overview of current and emerging technologies for the management of organic waste can be found in Appendix 8.4.

2.1 Develop markets for products made from recycled materials

Increasing the amount of resources recovered from waste requires market demand for products made from recovered resources. Without this demand, recovery industries will not be viable. *Getting Full Value* Goal 5: Strong markets for recovered resources, recognises the importance of this.

There are major opportunities to support markets by:

- using the data and information in the draft *SWRRIP* to guide investment decisions by industry and local governments (the *SWRRIP* will be revised every five years but the data on which it is based will be reviewed and made available, where possible, each year)
- supporting industry to reduce the level of contamination by improving source separation capacity through investment in infrastructure and education campaigns with generators
- encouraging best practice management of recovery infrastructure and facilities.

2.2 Improve waste consolidation through municipal procurements

Local governments collect and manage a substantial percentage of Victoria's waste. There is an important opportunity to consolidate waste into individual material streams, to achieve volumes that attract industry investment in resource recovery infrastructure. Mechanisms to achieve this include:

- collective procurement facilitated by waste management groups (WMG) with neighbouring local governments, or other local governments along major transport routes, to consolidate waste (which infrastructure operators might further supplement with waste from other sources, to increase volumes)
- resource recovery clauses in contracts for landfill services (for example, requiring landfill operators to pre-sort materials before disposal), which would also support the *Getting Full Value* action to facilitate the long term purpose of landfills to only receive treated residual waste)
- requirements in contracts for education campaigns to improve sorting and reduce contamination levels.

Mechanisms such as these not only reduce waste going to landfill, but improve services to communities and reduce risks to local governments by attracting industry interest in providing services. However, implementing mechanisms such as these will rely on local governments to refine their approach to procuring services.

2.3 Protect suitable land for waste and resource recovery activities

Getting Full Value is based on a hubs and spokes model of infrastructure that facilitates the consolidation of individual materials to volumes that attract industry investment.

Ultimately, industry investment decisions determine the location of hubs. An important consideration in attracting industry investment is surety that the site will remain available over the term of the investment. Poor planning decisions in the past have allowed the co-location of incompatible activities adjoining sites, within buffers or closely located to waste and resource recovery activities.

However, a balance is required between providing surety to industry and meeting expectations around the land use activities that do not impact on the amenity of the community. Long term planning that incorporates the requirements to supply suitable long term sites for waste and resource recovery activities will contribute towards achieving this.

The identification of these hubs of state importance in the draft *SWRRIP* highlights the need for planning at the local and regional level and the following should be considered.

- The costs and benefits to local communities and industries of keeping these sites as part of the waste management and resource recovery system.
- The alternative management requirements for materials currently going to these sites, if they were no longer available or had reduced functionality for waste management and resource recovery activities.
- Whether it is appropriate to preserve in planning schemes the buffers and ability to use these sites for waste and resource recovery activities in the long term.
- Community expectations around the future activities on these sites.

There is a major opportunity to preserve land for future waste and resource recovery activities, by identifying sites of importance. Often, these sites have existing buffers, transport links and supply spokes that support future activities. However, preserving the land usually involves ensuring that new, incompatible land uses do not encroach on it.

Preserving these sites for waste and resource activities does not mean that activities on these sites do not change. For example, landfills that have either been closed or are scheduled for closure can transition to other resource recovery activities, including transfer stations and resource recovery centres (TS/RRCs). This continues the provision of services to the community and improves recovery options.

The draft *SWRRIP* identifies hubs of state importance, using the criteria in Table 2.1.

Hubs and Spokes

HUB The concentration of reprocessing facilities where there are sufficient quantities of waste derived feedstocks to support viable reprocessing options. The location of hubs will vary for individual material streams.

SPOKES the sequence of activities that move materials from waste generators to (and from) hubs, for example, for collection, transport and sorting.

The length of the spoke and hence the location of the hub for a particular material stream is influenced by the impact of transport on the margin of return for that particular material stream.

TABLE 2.1
HUBS OF STATE IMPORTANCE CRITERIA

Criteria
The site manages or processes a significant proportion of one or more material streams for the state or region.
The type of materials managed or reprocessed at the site are of high economic value, or pose a significant risk to the environment and community if not recovered.
Activities at the site require significant buffers, which could be affected by other land uses threatening current or future activities.
The site is an existing hub with established spokes for one or more materials. If the site closed, it would put pressure on the viability of waste generating industries.
The site is close to the generator, market, port or transport infrastructure.
The site is in a location compatible with waste management and resource recovery activities, and has capacity for future waste management and resource recovery activities.

Using these criteria the draft *SWRRIP* analysis identified a number of hubs listed in Table 2.2. If the ability to undertake waste and resource recovery activities on these sites was restricted, it would be more difficult to manage the state's waste management and resource recovery system and to meet the objectives of *Getting Full Value*.

Some of these sites will need, in the longer term, to transition away from landfill towards resource recovery activities. This transition must occur in partnership with local communities, who are often concerned about past landfilling and poor management practices, and may expect that the land use will change from waste management and resource recovery. Part of this transition will be a discussion with local communities about the advantages of having access to well located sites for waste and resource recovery.

The draft *SWRRIP* consultation process will initiate the discussion required to plan for the future activities at these sites. The *metropolitan and regional waste and resource recovery implementation plans* will need to include provision for the future planning of the sites in their WMG areas. Additional site of local importance may be identified in the development of the *WRRIPS*.

Identification of these sites also informs land use and transport planning at the state level. This will be addressed through implementing *Getting Full Value* Action 6.2: Align waste and resource recovery planning and delivery with land use and transport requirements under the *Planning and Environment Act 1987* and *Transport Integration Act 2010*.

TABLE 2.2
HUBS OF STATE IMPORTANCE

WMG Area and Location	Why it is important to the state system?
Metropolitan Melbourne	
The Brooklyn precinct	› This precinct is a significant existing hub for metals and construction and demolition (C&D) reprocessing for the state. With well established spokes, it reprocesses around 40% of the state's metals and more than one million tonnes of C&D waste a year. › Due to its location in the metropolitan area, the closed landfills at the site should remain available for suitable waste and resource recovery activities. Pressure from residential encroachment and incompatible industrial and commercial activities could put pressure on the functionality of this site. › Planning needs to ensure the preservation of adequate buffer distances and that activity on the site is compatible and conducted in a manner that does not impact on the amenity of surrounding land users.
Werribee Landfill, Wyndham	› This landfill is a significant residual municipal solid waste (MSW) residual waste hub currently taking around 10% of Victoria's municipal waste from the Melbourne metropolitan and regional areas. It has available airspace for about 60 years and is located close to major transport routes. › There is high potential to expand resource recovery activities, particularly organics recovery, sharing the existing buffers at the site. › As it is located in a growth area, pressure from residential encroachment could put pressure on the functionality of the site. Future planning needs to ensure the preservation of adequate buffer distances and that activity on the site is compatible and conducted in a manner that does not impact on the amenity of surrounding land users.
Deer Park precinct (including Boral Quarry)	› This site is the largest MSW landfill in the state and reprocesses around 170,000 tonnes a year of C&D material, and 165,000 tonnes a year of organics. › It is well located close to the Melbourne metropolitan area and major transport routes. › There is a high potential to expand all activities onsite, including organics reprocessing, using existing buffers. › Urban encroachment is a future risk to the functionality of the site and future planning needs to ensure the preservation of adequate buffer distances and ensure that activities on the site are compatible and conducted in a manner that does not impact on the amenity of surrounding land users.

WMG Area and Location	Why it is important to the state system?
Laverton precinct	› This precinct is a major metals reprocessing hub for the state, reprocessing over 40,000 tonnes of C&D materials a year. It has well established spokes for metals and C&D and its position close to major transport routes and the Port of Melbourne makes it well located to service the Melbourne metropolitan area. › While there is some capacity for expansion, the main value to the state system is to preserve the land for appropriate resource recovery activities. The risk that residential encroachment may impact on the functionality of the site needs to be managed by ensuring adequate buffers and that activity on the site is compatible with surrounding land uses and conducted in a manner that does not impact on the amenity of surrounding land users.
Cooper Street precinct, Epping	› This precinct is a significant organics hub accepting garden organics, mainly from the metropolitan area. It is also the only C&D hub for northern metropolitan Melbourne. It is well located to service Melbourne, being close to major transport routes and has the capacity to expand all major activities, particularly organics. › The risk from residential encroachment resulting in close residential development and incompatible industrial development could impact on the functionality of the site. This should be managed by preserving adequate buffers, and by planning that ensures the establishment of compatible activities conducted in a manner that does not impact on the amenity of surrounding land users.
Wollert Hansen Quarry and Landfill	› This site is a major supplier of landfill airspace for MSW from metropolitan Melbourne, with available airspace for about 65 years. It is well located on the urban fringe and close to major transport routes. › Urban encroachment is a future risk to the functionality of the site and planning needs to ensure the preservation of adequate buffer distances, and that activities on the site are compatible and conducted in a manner that does not impact on the amenity of surrounding land users. › Future planning should also consider the co-location on the site of compatible waste and resource recovery activities that can share buffers.
Kingston/Clayton Dingley precinct	› This precinct is a significant hub for the surrounding area for organics, landfill and C&D processing. The landfills are all anticipated to close within seven years, providing an opportunity to transition the site to resource recovery activities that are compatible with surrounding land use and do not impact on the amenity of the surrounding community. › Preserving the land for resource recovery activities will increase the ability to meet the future needs of the surrounding metropolitan area. › Pressure from surrounding residential activities and community expectations could threaten the functionality of this site for recovery activities. Planning needs to preserve adequate buffers and prevent the establishment of incompatible land uses that could impact on the functionality of the site. › Community engagement is needed to demonstrate and explain the benefits to the community of this site remaining available for resource recovery activities, and to reassure the community that activities will have minimal impact on local amenity.
Hallam Road, Hampton Park	› This site is a major hub for commercial and industrial (C&I) and C&D reprocessing and for MSW residual waste from metropolitan Melbourne and regional areas. It is well located close to major transport hubs and potential markets. › The risk of residential encroachment resulting in close residential development and incompatible land uses could impact on the functionality of the site. This should be managed through preservation of adequate buffers and planning that ensures the establishment of compatible activities conducted in a manner that does not impact on the amenity of surrounding land users.
Lyndhurst Landfill, Taylors Road, Lyndhurst	› The site is the only remaining landfill for prescribed industrial wastes (PIWs) in metropolitan Melbourne. While these wastes are outside the scope of this plan, this site is listed as it is critical to the management of these wastes and contaminated soils, and is listed in the Metropolitan Landfill Schedule. › As the site is already involved in waste management activities, there is the opportunity to co-locate additional compatible resource recovery activities on the site that can share buffers.

WMG Area and Location	Why it is important to the state system?
Ordish Road Precinct, South Dandenong	› This is a major hub for organics, C&D reprocessing and commingled C&I recovery activities. It has well-established spokes and is well located with compatible activities. › The risk from residential encroachment resulting in close residential development and incompatible land uses could impact on the functionality of the site. This should be managed through preservation of adequate buffers and planning that ensures the establishment of compatible activities conducted in a manner that does not impact on the amenity of surrounding land users.
Owens Illinois	› This facility is the only reprocessor of recovered glass into new container glass in Victoria. It currently takes mixed sorted coloured glass from across the state and performs some beneficiation activities. If it was no longer able to take this material, there may be no other viable alternative other than to export interstate.
SKM Materials Recovery Facility (MRF) at Coolaroo	› This facility is the largest MRF in Victoria, accepting commingled recyclable streams from metropolitan and regional areas.
Barwon	
Drysdale Landfill	› This is a key regional landfill servicing the greater Barwon area. The volumes are significant and if residential encroachment or incompatible land use activities impacted on its functionality, the state system would be affected. › As the site is already involved in waste management activities there is the opportunity to co-locate additional compatible resource recovery activities on the site that can share buffers.
Moltoni Landfill, Fyansford Geelong	› This is a major C&D reprocessing hub for the area. The existing landfill on the site is anticipated to be full around 2018, providing an opportunity to transition the use of this land to additional resource recovery activities. › Planning needs to ensure the preservation of adequate buffer distances so incompatible land uses do not impact on the functionality of the site. It should ensure that activities on the site are conducted in a manner that does not impact on the amenity of surrounding land users.
Point Henry Geelong	› This precinct includes the Point Henry and Hays Road industrial areas and is a hub for a range of resource recovery activities including organics and C&D reprocessing and a key MSW transfer station.
Barro Quarry Point Wilson	› These quarries currently accept significant amounts of garden organics from metropolitan Melbourne for landfill rehabilitation, as an overflow arrangement with the Metropolitan WMG. As there is currently insufficient processing capacity for a higher order recovery option, this site has state importance. Investigation into long term solutions enabling higher order recovery of the organics may identify alternative options.
Calder	
Eaglehawk Landfill Bendigo	› This is a major hub for C&D reprocessing. The Eaglehawk Landfill on the site is expected to run out of airspace in 2017 and be closed. This provides an opportunity to transition the landfill space to additional resource recovery activities, particularly those related to the consolidation, sorting and transfer of material streams. It is also a potential site for organics recovery. › Planning needs to preserve adequate buffers and prevent the establishment of incompatible land uses that could impact on the functionality of the site. › Significant community engagement is needed to demonstrate and explain the benefits to the community of this site remaining available for resource recovery activities, and reassurance that activities will have minimal impact on local amenity.
Gippsland	
Dutson Downs, Gippsland	› This facility is a major organics reprocessing hub and accepts garden organics from metropolitan Melbourne and the surrounding region. Its composting processes use a range of other organic waste streams including biosolids, food waste, petroleum hydrocarbon, animal fats and some liquid PIW. It is ideally located and unlikely to be threatened by residential encroachment.

WMG Area and Location	Why it is important to the state system?
Goulburn Valley	
Western Composting, Shepparton	› This is a hub for organics processing and accepts garden organics for in-vessel composting from the surrounding regions. It is co-located with compatible activities and has sufficient buffers to increase organics processing activities.
Ellwaste Patho Landfill, Echuca	› This landfill services a number of local government areas (LGA) and cross regional flows from the Central Murray, Calder and Highland WMG areas. It has the potential to expand its acceptance of both MSW and solid industrial waste (SIW) streams.
Cosgrove Landfill, Shepparton	› This landfill serves a large population centre and a significant food processing sector that operates in the greater Shepparton region. It also accepts C&I waste from surrounding areas, including Benalla.
Hildene Landfill, Seymour	› This landfill is likely to become important as the population of the Mitchell Shire grows. The risk from residential encroachment resulting in close residential development and incompatible land uses could impact the functionality of the site. › This should be managed through preservation of adequate buffers and planning that ensures the establishment of compatible activities conducted in a manner that does not impact on the amenity of surrounding land users.
Grampians	
Statewide Landfill, Stawell	› This landfill accepts significant quantities of SIW from outside the region. › This should be managed through preservation of adequate buffers and planning that ensures the establishment of compatible activities conducted in a manner that does not impact on the amenity of surrounding land users.
Horsham Landfill, Dooen	› This landfill services a number of surrounding local areas and also accepts MSW and possibly some SIW from the Desert Fringe WMG area. › This should be managed through preservation of adequate buffers and planning that ensures the establishment of compatible activities conducted in a manner that does not impact on the amenity of surrounding land users.
Highlands	
Maddingley Brown Coal Landfill	› This site accepts significant amounts of SIW from metropolitan Melbourne. It is also the only landfill currently accepting shredder flock: if it could not, this would have a severe impact of the reprocessing of end-of-life cars and whitegoods. › Functionality should be managed through preservation of adequate buffers and planning that ensures the establishment of compatible activities conducted in a manner that does not impact on the amenity of surrounding land users.
Smythesdale Landfill	› This landfill services most of the Highlands WMG area, including PIW. Because of its location, it has good potential to increase recovery activities on the site, including organics reprocessing. › This should be managed through preservation of adequate buffers and planning that ensures the establishment of compatible activities conducted in a manner that does not impact on the amenity of surrounding land users.
Mildura	
Mildura Landfill, Mildura	› This landfill services the Mildura WMG area. Alternatives if it were to close or reduce functionality would be limited, due to the cost of transporting wastes to other regional landfills in Victoria. It is likely that the only viable alternative would be to transport wastes interstate.
South Western	
Corangamite Landfill (Naroghid)	› This landfill accepts both MSW and SIW from outside the South Western WMG area. › Functionality should be managed by preserving adequate buffers and by planning that ensures compatible activities are undertaken in ways that do not lessen the amenity of surrounding land users.

2.4 Encourage best practice management of recovery infrastructure

There is an important opportunity to increase materials recovery by achieving best practice management of recovery infrastructure. This involves:

- designing sites to be operationally efficient and safe
- identifying, understanding and managing social and environmental impacts
- monitoring and measuring the quality of materials accepted and produced
- providing staff with skills they need to implement best practice
- understanding market preferences.

Best practice management of recovery infrastructure involves:

- maximising return on investment
- reducing operating risks
- improving the infrastructure's ability to sort effectively
- reducing contamination
- resulting in greater quantities, of better quality, of feedstocks for reprocessing.

Sustainability Victoria's *Guide to Best Practice at Resource Recovery Centres*[7] addresses best practice in detail.

7 This guide is on Sustainability Victoria's website. Search for *'Guide to Best Practice at Resource Recovery Centres'*.

2.5 Infrastructure

2.5.1 Recovery infrastructure

The need for further TS/RRCs will mainly be driven by population growth over the next 30 years. Opportunities include:

- new or upgraded TS/RRCs in growth areas including south eastern metropolitan Melbourne , Geelong/Armstrong Creek/ Torquay, Mitchell Shire, Casey/Cardinia, and Wyndham/Melton/Hume/Whittlesea
- upgrading to best practice standards (particularly in regional Victoria) and improving management oversight of existing TS/RRCs
- rationalising the number of TS/RRCs where there would appear to be possible over servicing, and hence a high cost structure for local governments: sharing facilities between local government areas could realise economic advantages for individual local governments.

2.5.2 Reprocessing infrastructure

The draft *SWRRIP* identifies a range of opportunities to increase resource recovery across the state by facilitating industry investment in reprocessing infrastructure. There is an opportunity to provide industry with the confidence to invest in new and improved infrastructure by:

- providing industry with information and data to support investment decisions
- facilitating the consolidation of individual material streams to achieve volumes that attract industry investment
- land use planning that provides, in the long term, land for waste and resource recovery activities.

2.6 Materials recovery and disposal

Table 2.3 shows key recovery, landfill and generated statistics for the main material streams.

2.6.1 Organics

Table 2.3 shows that about 2.8 million tonnes of organic waste was generated in Victoria in 2010–11, and about 1.5 million tonnes of this ended up in landfill. This represented a loss to the economy of an estimated $30 million dollars a year, a significant lost opportunity for industry.

There is an important opportunity to use food and garden organics collected through municipal kerbside systems as base-load feedstock for recovery activities. Long term contracts with local governments give surety of supply and provides waste of a fairly consistent composition. There is a further opportunity to supplement this waste with C&I organic waste.

2.6.1.1 Food organics

In 2010–11, about 854,000 tonnes of food waste was generated, and only about 22,000 tonnes was reprocessed. The remaining 832,000 tonnes was sent to landfill, increasing management risks due to the potential impact on amenity and generation of greenhouse gases. This material going to landfill also represents a significant lost opportunity to recover valuable nutrients and energy.

The greatest opportunities for large scale food organics recovery are likely to be in metropolitan Melbourne and Geelong, and in large regional centres.

In the next five years, the main opportunities to increase the amount of food organics reprocessed will most likely come from one of the following options.

One option is to combine household food organics with household garden organics for in-vessel composting. The ratios of food to garden organics present in most MSW organic streams are favourable to composting. This opportunity has the added advantage of using kerbside collection systems, though they would need to be designed to minimise adverse impacts. This option is being trialled in several regions and is being implemented by some local governments. Other regional local governments are planning trials, with the intention of moving to larger scale operations in future.

Another option is to recognise that (particularly in the short term) there will always be an organic component in residual waste. Opportunities to recover valuable resources from these organics in the next five years will come through a combination of:

- developing processes to treat the residual waste stream through a mechanical biological process that recovers energy before disposal to landfill
- sending the residual waste stream to landfills with best practice gas capture and energy recovery.

To realise these opportunities, it would be essential to implement mechanisms—including education campaigns with householders and commercial enterprises, such as restaurants, hotels and supermarkets—to reduce the quantity of food organics going into residual waste bins.

A third option is to use source separated food organics to produce energy, process derived fuels and other products (including heat and soil conditioners). This option is technologically feasible but has not yet been undertaken on a large scale in Victoria. One factor underpinning the success of this option is establishing new collection systems that complement existing kerbside systems for households, and new systems designed specifically for C&I sources. Some trials of separate food waste collections have been undertaken in Victoria, with mixed results.

TABLE 2.3
MAIN MATERIAL STREAMS RECOVERED, LANDFILLED AND GENERATED, 2010–11[1]

Material		Recovered (tonnes)	Landfilled (tonnes)	Generated (tonnes)	Recovered (%)
Organics	Food waste	22,000	832,000	854,000	3
	Garden organics	815,000	242,000	1,057,000	77
	Wood/timber	107,000	285,000	393,000	27
	Textiles	5,000	146,000	150,000	3
	Other organics[2]	320,000	n/a	320,000	n/a
	Sub total	**1,269,000**	**1,505,000**	**2,774,000**	
Commingled recyclables	Paper/cardboard	1,213,000	447,000	1,659,000	73
	Glass	196,000	76,000	271,000	72
	Plastics (codes 1–3)	146,000	178,000	324,000	45
	Other plastics	0	216,000	216,000	n/a
	Sub total	**1,555,000**	**916,000**	**2,470,000**	
Tyres and rubber		55,000	6,000	61,000	n/a
Metals		1,390,000	65,000	1,455,000	96
Concrete/bricks/asphalt		4,194,000	861,000	5,055,000	83
Other		0	531,000	531,000	n/a
Total		**8,462,000**	**3,885,000**	**12,347,000**	**69**

Source: Sustainability Victoria, *Victorian Recycling Industry Annual Survey* (revised) 2010–11

Notes

1 Waste generated equals waste recovered plus waste to landfill. Landfill data is from Environment Protection Authority Victoria landfill levy receipts (unpublished). Recovered data is from *Victoria Recycling Industry Annual Survey* (revised) 2010–11 (unpublished at the time of this draft).

2 Includes agricultural waste.

Soil and Organic Recycling Facility at Dutson Downs, Gippsland

The Gippsland Water Soil and Organic Recycling Facility at Dutson Downs produces a range of compost products through the processing of liquid and solid organic wastes. Feedstocks are sourced from both commercial and domestic producers and include garden organics, biosolids, food waste, animal fats and vegetable oils and organic petroleum hydrocarbons. The processes used include in-vessel pasteurisation of the PIW and open windrow composting of non-prescribed organic wastes. Products from both process streams are matured for 8–12 weeks in open windrows until they meet requirements for classification as mature compost prior to screening and blending. The result is an Australian Standards compliant compost used as a soil improver and organic nutrient supplement in the agriculture sector and environmental remediation projects.

Strict controls are in place to monitor the process to ensure product consistency and maintain and continuously improve product quality. More information can be found at www.gippswater.com.au.

Based on current trends, waste-to-energy using source separated food waste is unlikely to happen on a large scale in Victoria in the next five years. However, the viability of this option will be determined by factors outside the scope of this document. Industry should nevertheless be encouraged to investigate these options as solutions when other economically viable options have been exhausted.

The use of food waste to supplement anaerobic digestion of wastewater treatment plant biosolids, to produce energy and organic material for soil conditioning or composting is an opportunity likely to eventuate in the next five years. Studies are required to determine the viability, logistics, potential contamination issues and amount of organic material that could be successfully recovered this way.

On a smaller scale, on-site processing solutions for post consumer food waste are emerging at a rapid pace. Units that dehydrate or digest food in a short amount of time are now readily available. These units may be suited to high intensity areas such as food markets, restaurant precincts and laneways. However, they are expensive compared with regular disposal costs, and often energy intensive. The liquid digestate from the process is not a compost product and often requires further treatment. Disposal can also be a challenge, as markets for these products are quite localised and limited.

To increase recovery of food waste, there is a need to reduce contamination, particularly by better separation at the source. This requires educating households and industry about source separation, improving collection mechanisms and investing in sorting and treatment technology.

Generating more demand for the products made from reprocessed food and garden organics would support greater recovery. Purchasers of these products want a consistent supply of high quality, fit-for-purpose products. To achieve this, reprocessors must reduce contamination. Again, this requires an approach that includes household and industry education, better collection mechanisms and investment in sorting and treatment technology.

To increase recovery of food waste, a multifaceted approach is needed, including:

- local governments forming partnerships to achieve the economies of scale needed to support new or enhanced collection systems, and to achieve volumes attractive to industry
- reducing contamination through education campaigns and improved sorting technology
- industry research into, and trials of, potential technological solutions.

2.6.1.2 Garden organics

In 2010–11, about one million tonnes of garden organic material was generated, and about 240,000 tonnes reprocessed. The remaining 815,000 tonnes was sent to landfill. This represented a loss to the state economy, and increased management risks for landfills due to the potential generation of greenhouse gases.

There are opportunities for improved or new large scale garden organics reprocessing infrastructure for garden organics generated in metropolitan Melbourne, Geelong, Ballarat and Bendigo. There are also opportunities to build on reprocessing capabilities in the Goulburn Valley and Latrobe Valley. Industry has the opportunity to secure base flows from kerbside collections through long term contracts with procurement clusters of local governments. These base flows can be supplemented with organic waste from other sources, including the C&I sector.

Victoria has insufficient infrastructure to reprocess the garden organics currently collected through kerbside systems. This has led to less-than-optimal practices, such as quarry rehabilitation.

The majority of garden organics is reprocessed through composting. Further processing infrastructure will be required to process the expected increase in garden organics collected from kerbsides, and dropped off at TS/RRCs. This increase is expected as the population grows and more local governments offer kerbside garden organics collection services.

Windrow composting is realistically only an opportunity in rural and regional areas, or co-located with an existing compatible industrial activity, because of buffer requirements and potential amenity issues. In metropolitan areas, most composting opportunities will involve developing in-vessel or controlled environment facilities.

However, where there are suitable sites, (such as Dutson Downs in Gippsland—see boxed story on this page), windrow composting may be an option, provided there are adequate management and quality control procedures.

2.6.1.3 Wood and timber

In 2010–11, about 393,000 tonnes of timber waste was generated and about 107,000 tonnes reprocessed. The remaining 285,000 tonnes was sent to landfill.

There are opportunities for greater recovery of timber in metropolitan Melbourne, Geelong and the larger regional centres (such as Ballarat, Bendigo, Latrobe Valley and Shepparton).

There are opportunities to improve source separation and recovery of timber in residential construction, commercial fitouts (and refits), all demolition sectors, and C&I packaging. This would involve educating the community, builders and collection service providers, and developing supporting collection systems and infrastructure.

Timber packaging waste makes up a significant percentage of the waste generated by the C&I sector. Designated C&I collection services would require substantial volumes (more than 50 pallets) to be economically viable. Areas of high activity, such as industrial estates, retail precincts and homemaker centres, may offer the greatest opportunities.

The versatility of timber makes it attractive as a fuel source, through waste-to-energy technologies. Non-structural, untreated timber (such as packaging pallets) may be used as a cheap and effective fuel source in traditional thermal processes and in low-oxygen thermal processes that extract a highly combustible synthetic gas (syngas) such as pyrolysis and gasification.

Timber can be processed into secondary products, depending on the properties of the thermal treatment for which it is destined. For example, waste timber can be shredded for use in industrial processes; cut down for use in domestic heating; or shredded and compacted into wood briquettes and wood pellets.

The market for mulch using timber based waste streams is quite mature, but has further growth potential. To realise this potential, we need more sorting infrastructure and greater demand for products. The biggest market for these mulches is for use on roadside batters (to help stabilise and revegetate them) but this market is cyclic. Coloured mulches for home gardens have become very popular.

Opportunities for emerging technologies including around pyrolysis (biochar) and gasification are of interest, especially as these have the potential to operate at small and medium scales, and to be modular. Further research is needed into these technologies, and to establish long term, viable markets for biochar products.

2.6.2 Paper, cardboard, glass and plastics (commingled)

In 2010–11, about 2,470,000 tonnes of commingled paper, cardboard, glass and plastic waste was generated and about 1,555,000 tonnes reprocessed. The remaining 916,000 tonnes was sent to landfill.

A mature industry already exists for sorting and reprocessing commingled recyclables collected by local government services.

Investment by the private sector in MRFs is expected to keep pace with the increase in the volume of recyclables collected from the kerbside. The current trend—of increasing transportation of commingled recyclables to MRFs in Melbourne and Geelong for sorting—is likely to continue under current market conditions, but is subject to local government contracting arrangements.

Recovery from the C&I sector could be substantially increased by:

- collecting more source separated material streams from C&I businesses by improving their ability to separate material streams onsite, and by making materials collection convenient and economically viable
- improving the sorting capability of MRFs so they generate high quality material streams attractive to reprocessors.
- using residual waste materials to generate energy products (such as electricity and process engineered fuels).

These opportunities require business education as well as investment in sorting and collecting infrastructure, and research and market development of new technologies.

Contamination from other waste materials significantly inhibits the successful separation and recovery of commingled waste. Service providers may seek to include in their contracts with local governments the provision of householder education campaigns about source separation to improve services, reduce contamination and improve recovery rates.

2.6.2.1 Paper and cardboard

In 2010–11, about 1,660,000 tonnes of paper and cardboard waste was generated and about 1,213,000 tonnes reprocessed. The remaining 447,000 tonnes was sent to landfill.

Further opportunities to recover paper and cardboard do not appear to be in the area of reprocessing infrastructure, but in:

- developing better systems for recovering cardboard and paper at the point of generation
- increasing the density of cardboard and paper to reduce transport costs from collection points (such as TS/RRCs) to reprocessors, especially if they are transported from regional Victoria
- increasing investment in sorting facilities, to recover paper and cardboard from mixed recyclable materials from the C&I sector.

2.6.2.2 Glass

In 2010–11, about 271,000 tonnes of glass waste was generated, and about 196,000 tonnes reprocessed. The remaining 76,000 tonnes was sent to landfill.

Investing in technology upgrades at glass beneficiation facilities (to improve sorting based on colour and size) would increase the quantity of glass returned for reprocessing and reduce the amount of glass fines being generated.

Developing the market for glass fines requires further investment in infrastructure, research and development. Possible markets include:

- using it as a feedstock for inclusion in recycled cullet, through further processing
- replacing sand with glass fines in a range of applications (such as in asphalt).

There is also an opportunity to invest in the infrastructure required to collect and reprocess sheet glass.

2.6.2.3 Plastics

In 2010–11, about 540,000 tonnes of plastic waste (of all codes) was generated, and about 146,000 tonnes reprocessed. The remaining 394,000 tonnes was sent to landfill.

The increased use of plastics in the community will generate increasing amounts of plastics that need reprocessing, particularly soft plastics in packaging. About 50% of plastics recovered in Victoria are currently baled and exported overseas for reprocessing. Industry has an opportunity to recover more plastics to sell to overseas markets, and to use as feedstock in Victoria. Getting more volumes of source separated plastics will also make more reprocessing options viable.

Investment in infrastructure to collect, sort and reprocess plastics is required to significantly increase the recovery of a range of plastics including:

- film plastics used for consumer packaging
- rigid plastics used in the C&D sector (which can be recovered during the renovation, refurbishment and demolition of residential and commercial buildings)
- film plastics used in the logistics sector
- automotive plastics from manufacturing, servicing, repair and end-of-life processes.

Because plastics have a high calorific value, they are a potential source of process-engineered fuels for energy plants. This is most appropriate for residual plastic streams and should only be considered when there are no other economically viable sorting and recovery options.

2.6.3 Tyres and rubber

Research[8] suggests that at least 51,000 tonnes of tyre rubber is not being reprocessed each year in Victoria and represents a potential opportunity for industry. An additional, unknown quantity of other rubber products is also not being reprocessed. Most reprocessing involves shredding the tyres for use in making soft surfaces.

Given the volumes of tyres generated and stockpiled in Victoria, the low volumes required for soft surfaces, concerns about the environmental outcomes of stockpiling, and the unknown destination of many tyres, the biggest opportunity in the short term is probably for use in road base.

Using rubber and tyres for waste-to-energy is currently not viable on a large scale in Victoria. However, industry should be encouraged to continue market development of this technology.

Under the *National Waste Policy*, end-of-life tyres are listed as a priority product and a product stewardship organisation is being established to support the tyre supply chain to take greater responsibility for their product at end-of-life.

8 Price Waterhouse Coopers, *An options framework for end of life tyres,* prepared on behalf of Sustainability Victoria, 2013

2.6.4 Metals

Metals reprocessing is already a mature market which is driven by worldwide commodity prices. However there is an opportunity to reduce the residual waste from metal reprocessing, in particular shredder flock. Shredder flock results from the shredding of metal, particularly from the reprocessing of end-of-life cars and whitegoods. An estimated 140,000 tonnes of shredder flock is generated each year, much of it in the Laverton/Brooklyn area. Shredder flock is a significant proportion of the waste going to landfill from the C&I sector.

Mechanical recovery of plastics and other materials from this mixed waste stream is difficult, due to the mixture of different materials and the presence of some degree of contamination. Energy recovery options may be more feasible. Industry should continue to explore these opportunities, taking account of changing market conditions (which may favour recovery options).

2.6.5 Concrete, brick and asphalt

In 2010–22, about 5,055,000 tonnes of concrete, bricks and asphalt waste was generated, and about 4,194,000 tonnes of this was recovered. The remaining 861,000 tonnes was sent to landfill. While this recovery rate (83%) is very high, the amount still going to landfill represents a significant opportunity.

There is much infrastructure in Victoria to recover concrete, brick and asphalt, and there does not appear to be the need for substantial further infrastructure investment in metropolitan Melbourne and Geelong. However, more processing infrastructure is needed in regional Victoria, particularly in:

- the Latrobe Valley
- Ballarat (which has several reprocessors but also significant stockpiles of unprocessed material, suggesting either inadequate market demand for recycled aggregate products, or that reprocessors do not consistently produce product to required specifications)
- the Goulburn Valley
- south west Victoria.

When assessing infrastructure solutions, industry should consider infrastructure that can be moved between local government areas, particularly in regional areas of Victoria.

There is an opportunity to increase the recovery of materials from household renovations, residential developments and small C&D projects. This would need better source separation and collection systems, and investment in sorting infrastructure by small bin hire companies. Local governments can support this by helping to educate householders and home builders.

2.6.6 Residual waste

Residual waste is made up of materials that cannot currently be viably reprocessed from household and commercial waste, and from residual materials from reprocessing facilities. Residual waste represents all materials currently going to landfill, which in 2010–11 was about 885,000 tonnes. Reducing residual waste has many benefits, including increased amenity for the community, reduced risks for local governments (which are responsible for collecting MSW), and economic benefits for Victoria by realising the value of recovered resources.

Contamination is a major barrier to recovering resources from residual waste. Better sorting capability and technology should result in more materials being recovered.

The biggest resource recovery opportunity with residual waste is to reduce the amount being generated, including by:

- educating householders and businesses to source separate their waste and to reduce contamination in the garden organics and commingled bins
- improving the sorting capabilities of TS/RRCs
- investing in resource recovery technologies.

2.6.7 Landfills

While landfills are important waste management infrastructure, *Getting Full Value* notes the long term purpose of landfills to only receive treated residual waste.

The costs of designing, building and managing landfills are steadily increasing making resource recovery options more economically viable. As a result there has been a steady decrease in the number of landfills in Victoria particularly small regional landfills.

Table 2.4 shows the landfills owned by local governments that are scheduled for closure in the next five to seven years.

Recent research undertaken by Environment Protection Authority Victoria (EPA,) for the development of the draft *SWRRIP*, has identified that landfills that have a shallow cell depth, accept less that 25,000 tonnes per year and only accept waste from their local area are likely to be economically vulnerable. Investigations for these landfills and those listed in Table 2.4 should be undertaken including includes transitioning activities on the site to increase recovery and consolidate volumes for transport to a larger, regional landfill. This is likely to be particularly viable if the landfill will struggle to meet the costs associated with the EPAs Best Practise Environmental Management requirements.

Further opportunities relating to landfills include:

- Replacing landfills exempt from licencing and those scheduled for closure over the next 10 years with state-of-the-art TS/RRCs to increase recovery and consolidate volumes for transport to a larger, regional landfill (shaded blue on Figure 4). This has been demonstrated by the landfills at Manangatang, Piangil and Ultima which have recently closed and the sites now function as TS/RRCs.
- Developing options for management of residual waste in Bendigo, Anglesea, Mornington Peninsula, Lakes Entrance and south east Melbourne when these landfills close in the coming years.
- Joint procurement by groups of local governments, potentially with major industries, of solutions (including transport to larger regional landfills or alternative technologies) to achieve the economies of scale needed to attract industry investment.
- Develop the capacity and capability of landfill operators—particularly regional local governments that own and operate landfills—to meet best environmental practice management standards.
- Co-locate recovery operations at landfill sites (for example, co-locate sorting facilities to screen materials going to landfill, particularly at rural landfills where community access to resource recovery facilities may be limited: this could help consolidate some material streams until it is economically feasible to collect them, and so attract industry interest).
- Encourage pre-sorting of residual waste through clauses in contracts for the provision of municipal landfill services.

There is an opportunity to increase the co-location of recovery operations at landfill sites (for example, sorting facilities to screen materials going to landfills, particularly to rural landfills, where access to resource recovery facilities may be limited) which could serve to consolidate some material streams until it is economically feasible to attract investment in collection services. A major advantage of co-locating recovery activities with landfills is that they can use the existing buffers, and are therefore less likely to have adverse impacts on the community.

TABLE 2.4
LOCAL GOVERNMENT LANDFILLS SCHEDULED FOR CLOSURE IN THE SHORT TERM BY LGA

Proposed WMG Area	Local Government Area	Landfills Exempt From Licences	Licensed Landfills
Metropolitan Melbourne	Clayton Regional landfill		Jointly owned by four surrounding councils
	Mornington Peninsula Shire Council		Rye
Barwon South West	Glenelg Shire Council	Casterton	
		Dartmoor	
		Nelson	
	Southern Grampians Shire Council	Glenisla	
	Colac Otway		Alvie
	Surf Coast Shire		Anglesea
	Moyne Shire Council	Killarney	
Gippsland	East Gippsland Shire Council	Benambra	
		Bendoc	
		Bonang	
		Cann River	
		Mallacoota	
		Orbost	
Grampians	Northern Grampians Shire Council	Hard Hills	
		Marnoo	
Loddon Mallee	Swan Hill Rural City Council	Boundary Bend	
	Buloke Shire Council	Charlton	
		Wycheproof	
	Mildura Rural City Council	Murrayville	
		Ouyen	

3. Priority actions

Sustainability victoria
State Government Victoria

As a state level planning tool, the draft *Statewide Waste and Resource Recovery Infrastructure Plan (SWRRIP)* will identify actions and opportunities for waste management and resource recovery at the state level. It will also provide the framework for *metropolitan and regional waste and resource recovery implementation plans*, and for planning by local governments and industry.

The draft *SWRRIP* has identified priority actions that must be completed or well underway in the next five years to meet the vision and goals. These are detailed in Table 3.1. Given the long lead times to plan, gain regulatory approvals and secure investment for these actions, they should be started soon, if they are not already under way. While Table 3.1. groups actions by the *SWRRIP* goal they directly address, many actions also address other goals as well.

TABLE 3.1
DRAFT SWRRIP PRIORITY ACTIONS

Priority Actions	Potential Approach
Goal 1. Facilitate efficient markets by consolidating material streams to establish economies of scale that attract industry investment	
1.1 Facilitate the cross regional movement of material streams to consolidate volumes, to establish economies of scale to attract industry investment.	Work with waste management groups (WMG) to broker local government procurement clusters—around geographical locations, transport links and common needs for services relating to individual material streams—for waste management and resource recovery services.
1.2 Work with local government to build the capacity of local government procurement processes to increase resource recovery.	Work with local governments to increase their ability to procure waste management and resource recovery services that reduce their long term risks, improve outcomes for their communities and increase resource recovery capacity, through: › joint procurements with other local governments seeking solutions for the same material streams › giving service providers the flexibility to supplement municipal solid waste streams with waste from other sources › including requirements in contracts to educate householders to source separate waste, and to pre-sort residual waste before disposal to landfill.
1.3 Explore options for cross regional processing of garden organics from Geelong, Ballarat, Bendigo and potentially Shepparton.	In partnership with WMGs, broker relationships between relevant local governments and industry to explore potential cross regional solutions.
1.4 Achieve south eastern Organics tender objectives.	› Metropolitan Waste Management Group (WMG) to complete the South Eastern Organics Tender process being conducted in partnership with eight local governments. › Metropolitan WMG to achieve the tender objective of conducting a feasibility study for a location of a new organics facility to service south east Melbourne.
1.5 Develop options for processing garden organics from the eastern metropolitan Melbourne local government cluster.	› Support Metropolitan WMG to develop a procurement process with five eastern metropolitan local governments for the processing of garden organics. › Provide statewide facilitation if the best location for a new facility is outside the metropolitan area. › Provide facilitation if required to involve relevant non-metropolitan local governments in the procurement cluster.
1.6 Explore options for processing food waste in larger regional centres, including Geelong, Ballarat, Shepparton, Echuca, Latrobe Valley, Wangaratta, Wodonga and Warrnambool.	Provide statewide facilitation of cross regional partnerships to: › form local government procurement clusters › partner industry and local government › use land already used for waste management and resource recovery (including landfills) for sorting and processing food waste, and other resource recovery activities (for example, using Patho and Cosgrove landfills in the Shepparton region to recover resources from food waste).

Priority Actions	Potential Approach
Goal 2. Maximise the recovery of valuable resources from waste streams	
2.1 Develop partnerships with industry to reduce contamination in material streams for reprocessing.	Develop partnerships with industry to: › adopt best practice operational procedures and practises › provide material recovery facilities (MRF) with information to support investment in infrastructure that improves sorting capability › help industry access economically viable quantities of materials › provide industry with information and data for business planning › educate waste generators to source separate › upskill recovery and reprocessing workers.
2.2 In partnership with industry and local governments establish mechanisms that will increase the amount of food waste recovered from household waste.	In partnership with industry and local governments, establish collection and treatment systems for household organics, which might involve one or more of the following. › Combine food waste with household garden organics for in-vessel composting. › Send residual waste to a landfill with gas capture (but only if combined with education to reduce the quantity of organics in the residual waste bin), which would capture some of the resource and use it to generate energy, and reduce the adverse impacts that organic materials have as they break down in landfill. › Encourage industry to investigate mechanical biological treatment of food waste in residual waste to capture energy before disposal to landfill. › Encourage industry to research and develop viable options to use source separated food waste for waste-to-energy opportunities.
2.3 Facilitate partnerships between industry and local governments to investigate and develop mechanisms that will increase the amount of food waste recovered from manufacturers and other businesses.	› Facilitate partnerships between industry and local governments to investigate using food waste from commercial sources to supplement household sources. › Support industry research and development of the use of pre-consumer food waste to produce energy and other products when there are no other economically viable reprocessing options. › Facilitate industry and water authorities to explore using food waste from manufacturing process to supplement or enhance the digestion of waste biosolids.
2.4 Facilitate partnerships between industry and local governments to investigate and develop mechanisms that increase the amount of materials recovered from the commingled stream.	› Facilitate partnerships between industry and local governments to collect and process more source separated materials from commercial and industrial sources by investing in infrastructure and educating waste generators. › Help industry improve MRF sorting capabilities (particularly for commercial and industrial materials) including by identifying infrastructure investment opportunities, educating waste generators to source separate, training staff and identifying opportunities to upgrade existing municiple solid waste MRFs to accept commingled waste streams from non-municipal sources, › Support industry to adopt best practice to improve their return on investment and the quality and quantity of recovered materials.
2.5 Develop partnerships with industry that facilitate and increase their ability to recover film plastics.	In partnership with industry facilitate expansion of the recovery of plastics to meet the expected increase in volumes.
2.6 Develop partnerships with industry that facilitate and increase their ability to recover more tyres.	In partnership with industry explore options to recover resources from tyres.

Priority Actions	Potential Approach
Goal 3. Support the *Getting Full Value* action to facilitate the long term purpose of landfills to only receive treated residual waste	
3.1 Explore ways to manage residual waste streams currently going to landfills with limited remaining airspace in the south east metropolitan area and on the Mornington Peninsula.	Support the Metropolitan WMG, Mornington Peninsula Regional Waste Management Group (RWMG), other relevant RWMGs, local governments and industry to best manage residual waste from the south east metropolitan area and the Mornington Peninsula, as this may require moving residual waste streams across regions.
3.2 Explore ways to manage residual waste streams currently going to landfills with limited remaining airspace in Bendigo.	Support Calder RWMG to identify, and relevant local governments and industry to implement, the best option to manage residual waste streams from the Bendigo area: options they investigate should include: › using land currently landfill for other waste management and resource recovery activities such as transfer stations and resource recovery centres, drop-off centres and possibly reprocessing centres › improving the sorting of residual waste streams to recover materials before transporting the residual waste to a regional best practice landfill › analysing the viability of alternatives to establishing new landfills › jointly procuring services with other local governments including Geelong, Ballarat and possibly Shepparton.
3.3 Explore ways to manage residual waste streams currently going to landfills with limited remaining airspace in Anglesea.	Support Barwon RWMG to identify, and relevant local governments and industry to implement, the best option to manage residual waste streams from the Anglesea area.

Priority Actions	Potential Approach
Goal 4. Provide industry, local government, metropolitan and regional WMGs and other government agencies with information and guidance to inform planning at the state, regional and local levels	
4.1 In partnership with local governments facilitate a rationalisation of landfills so, in the long term, they are: › economically viable › able to meet current and future compliance requirements (including post-closure rehabilitation requirements).	Build local government's capacity to evaluate the costs, benefits and risks of establishing new landfills and maintaining existing landfills, compared to increasing the percentage of resources recovered and transporting residual waste to regional best practice landfills.
4.2 Support local governments within regional areas with small local landfills to investigate options to move to alternative waste management and resource recovery options where these are economically feasible.	Support local governments to manage their waste to maximise resource recovery, including to: › build their capacity to evaluate options for alternative waste management › build their capacity to identify and manage ongoing rehabilitation risks › facilitate partnerships with other local governments and industry to form procurement clusters.
4.3 Inform land use planning so that it balances the need for adequate provision of land for waste and resource recovery activities with the need to preserve the amenity of surrounding land uses.	Facilitate Department of Environment and Primary Industries, Sustainability Victoria and other relevant public sector agencies to work together to integrate planning requirements for waste and resource recovery infrastructure into the state's transport and land use planning frameworks, to achieve: › adequate land set aside in growth areas › a mechanism to preserve buffers against encroachment by incompatible land uses › local and regional plans that have regard to the *SWRRIP*.
4.4 Inform planning process to facilitate the adequate provision of resource recovery infrastructure to service new growth areas (particularly Geelong/Armstrong Creek/ Torquay, Mitchell Shire, Casey/ Cardinia, and Wyndham/ Melton/Hume/Whittlesea).	Facilitate partnerships between relevant WMGs and local governments to examine options to maximise resource recovery, including: › upgrading existing infrastructure to meet future needs › co-locating waste and resource recovery infrastructure and wastewater treatment infrastructure › sharing facilities across local government boundaries to maximise efficiencies and reduce costs › jointing procurement to achieve volumes of materials that attract industry investment.
4.5 Align planning at the regional and local level with the *SWRRIP*.	Work with the metropolitan and regional WMGs to align their waste and resource recovery plans with the *SWRRIP*, including exploration of options for the hubs of state importance identified in the draft *SWRRIP*.

4. Waste generation, recovery and disposal

Sustainability victoria
State Government Victoria

4.1 Current waste generation

4.1.1 Locations

In 2010–11, Victorians generated about 12.3 million tonnes of waste, and the amount is increasing every year. From 2000 to 2010, total waste generation increased at an average rate of 4% a year. This increase in waste is due to increasing construction and demolition (C&D) activity and population growth, combined with a trend of increasing waste generation per capita. Victoria's population has grown from 4.8 million in 2000 to 5.6 million in 2013, and is projected to grow to 8.1 million by 2042.

One of the challenges in managing Victoria's waste system is the uneven geographical distribution of waste generation across the state. As would be expected, waste generation is concentrated around population centres. The metropolitan Melbourne region accounts for around 71% of all the waste generated: compare this with a small waste management group (WMG) area like the Desert Fringe, which accounts for less than 0.2% of waste generated in Victoria. As a result, it can be difficult to attract industry investment in facilities in regional areas, due to the lack of economically viable volumes of waste materials.

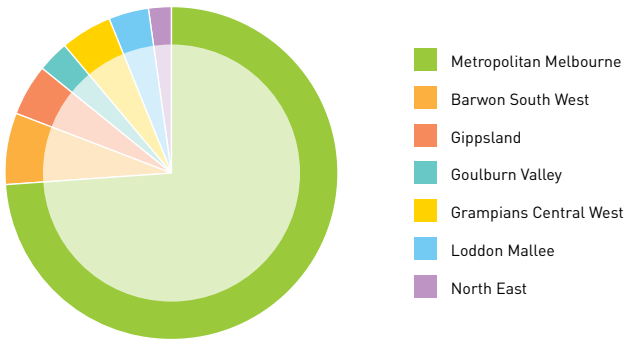
Table 4.1 and Figure 4.1 show the distribution of waste generated, by WMG area, in Victoria in 2010–11, based on modelled data.

TABLE 4.1
WASTE GENERATED, BY WASTE MANAGEMENT GROUP AREA, 2010–11

Waste Management Group Area	Total by Area (tonnes per annum)	% of Total (approx.)
Metropolitan Melbourne	9,090,000	74%
Barwon South West	838,000	7%
Gippsland	586,000	5%
Goulburn Valley	427,000	3%
Grampians Central West	534,000	4%
Loddon Mallee	597,000	5%
North East	274,000	2%
Total	**12,346,000**	**100%**

Source: Sustainability Victoria, *Regional Waste and Resource Recovery Projection Model*, v 1.1, 2013

FIGURE 4.1
TOTAL WASTE GENERATED, BY WASTE MANAGEMENT GROUP AREA, 2010–11



Source: Sustainability Victoria, *Regional Waste and Resource Recovery Projection Model*, v 1.1, 2013

4.1.2 Material streams

Table 4.2 shows the tonnages of materials generated, by sector, in 2010–11. It also shows that the C&D sector generates about 40% of the state's waste, the commercial and industrial (C&I) sector about 33% and the municipal solid waste (MSW) sector about 27%.

TABLE 4.2
WASTE GENERATED, BY MATERIAL STREAM AND SECTOR, 2010–11[1]

Material		MSW	C&I	C&D	Totals
Organics	Food waste	595,000	260,000	‹1,000	854,000
	Garden organics	864,000	170,000	23,000	1,057,000
	Wood/timber	21,000	227,000	145,000	393,000
	Textiles	48,000	91,000	11,000	150,000
	Other organic[2]	16,000	300,000	4,000	320,000
Commingled recyclables	Paper/cardboard	495,000	1,158,000	7,000	1,659,000
	Glass	163,000	108,000	‹1,000	271,000
	Plastics (codes 1–3)	121,000	189,000	14,000	324,000
	Other plastics	89,000	122,000	5,000	216,000
Tyres and rubber		n/a	61,000	n/a	61,000
Metals		261,000	1,097,000	97,000	1,455,000
Concrete/bricks/asphalt		199,000	217,000	4,640,000	5,055,000
Other		456,000	70,000	6,000	531,000
Total		**3,326,000**	**4,069,000**	**4,952,000**	**12,347,000**
Percentage of total		27%	33%	40%	

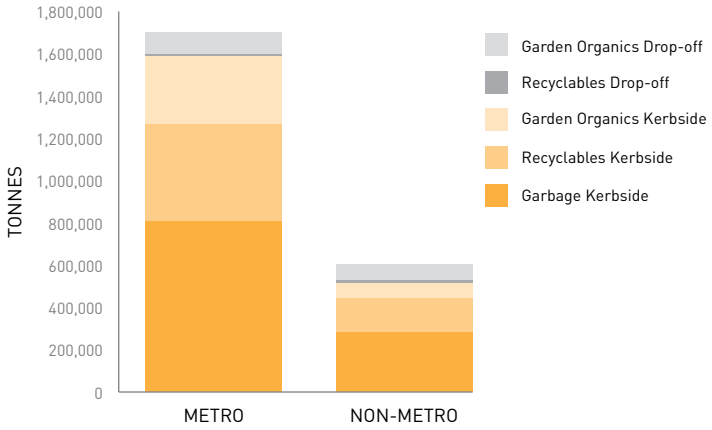
Source: Sustainability Victoria, *Regional Waste and Resource Recovery Projection Model,* v 1.1, 2013

Notes

1 The data about the composition of waste material streams varies across sectors. For municipal solid waste, most data comes from kerbside collection systems. This is reported annually and is quite robust. Data for commercial and industrial and construction and demolition waste is modelled using data from 2009 landfill audits.

2 Includes agricultural waste.

FIGURE 4.2
HOUSEHOLD MSW, BY COLLECTION SERVICE, METROPOLITAN AND NON-METROPOLITAN LOCAL GOVERNMENT AREAS (LGAS), 2010–11



Source: Sustainability Victoria, *Victorian Local Government Data Survey*, 2010–11

Note

The data does not include residual municipal solid waste.

4.1.3 Sectors

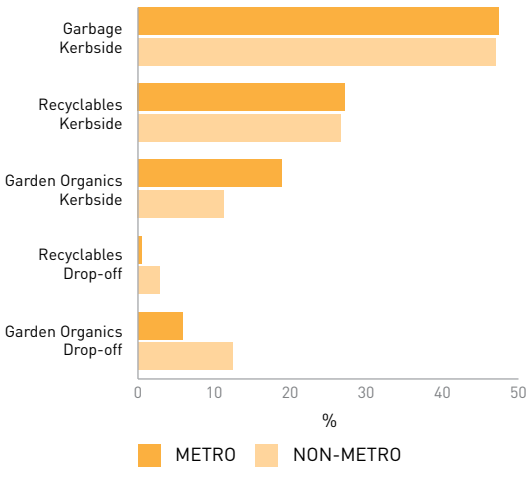
4.1.3.1 Municipal solid waste

Figure 4.2 shows that most municipal solid waste is collected via kerbside collection services for garden organics, commingled recyclables and residual waste.

While metropolitan Melbourne clearly generates the majority of Victoria's MSW, Figure 4.3 shows that the composition of kerbside garbage and recyclables is very similar in both metropolitan and non-metropolitan areas.

The one exception is the kerbside collection of garden organics. In 2010–11, metropolitan Melbourne collected at the kerbside double the percentage of garden organics as did non-metropolitan areas. However, the non-metropolitan regions collected a higher proportion of their garden organics from drop-off facilities. This reflects the greater availability of kerbside organics collection systems in metropolitan Melbourne and the need for alternative mechanisms in regional areas where garden organics kerbside pick-up services may be less economically viable. It also underlines the importance of making drop-off facilities for garden organics available in non-metropolitan regions.

FIGURE 4.3
HOUSEHOLD MSW, BY COLLECTION SERVICE, METROPOLITAN AND NON METROPOLITAN, LGAS, 2010–11, PERCENTAGE OF TOTAL

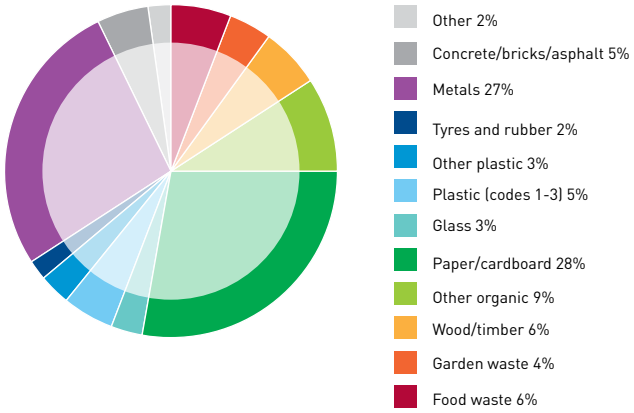


Source: Sustainability Victoria, *Victorian Local Government Data Survey*, 2010–11

Note

The data does not include residual municipal solid waste.

FIGURE 4.4
C&I WASTE, BY MATERIAL STREAM, 2010–11



Source: Sustainability Victoria, *Regional Waste and Resource Recovery Projection Model*, v 1.1, 2013

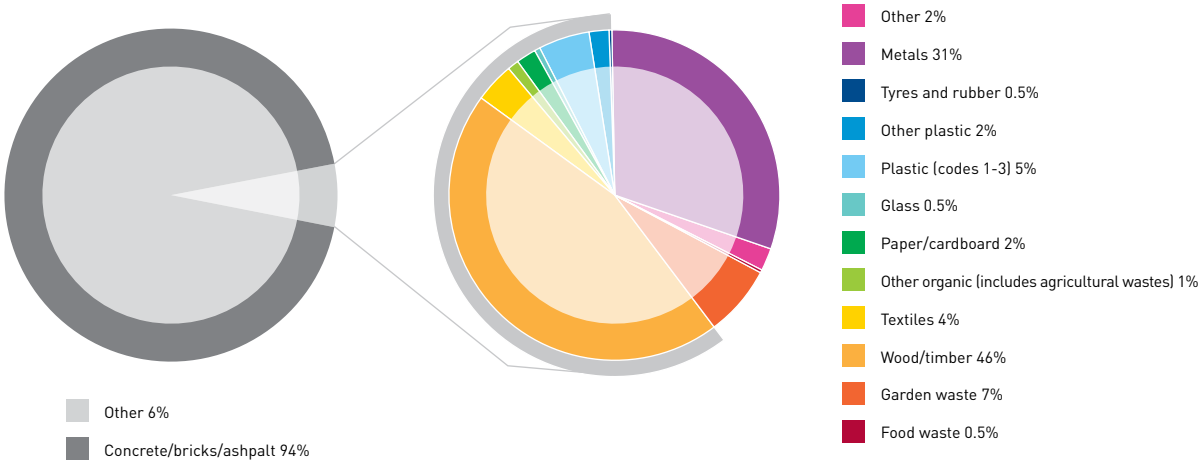
4.1.3.2 Commercial and industrial

Figure 4.4 shows the most generated types of C&I waste in 2010–11 in Victoria were paper, cardboard and metals.

4.1.3.3 Construction and demolition

As Table 4.2 shows, in 2010–11 the C&D sector generated 40% of all waste generated in Victoria. This high proportion was due in part to waste being measured by weight. As Figure 4.5 shows, 94% of C&D waste consists of concrete, bricks and asphalt (which are heavy). A total of 71% of C&D waste was generated in the Melbourne metropolitan area: a similar proportion to C&I waste and MSW.

FIGURE 4.5
C&D WASTE GENERATED, BY MATERIAL STREAM, 2010–11



Source: Sustainability Victoria *Regional Waste and Resource Recovery Projection Model*, v 1.1, 2013

4.2 Current waste recovery and disposal

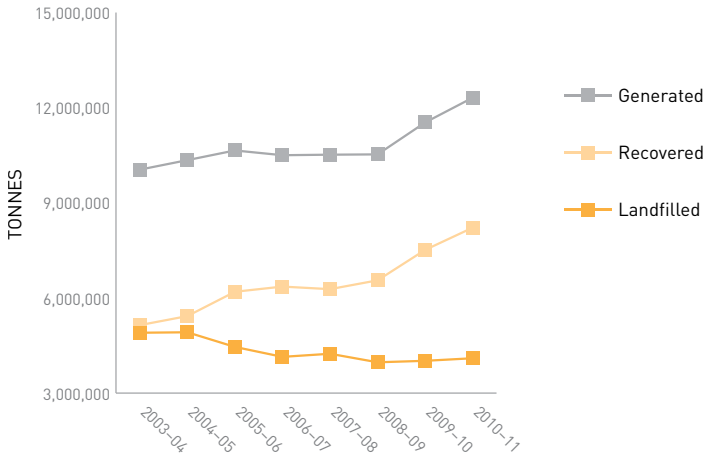
4.2.1 Victoria

Of the 12.3 million tonnes of waste generated in Victoria in 2010–11, 8.4 million tonnes (68% by weight) was recovered for reprocessing and reuse. The value of the resource recovery sector in Victoria was estimated to be about $524.4 million and the sale of recovered materials and products was worth an additional $807.6 million.[9]

Figure 4.6 shows that resource recovery rates have grown steadily in the past 10 years, based on strong markets for some material streams.

Figure 4.6 also shows that the amount of waste generated is increasing. Landfills are, and will remain for some time, an important component of our waste management and resource recovery system. One of the goals of *Getting Full Value: the Victorian Waste and Resource Recovery Policy* is for the long term purpose of landfills to only receive treated residual waste. That is, over time, landfills will receive waste only after all economically viable resource recovery opportunities have been realised.

FIGURE 4.6
WASTE RECOVERED, LANDFILLED AND GENERATED, 2003–04 TO 2010–11, PER YEAR, TONNES



Source: Sustainability Victoria, *Regional Waste and Resource Recovery Projection Model*, v 1.1, 2013

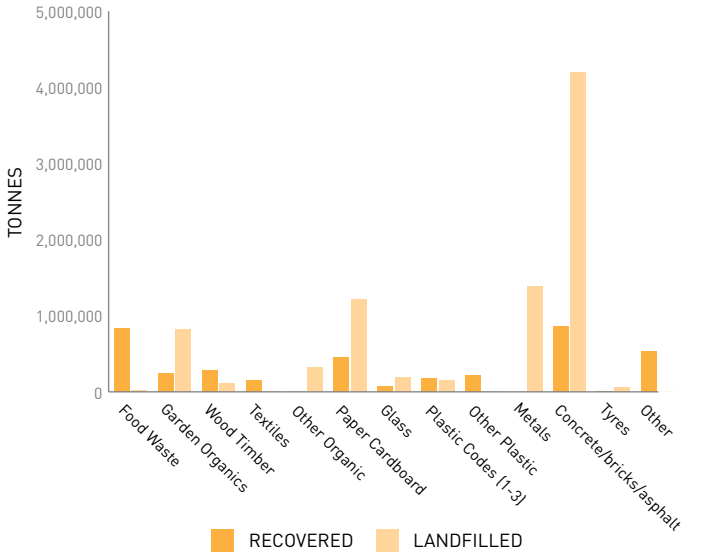
4.2.2 Material streams

Table 4.3 shows the tonnages of materials recovered, landfilled and generated, and the percentage recovered, in 2010–11.

Figure 4.7 shows that the proportion of materials recovered varies considerably for each of the major material streams.

As Table 4.3 and Figure 4.7 show, a considerable amount of organic waste goes to landfill. In 2011, Victoria generated about 4 million tonnes of organic waste: about 1.9 million tonnes of this went to landfill. This included food waste from households and industry, garden organics, timber and some paper and cardboard based products. This waste is biologically active and can generate odours, leachate and greenhouse gases. All of these must be managed, at a cost to the community.

FIGURE 4.7
MATERIAL STREAMS RECOVERED AND LANDFILLED, 2010–11



Source: Sustainability Victoria, *Regional Waste and Resource Recovery Projection Model*, v 1.1, 2013

9 Waste Management and Environment, *Inside Waste Industry Report*, p. 90, 2011–12

TABLE 4.3
MAIN MATERIALS RECOVERED, LANDFILLED AND GENERATED, 2010–11[1]

Material		Recovered (tonnes)	Landfilled (tonnes)	Generated (tonnes)	Recovered (%)
Organics	Food waste	22,000	832,000	854,000	3
	Garden organics	815,000	242,000	1,057,000	77
	Wood/timber	107,000	285,000	393,000	27
	Textiles	5,000	146,000	150,000	3
	Other organic[2]	320,000	n/a	320,000	n/a
	Sub total	1,269,000	1,505,000	2,774,000	
Co-mingled recyclables	Paper/cardboard	1,213,000	447,000	1,659,000	73
	Glass	196,000	76,000	271,000	72
	Plastics (codes 1–3)	146,000	178,000	324,000	45
	Other plastics	n/a	216,000	216,000	n/a
	Sub total	1,555,000	916,000	2,470,000	
Tyres and rubber		55,000	6,000	61,000	90
Metals		1,390,000	65,000	1,455,000	96
Concrete/bricks/asphalt		4,194,000	861,000	5,055,000	83
Other		0	531,000	531,000	n/a
Total		**8,462,000**	**3,885,000**	**12,347,000**	**69**

Notes

1 Waste generated equals waste recovered plus waste to landfill. Landfill data is from Environment Protection Authority Victoria landfill levy receipts (unpublished). Recovered data is from *Victorian Recycling Industry Annual Survey* (revised) 2010–11 (unpublished at the time of this draft).

2 Includes agricultural waste.

TABLE 4.4
WASTE RECOVERED, LANDFILLED AND GENERATED, BY SECTOR, 2010–11[1]

	MSW (tonnes)	C&I (tonnes)	C&D (tonnes)	Totals (tonnes)
Recovered	1,675,000	2,684,000	4,103,000	8,462,000
Landfilled	1,651,000	1,385,000	849,000	3,885,000
Generated	3,326,000	4,069,000	4,952,000	12,347,000
Recovery rate	50%	66%	83%	

Note

1 Waste generated equals waste recovered plus waste to landfill. Landfill data is from EPA landfill levy receipts (unpublished). Recovered data is from *Victorian Recycling Industry Annual Survey* (revised) 2010–11 (unpublished at the time of this draft).

4.2.3 Sectors

Figure 4.8 shows the trends in landfill and recovery from each sector for the period between 2002–03 and 2010–11. Total waste generated is represented by the sum of the material recovered plus waste to landfill.

Table 4.4 and Figure 4.9 show the amount of waste from each sector that was recovered, landfilled and generated, and the recovery rate, in 2010–11. The landfill data in this section is in net tonnages[10] unless otherwise stated.

Table 4.4 shows that the C&D sector achieved the highest recovery rate (83%) of the three sectors. This is strongly influenced by the *Towards Zero Waste* recovery target, which was measured by weight, driving the industry to remove heavier materials (such as concrete and rubble) before sending the residual waste to landfill. This established a recovery industry for recycled concrete and aggregate, but anecdotal evidence suggests it also resulted in stockpiling.

Figure 4.10 shows that quantities of materials recovered from all sectors have increased since 2003–04.

4.2.3.1 Municipal solid waste

Table 4.5 shows the tonnages of MSW materials recovered, landfilled and generated in 2010–11. It shows that of the 3.33 million tonnes of MSW generated, 1.66 million tonnes (50%) was recovered.

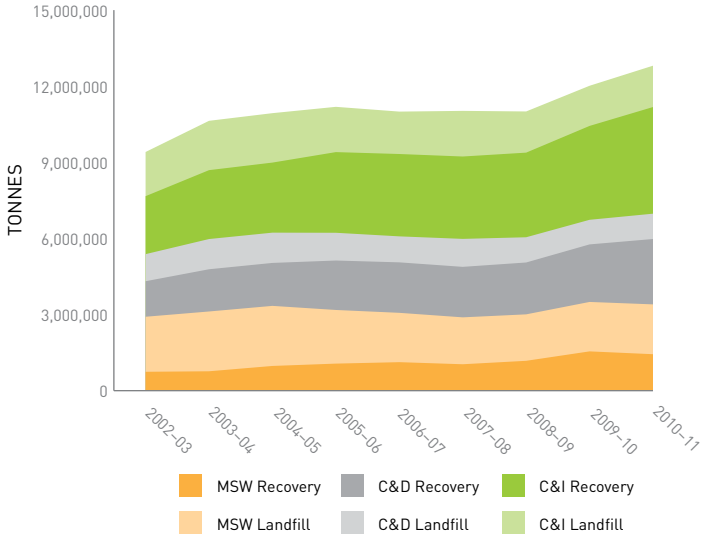
The largest component of MSW that goes to landfill is residual waste from kerbside collections and transfer stations and resource recovery centres. An estimated 40%[11] of the contents of household residual waste bins in Victoria is food waste. It is difficult to recover this waste because it is contaminated. Other sources of MSW include litter bins and traps, illegal dumping and litter clean-up, hard waste collections and street sweepings.

Table 4.6 shows the main items recovered from MSW. It shows that the largest single stream of materials recovered from MSW was garden organics, representing 47% of the total materials recovered.

10 Net tonnages are determined from the landfill levy receipts and are corrected to remove the 15% daily cover allowance.

11 Sustainability Victoria, *Kerbside Garbage Composition: Recent Findings*, 2008. Search for 'Kerbside Garbage Composition — Sustainability Victoria'.

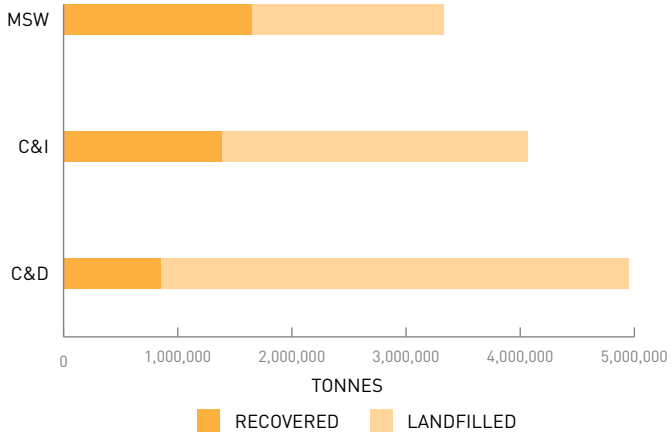
FIGURE 4.8
TRENDS IN LANDFILL AND RECOVERY FROM THE MSW, C&I AND C&D SECTORS FOR THE PERIOD 2002–03 TO 2010–11



Note

1 Data sourced from the *Victorian Recycling Industry Annual Survey* and landfill levy receipts.

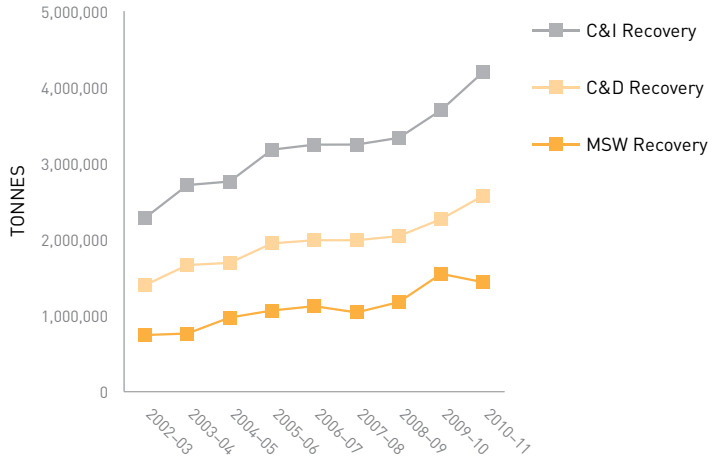
FIGURE 4.9
WASTE RECOVERED AND LANDFILLED, BY SECTOR, 2010–11[1]



Note

1 Waste generated equals waste recovered plus waste to landfill. Landfill data is from Environment Protection Authority Victoria landfill levy receipts (unpublished). Recovered data is from the *Victorian Recycling Industry Annual Survey* (revised) 2010–11 (unpublished at the time of this draft).

FIGURE 4.10
MSW, C&I AND C&D RECOVERED, 2003–04 TO 2010–11, TONNES



Source: Sustainability Victoria, *Victorian Recycling Industry Annual Survey*, 2010–11

TABLE 4.5
MSW RECOVERED, LANDFILLED AND GENERATED, BY MATERIAL STREAM, 2010–11[1]

Material		Recovered (tonnes)	Landfilled (tonnes)	Generated (tonnes)
Organics	Food waste	0	595,000	595,000
	Garden organics	742,000	122,000	864,000
	Wood/timber	16,000	5,000	21,000
	Textiles	4,000	44,000	48,000
	Other organic[2]	15,000	n/a	16,000
Commingled recyclables	Paper/cardboard	315,000	180,000	495,000
	Glass	116,000	47,000	163,000
	Plastics (codes 1–3)	56,000	65,000	121,000
	Other plastics	0	89,000	89,000
Tyres and rubber		n/a	n/a	n/a
Metals		233,000	28,000	261,000
Concrete/bricks/asphalt		178,000	21,000	199,000
Other		0	456,000	456,000
Total		**1,675,000**	**1,651,000**	**3,326,000**

Notes

1 Waste generated equals waste recovered plus waste to landfill. Landfill data is from Environment Protection Authority Victoria landfill levy receipts (unpublished). Recovered data is from *Victorian Recycling Annual Survey* (revised) 2010–11 (unpublished at the time of this draft).

2 Includes agricultural waste.

TABLE 4.6
MSW RECOVERED, BY ITEM AND COLLECTION SERVICE, 2010–11

Main Items Recovered	Kerbside (tonnes)	Drop-Off (tonnes)	Total (tonnes)	Total (%) (approx.)
Plastic containers	53,000	5,000	58,000	5
Paper	383,000	12,000	394,000	32
Glass containers	165,000	2,000	167,000	14
Steel cans	15,000	7,000	21,000	2
Aluminium cans	7,000	0	7,000	<1
Garden organics	390,000	175,000	565,000	47
Total	**1,013,000**	**201,000**	**1,213,000**	

Source: Sustainability Victoria, *Victorian Local Government Annual Survey,* Table 27, Melbourne, 2010–11

Note

The data is not complete, as it does not include materials recovered from transfer stations and resource recovery facilities residual waste, local government operations and hard waste collections. This accounts for the difference in the total amounts recovered in Table 4.21 above and Table 4.22 below.

TABLE 4.7
C&I WASTE RECOVERED, LANDFILLED AND GENERATED, BY MATERIAL STREAM, 2010–11[1]

Material		Recovered (tonnes)	Landfilled (tonnes)	Generated (tonnes)
Organics	Food waste	22,000	237,000	260,000
	Garden organics	73,000	97,000	170,000
	Wood/timber	46,000	181,000	227,000
	Textiles	<1,000	90,000	91,000
	Other organic[2]	300,000	n/a	300,000
Commingled recyclables	Paper/cardboard	898,000	260,000	1,158,000
	Glass	80,000	28,000	108,000
	Plastics (codes 1–3)	87,000	102,000	189,000
	Other plastics	0	122,000	122,000
Tyres and rubber		55,000	6,000	61,000
Metals		1,066,000	31,000	1,097,000
Concrete/ bricks/asphalt		56,000	161,000	217,000
Other		0	70,000	70,000
Total		**2,684,000**	**1,385,000**	**4,069,000**

Notes

1 Waste generated equals waste recovered plus waste to landfill. Landfill data is from Environment Protection Authority Victoria landfill levy receipts (unpublished). Recovered data is from the *Victorian Recycling Industry Annual Survey* (revised) 2010–11 (unpublished at the time of this draft).

2 Includes agricultural waste.

4.2.3.2 Commercial and industrial

Table 4.7 shows the tonnages of C&I materials recovered, landfilled and generated in 2010–11. It shows that of the 4.07 million tonnes of C&I waste generated, 1.38 million tonnes (66%) was recovered.

Sustainability Victoria (SV) is currently researching material flows by industry in the C&I sector. This research will be completed in time for the final *Statewide Waste and Resource Recovery Infrastructure Plan*.

4.2.3.3 Construction and demolition

Table 4.8 shows the tonnages of C&D materials recovered, landfilled and generated in 2010–11. It shows that of the 4,952,000 tonnes of C&D waste generated 4,099,000 tonnes (88%) was recovered.

TABLE 4.8
C&D WASTE RECOVERED, LANDFILLED AND GENERATED, BY MATERIAL STREAM, 2010–11[1]

Material		Recovered (tonnes)	Landfilled (tonnes)	Generated (tonnes)
Organics	Food waste	0	‹1,000	‹1,000
	Garden organics	0	23,000	23,000
	Wood/timber	45,000	100,000	145,000
	Textiles	0	11,000	11,000
	Other organic[2]	0	0	4,000
Commingled recyclables	Paper/cardboard	0	7,000	7,000
	Glass	0	‹1000	‹1,000
	Plastics (codes 1–3)	3,000	11,000	14,000
	Other plastics	0	5,000	5,000
Tyres and rubber		n/a	n/a	n/a
Metals		91,000	6,000	97,000
Concrete/bricks/asphalt		3,960,000	679,000	4,640,000
Other		0	6,000	6,000
Total		**4,103,000**	**849,000**	**4,952,000**

Source: Sustainability Victoria, *Victorian Local Government Annual Survey,* Table 18, Melbourne, 2010–11

Notes

1 Waste generated equals waste recovered plus waste to landfill. Landfill data is from Environment Protection Authority Victoria landfill levy receipts (unpublished). Recovered data is from the *Victorian Recycling Industry Annual Survey* (revised) 2010–11 (unpublished at the time of this draft).

2 Includes agricultural waste.

4.3 Projected waste generation

4.3.1 Population projections

Figure 4.11 shows that Victoria's population is expected to grow to 8.7 million by 2051. Waste generation per capita has increased by an average rate of 4% per year over the past decade. We need to understand the impact of this growth on waste management and resource recovery infrastructure, if we are to successfully plan for the future.

4.3.2 Resource recovery scenarios

Using its *Waste and Resource Recovery Projection Model*, SV has made projections for three resource recovery scenarios.

- Business as usual (BAU)
  The recovery rate remains at the most recently recorded level (which, as there is no improvement in recovery rates, is the worst case scenario)
- Moderate additional diversion
  By 2041–42, the quantity of recovered tonnes exceeds BAU by 0.75 million tonnes over the period
- High additional diversion
  By 2041–42, the quantity of recovered tonnes exceeds BAU by 1.5 million tonnes over the period (this is the best case scenario).

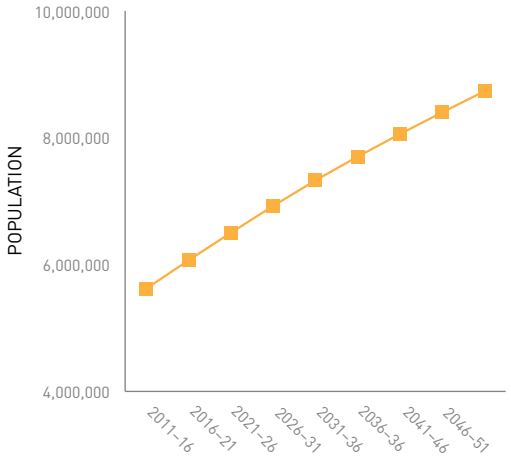
While the model uses the best available data, it has a number of limitations which users of the data need to consider.

- The model overestimates the proportion of the total volumes of waste recovered from the C&D and C&I sectors (because it uses past trends to project future trends, and recovery trends in these sectors were very high for several years before 2010–11: C&D waste generation grew from about 1.4 million tonnes in 2003–04 to 2.3 million in 2010–11, and in the C&I sector from about 2.3 million tonnes to 3.7 million tonnes over the same period).
- The model actually models solid industrial waste (SIW) and then splits it into C&D and C&I sector streams, based on landfill waste audits in 2005.
- The model's generation projections are the sum of the projections for landfill and for recovery, and are therefore only indicative of generation.

As a result, users should consider the model as giving a good estimate of total amounts going to landfill and total amounts recovered, but providing only an indication of the sector breakdown.

Unless stated all projections cited in this document are based on the BAU projection. There is further information about the model in Section 9 Appendices.

FIGURE 4.11
PROJECTED POPULATION GROWTH, VICTORIA, 2011–2051



Source: Department of Planning and Community Development, *Victoria in the Future 2012: population and household projections 2011–2031 for Victoria and its regions*, Melbourne, 2012

4.4 Projected waste recovery and disposal

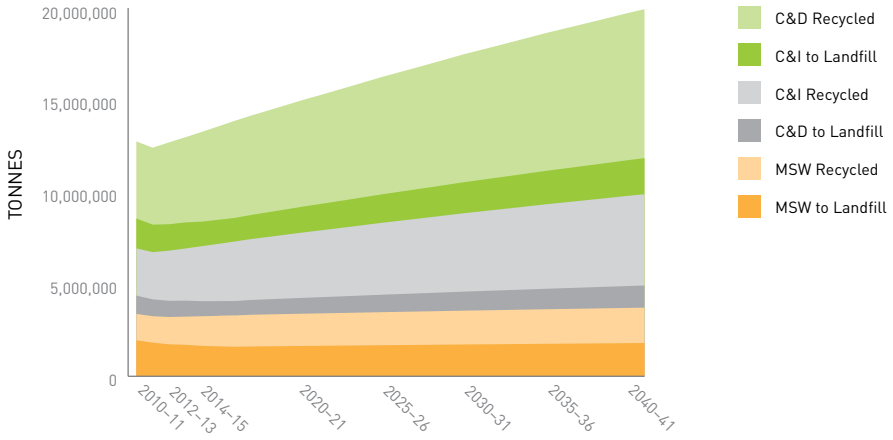
4.4.1 Victoria

Figure 4.12 shows projections—using the BAU scenario—for each sector of waste being recovered and going to landfill, for the next 30 years. The amount of waste generated is the sum of waste landfilled and waste recovered.

The reliability of these projections is qualified by the assumptions and limitations of the model (which are explained in Appendix 8.1), and by other factors that cannot be reliably predicted (such as market demand for end products), and the level of investment in advanced waste treatment and other resource recovery infrastructure, and on the success of waste minimisation strategies. Table 4.9 shows projected quantities waste requiring disposal to landfill in each WMG area from 2041–42, compared to what went to landfill in 2011–12, under a business-as-usual scenario.

As Table 4.9 shows, trends differ between regions, reflecting different regional population growth predictions.

FIGURE 4.12
WASTE RECOVERED AND LANDFILLED PROJECTIONS, BAU SCENARIO, 2012–13 TO 2041–42



Source: Sustainability Victoria, *Waste and Resource Recovery Projection Model,* v1.1, 2013

4.4.2 Sectors

4.4.2.1 Municipal solid waste

Commingled recyclables and residual waste

Table 4.10 shows the increase in the tonnages of commingled recyclables and residual waste projected through kerbside collection services in 2041–42, compared to what was collected in 2011–12. It shows that residual waste for kerbside collection is projected to grow in line with population and increase by about 350,000 tonnes over the next 20 years.

MSW waste projections are based on trends in kerbside collection services as this is the largest component of MSW and there is good data available. The growth in volumes of MSW commingled recyclables and residual waste will mostly be influenced by population growth and the number of households with access to commingled recycling services. As 97% of Victorian households already have access to these services, the main factor influencing projections is population growth.

Increasing the amount of materials recovered from residual waste will increase the ratio of materials recovered to that landfilled. However, it is unlikely in the short term that the total amount of waste being generated will decrease, due to population growth.

4.4.2.2 Garden organics

The growth in the volume of garden organics generated will be influenced by the number of households, the total population, the number of local governments offering a garden organics collection service, and the type of service they offer. Projecting this growth is problematic: there has been a significant increase in garden organics collection services offered since 2002–03, but it is not certain that this trend will continue. The amount of garden organics collected has increased from 141,000 tonnes in 2002–03 to 390,000 tonnes in 2010–11. Even so, only 48% of households have access to garden organics collection services.

4.4.2.3 Commercial and industrial; Construction and demolition

The landfill projection model generates projected data for SIW because it is based on data collected from landfill levy receipts which group C&D and C&I waste as SIW. Table 4.11 compares the projected SIW for each WMG area for the year 2011–12 and 2040–41.

The projections for C&I and C&D sector streams can be estimated by splitting SIW 62% for C&D and 38% for C&I.

TABLE 4.9
WASTE LANDFILLED, BY PROPOSED WASTE MANAGEMENT GROUP AREAS 2011–12 AND 2041–42[1]

WMG Area	2011–12 Total (tonnes)	2041–42 Total (tonnes)
Metropolitan Melbourne	3,121,000	3,621,000
Barwon South West	490,000	368,000
Gippsland	155,000	164,000
Goulburn Valley	110,000	169,000
Grampians Central West	687,000	799,000
Loddon Mallee	151,000	115,000
North East	32,000	30,000
Total	**4,744,000**	**5,266,000**

Source: Sustainability Victoria *Regional Waste and Resource Recovery Projection Model*, v 1.1, 2013

Notes

1 All figures in the table are gross tonnes with no adjustment for a daily cover allowance.

2 These figures are rough estimates of the amount of waste generated in the Desert Fringe and transported to landfills outside the area.

TABLE 4.10
PROJECTED TONNAGES OF MSW RECOVERED, LANDFILLED AND GENERATED, 2010–11 TO 2040–41

Year	Population	Recovered (tonnes)	Landfilled (tonnes)	Generated (tonnes)
2010–11	5,535,000	1,437,000	1,964,000	3,401,000
2020–21	6,501,000	1,757,000	1,652,000	3,410,000
2030–31	7,327,000	1,845,000	1,734,000	3,579,000
2040–41	8,058,000	1,922,000	1,807,000	3,728,000

Source: Sustainability Victoria *Regional Waste and Resource Recovery Projection Model* v 1.1, 2013.
The amount generated is the sum of the amounts landfilled and recovered.

TABLE 4.11
PROJECTED TONNAGES OF SIW RECOVERED, LANDFILLED AND GENERATED, 2010–11 TO 2040–41

Year	Population	Recovered (tonnes)	Landfilled (tonnes)	Generated (tonnes)
2010–11	5,535,000	6,779,000	2,628,000	9,408,000
2020–21	6,501,000	9,350,000	1,940,000	11,290,000
2031–32	7,400,000	11,428,000	2,371,000	13,798,000
2040–41	8,058,000	12,946,000	2,686,000	15,632,000

5. Resource recovery

Sustainability victoria
State Government Victoria

5.1 Introduction

Resource recovery is the selective removal of material streams from waste for a specific next use. Resource recovery infrastructure:

- sorts waste that has been collected or dropped off
- consolidates materials
- reprocesses materials to produce a marketable product.

The types of resource recovery infrastructure examined in this section are transfer stations, resource recovery centres, drop-off facilities and materials recovery facilities (MRF).

Most resource recovery facilities contain more than one type of infrastructure — both a transfer station and a resource recovery facility, for example, and for that reason the two are combined in the draft *Statewide Waste and Resource Recovery Infrastructure Plan (SWRRIP)* using the acronym transfer station and resource recovery centre (TS/RRC).

Resale centres are often attached to recovery facilities but because they are not generally the focus they are not examined in this section. Reprocessing facilities, which convert waste materials into saleable products, are examined in Section 6.

5.2 Data considerations

The available data on waste received and dispatched by resource recovery facilities is limited. Table 5.1 and Table 5.2 show the state of the data.

As Table 5.1 and Table 5.2 show, the main sources of data are the *Victorian Local Government Annual Survey (VLGAS)* and the *Victorian Recycling Industry Annual Survey (VRIAS)*. Information about these surveys can be found in Section 1.8 Data modelling considerations.

5.3 Victoria

Number, type and location

In Victoria, there are 255 TS/RRCs, 33 drop-off facilities and 19 MRFs. Table 5.3 and Figure 5.1 show recovery facilities, by type and by area.

The *SWRRIP* analysis identified and mapped the major recovery facilities, by type and proposed waste management group area (WMG). This map can be found in Section 9, Figure 9.1.

Figure 5.1 shows the distribution of local government operated facilities across the state.

TABLE 5.1
DATA SOURCES FOR WASTE INTO TS/RRCS, DROP-OFF FACILITIES AND MRFS

	TS/RRCs and Drop-Off Facilities				MRFs	
	Via Kerbside Collection		Dropped Off			
	Kerbside Residual Waste and Garden Organics	Commingled Recyclables	Residual Waste	Garden Organics and Commingled Recyclables	Commingled Recyclables	Other Sources
Metropolitan areas	Incomplete: Some data from Metropolitan WMG research[1]	Unknown	Incomplete: Some data from Metropolitan WMG research, some from *VLGAS*	Robust *VLGAS*	Robust *VLGAS*	Unknown
Regional areas	Unknown			Robust *VLGAS*	*VRIAS* and *VLGAS*	Unknown

TABLE 5.2
DATA SOURCES FOR MATERIALS OUT OF TS/RRCS, DROP-OFF FACILITIES AND MRFS

	TS/RRCs and Drop-Off Facilities							MRFs	
	Kerbside Consolidation at TS/RRCs			Dropped Off					
	Residual Waste	Organics	Commingled Recyclables	Residual Waste	Organics	Commingled Recyclables	Other	Material Volume	Material Dest'n
Metropolitan	Dest'n, volume known	Dest'n, volume known	Not known	Dest'n, volume known	Dest'n, volume known	Volume known	Dest'n, volume unknown	*VLGAS*	Not known
Non-metropolitan	Not known	Not known	Not known	Not known	Volume known	Volume known	Dest'n, volume known	*VRIAS*	Not known

TABLE 5.3
RECOVERY FACILITIES, BY TYPE AND PROPOSED WASTE MANAGEMENT GROUP AREAS

Waste Management Group Area	TS/RRC	Drop-Off Centres	MRF	Total
Metropolitan	38	4	7	49
Barwon South West	38	4	2	44
Gippsland	37	15	3	55
Goulburn Valley	31	3	0	34
Grampians Central West	56	6	3	65
Loddon Mallee	33	0	2	35
North East	22	1	2	25
Total	**255**	**33**	**19**	**307**

5.3.1 Transfer stations, resource recovery centres and drop-off facilities

TS/RRCs and drop-off facilities allow for the aggregation of waste collected through kerbside collection services from households and businesses, and waste dropped off directly at facilities. TS/RRCs allow residents to drop off waste for recycling or disposal, if they cannot put the waste in kerbside bins, or where there is no kerbside collection service. Consequently, they mainly handle municipal solid waste (MSW).

The term 'resource recovery centre' came into use about a decade ago to describe transfer stations. Traditionally, a transfer station collected and consolidated waste before sending it to landfill. It did not sort materials for reprocessing. Over time, many transfer stations have evolved into resource recovery centres: that is, they also recover from waste reusable and recyclable materials that would otherwise be sent to landfill. In practice, the difference between a transfer station and resource recovery centre is blurred and many facilities perform both functions. Resource recovery centres and transfer stations may also include drop-off facilities.

Figure 5.2 illustrates the growth in publicly owned and operated TS/RRCs and drop-off facilities since 2000–01. This growth corresponds to a decrease in the number of landfills.

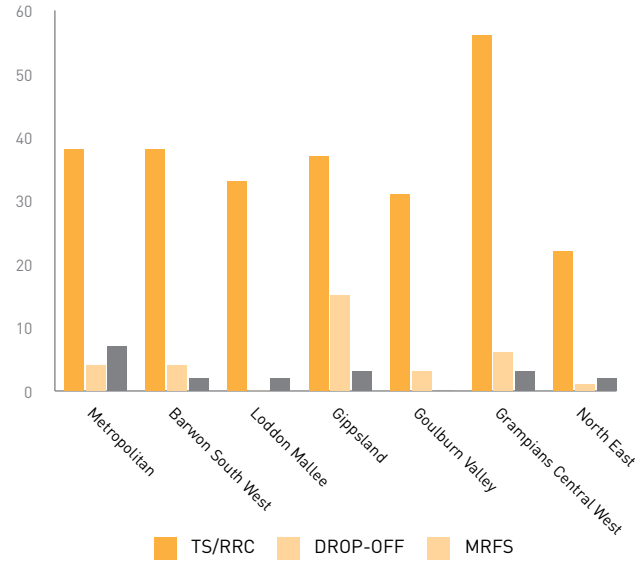
Most of these facilities sort and consolidate garden organics and kerbside commingled recyclables into quantities that are economically viable to transport, either for reprocessing or disposal to landfill. In metropolitan Melbourne, some dedicated facilities consolidate kerbside residual waste for bulk transport to landfill or reprocessing.

Facilities across the state vary significantly in size, types of services offered and the materials they accept. In remote areas, TS/RRCs may be limited to a small trailer that is emptied or collected periodically. In some cases, they sit in front of a landfill so that recyclables (that would otherwise be landfilled) can be removed. Many TS/RRCs and landfills have retail shops to sell diverted materials.

In regional areas, facilities are mostly owned by local governments. Some may contract management out to private service providers. In metropolitan Melbourne, eight of the 42 facilities are privately owned. Private facilities are more likely to accept non-municipal waste. Some MRF operators (such as SKM and Visy) also operate transfer stations to consolidate materials going to their MRFs.

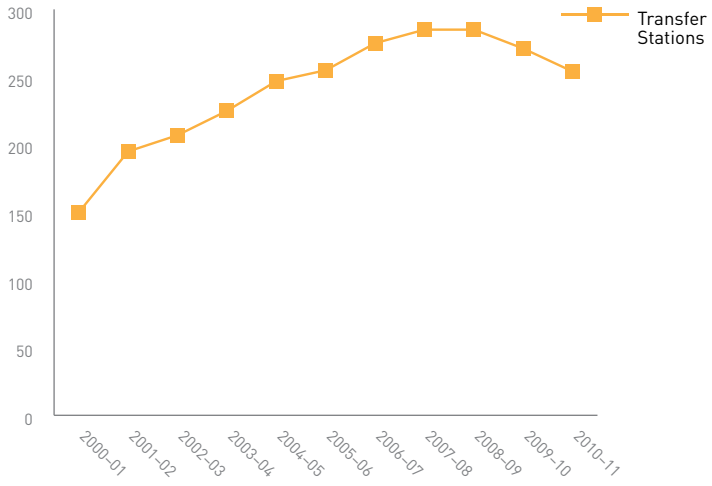
An important function of TS/RRCs and drop-off facilities is to augment kerbside collection systems. This is especially important in regional areas, where kerbside systems may be limited or non-existent.

FIGURE 5.1
RECOVERY FACILITIES OWNED BY LOCAL GOVERNMENTS, BY PROPOSED WASTE MANAGEMENT GROUP AREA



Source: Sustainability Victoria, *draft Statewide Waste and Resource Recovery Infrastructure Plan,* data set (unpublished), 2013

FIGURE 5.2
TREND IN NUMBERS OF TS/RRCS AND DROP-OFF FACILITIES, 2000–01 TO 2010–11



Source: Sustainability Victoria, *Victorian Recycling Industry Annual Survey,* 2010–11

Note

No data was collected for the 2003–04 period but the trend has been extrapolated from existing data.

5.3.2 Materials recovery facilities

A MRF receives, separates and prepares recyclable materials for marketing to end user manufacturers. In Victoria, they are mainly used to separate household and commercial commingled recyclables into material streams, including plastics, paper and cardboard, glass, steel and aluminium. The degree to which they can separate recyclables depends on the technology they use, which continues to improve rapidly.

Most of Victoria's larger MRFs are located in metropolitan Melbourne and receive feedstock from metropolitan and regional areas. Table 5.4 shows there are seven MRFs in metropolitan Melbourne and 11 MRFs spread across eight of the regions. MRFs are privately owned and operated. Several operators own more than one MRF across the state.

The SKM and Visy MRFs are supported by transfer stations operated by these companies in Laverton and Mornington.

Several regional MRFs operate as an Australian disability enterprise, employing people with a disability. These facilities use hand picking to a greater extent than do other MRFs. For example, VATMI operates three MRFs as Australian disability enterprises in regional Victoria, with the largest in Bendigo. Metropolitan MRFs are much larger in scale and rely more on advanced mechanical sorting equipment.

TABLE 5.4
MATERIAL RECYCLING FACILITIES IN VICTORIA

Facility/Owner	Location
Polytrade Recycling	Hallam/Darebin/ Dandenong
SKM Recycling	Coolaroo
Visy	Banyule
Visy	Springvale
Green Triangle	Portland
SKM	Geelong
Visy	Geelong
Mildura Bottle Exchange	Mildura
VATMI	East Bendigo
Dasma Group	Morwell
Wonthaggi Recyclers	Wonthaggi
Tambo Waste	Lakes Entrance
VATMI	Stawell
Wastebusters Recycling	Horsham
Hepburn MRF	Hepburn
VATMI	Wangaratta
TPI Wodonga	Wodonga

Clean and Dirty MRFs

Clean MRFs generally only accept commingled materials that have already been separated at the source from MSW (for example, the contents of the 240 litre household commingled recyclables bin). They usually use a mechanical process to separate materials using characteristics such as weight, size, magnetism and optical density.

Dirty MRFs accept residual waste and separate out recyclable materials using manual and mechanical sorting.

Each type of MRF has a quite different design and technology because of the different types and characteristics of the feedstocks.

Most MRFs in Victoria are clean, although there could be potential for high volume, dirty MRFs in major cities to sort recyclables from a dry, commercial and industrial (C&I) residual waste stream.

5.4 Material quantities

5.4.1 Quantities entering facilities

Table 5.5 shows the source and quantities of waste entering TS/RRCs, drop-off facilities and MRFs in 2010–11.

The total amount of MSW waste entering TS/RRCs in non-metropolitan areas is not known, due to lack of reporting of residual waste going from TS/RRCs to landfills, and of MSW dropped off. The *VLGAS* shows a very small percentage of residual waste being collected through regional TS/RRCs.

Information from local governments about metropolitan TS/RRCs and drop-off facilities (not including privately owned facilities) indicates around 276,000 tonnes of waste was dropped off by residents or small vehicles in 2010–11. This suggests that in metropolitan Melbourne, more than 23% of MSW residual waste (which is landfilled) is being dropped off at TS/RRCs and drop-off facilities.

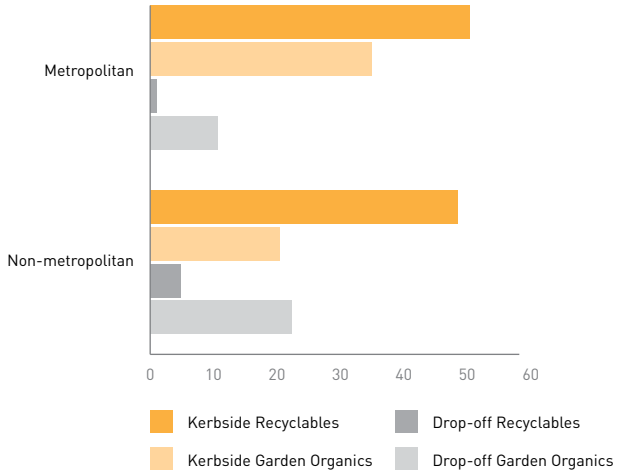
Sustainability Victoria is currently undertaking research to identity the volume and types of materials that are going to landfill from regional TS/RRCs and drop-off facilities.

In regional areas, waste collected at TS/RRCs and drop-off facilities plays a large role in supplementing kerbside collection systems.

VLGAS estimates that in regional areas, 17% of MSW is sourced through TS/RRCs and drop-off facilities: in metropolitan Melbourne it is closer to 6%. Figure 5.3 shows the discrepancy between metro and non-metro areas is greatest with garden organics.

Most sorting of kerbside collected waste is done by MRFs in Melbourne. In 2010–11, they received an estimated 448,000 tonnes from metropolitan Melbourne local governments and 85,000 tonnes from regional Victorian local governments.

FIGURE 5.3
COMPOSITION OF RECYCLABLES AND GARDEN ORGANICS FROM MSW KERBSIDE SERVICES AND DROP-OFF FACILITIES, VICTORIA 2010–11



Source: Sustainability Victoria, *Victorian Local Government Annual Survey,* 2010–11

TABLE 5.5
WASTE INTO TS/RRCS, DROP-OFF FACILITIES AND MRFS, BY SOURCE, 2010–11, TONNES

	TS/RRCs and drop-off facilities						MRFs	
	From kerbside collections			Dropped off				
	Residual waste	Organics	Commingled	Residual waste	Organics	Commingled	MSW commingled	C&I recyclables
Metropolitan	94,000	44,000	n/a	267,000	75,000	9,000	533,000	n/a
Regional	n/a	n/a	n/a	n/a	100,000	17,000	115,000	n/a

Source: This data represents an estimate only and is sourced from a range of sources including *Victorian Local Government Annual Survey*, and a Metropolitan Waste Management Group 2013 review of metropolitan transfer stations and resource recovery centres and drop-off facilities.

Note

The 2010–11 *Victorian Local Government Annual Survey* identified 26,000 tonnes of garbage that was dropped off at regional transfer stations and resource recovery centres and drop-off facilities. This is thought to be a small proportion of the total for the state.

5.5 Material flows

5.5.1 To transfer stations and resource recovery facilities

The main material flows into TS/RRCs and drop-off facilities are either via drop off from the community or via kerbside collection trucks. In most cases, waste is sorted and materials prepared for transport to a reprocessor, with the residual waste being sent to landfill.

The distance that materials are transported for reprocessing depends on the commodity value of the materials. In metropolitan Melbourne, most materials are reprocessed in the metropolitan area. In regional Victoria, materials are transported to a reprocessing hub for each particular material. Where this is located depends on a range of factors including who has the contract, the type of material and the cost of transport.

In the metropolitan and surrounding areas, privately owned transfer stations are used to consolidate material streams before disposal to landfill. These include:

- SKM Recycling's transfer stations in Mornington and Laverton, and Visy's transfer stations in Laverton and Geelong (which consolidate kerbside residual waste or recyclables for transport to landfills or MRFs)
- kerbside garden organics which are consolidated at a number of transfer stations in the metropolitan area for transport to the Barro Quarries and Dutson Downs for processing
- commercial and industrial (C&I) waste from the Calleja transfer stations at Altona and Coburg which is sent to the Maddingley Brown Coal Landfill in Bacchus Marsh, which accounts for a significant quantity of C&I waste sent to landfill (Calleja also sends garden organics for composting at the Maddingley Brown Coal facility).

There is significant movement of organic material to both the Barro Quarries (67,000 tonnes in 2010–11) at Point Wilson and to Dutson Downs (51,600 tonnes in 2010–11) at Longford, in Gippsland.

5.5.2 To material recovery facilities

While TS/RRCs and drop-off facilities do some sorting, most commingled recyclables are sorted at MRFs. Commingled recyclables sourced from the kerbside collection system and from drop-off facilities travel to MRFs in metropolitan Melbourne and larger regional centres. In the past decade, increasing amounts have gone to metropolitan MRFs, contributing to the closure of MRFs in Shepparton and Swan Hill in recent years.

In 2010–11, metropolitan MRFs received an estimated 533,000 tonnes of recyclables, of which 85,000 tonnes was sourced from regional local governments. This is equivalent to an estimated 82% of all kerbside collections. In 2010–11 non-metropolitan MRFs received 115,000 tonnes of recyclables. Almost half of this amount was processed in Geelong. SKM transports some semi-sorted materials (such as mixed plastics and glass) from its Geelong MRF to its Coolaroo MRF for further processing.

This movement of materials to Melbourne appears to be a result of the greater economies of scale achieved by the larger MRFs, the commodity value of the recyclables and reduced transport costs from using B-double trucks. This trend—of increasing transfer of recyclables to Melbourne—appears set to continue as local government contracts are retendered. This concentrates the processing of commingled recyclables in metropolitan Melbourne and Geelong.

Movement of commingled recyclables is determined by local government contracts and destinations can change rapidly. As part of the *SWRRIP* analysis the destinations of kerbside collected commingled recyclables was mapped. This map can be found in Section 10, Figure 10.2. The colours represent the destination MRFs. However since this map was contrasted in early 2013 , there have been three changes: Hepburn Shire recyclables now go to SKM in Geelong via Ballarat, South Gippsland recyclables go to Polytrade in Dandenong, and Horsham and Stawell send their recyclables to Warrnambool.

Currently, the only MRFs that service single local governments are in Portland, Mildura and Daylesford.

5.5.3 To landfills

Residual waste from TS/RRCs, drop-off facilities and MRFs that cannot be reprocessed economically goes to landfill. In regional areas, this tends to be to the local landfill, which is often co-located with the transfer station. With the recent trend to replace landfills with transfer stations residual waste is combined with kerbside household residual waste.

5.6 Infrastructure capacity

5.6.1 Current capacity

Development of the draft *SWRRIP* did not include a comprehensive analysis of the capacity of Victoria's TS/RRCs, drop-off facilities and MRFs but the following was found.

- Most current TS/RRCs, drop-off facilities and MRFs are designed around the three bin kerbside collection system, which limits their ability to accept C&I and construction and demolition (C&D) waste.
- Technology is available to improve sorting and separation rates, and reduce contamination of some material streams; but it is expensive, and needs large volumes to achieve the necessary economies of scale for economic viability.
- Some facilities stockpile materials, either because they receive too much waste or they don't have the ability to process what they do receive. In some cases, facilities stockpile waste while waiting to upgrade their sorting capacity. Stockpiling can increase environmental and social risks to the processor.
- C&I MRFs in Victoria recover significantly lower percentages of recyclables from their feedstock than do MSW MRFs. The financial viability and recovery rate of C&I MRFs could be increased by including other waste derived products (such as process engineered fuel) derived from the residue of the sorting process: an example of this is SITA's Wingfield plant in South Australia.

5.6.2 Future capacity

The future need for TS/RRCs and drop-off facilities will be largely determined by:

- changing demographics (such as population growth and density)
- the standard of existing infrastructure and its capacity to meet demand
- the closure of landfills, regional MRFs and some reprocessors
- changes to the kerbside collection system
- changes in market demand for recovered materials
- impacts on the amenity of neighbouring business and residents.

SV is currently researching opportunities to increase resource recovery by upgrading TS/RRCs and drop-off facilities in regional Victoria. Their findings will be available in late 2013 and will be included in the final *SWRRIP*.

In 2013, a review of metropolitan TS/RRCs and drop-off facilities identified the need to significantly increase their capacity to manage projected increases in kerbside MSW. Eleven local government TS/RRCs in metropolitan Melbourne consolidate MSW to go to landfill. Projected population growth provides some guide to the future capacity requirements of TS/RRCs and drop-off facilities. Some areas which will require greater capacity are the growth areas of Armstrong Creek in Barwon, Melbourne's north west suburbs, Casey and Cardinia in Melbourne's south east, and peri-urban parts of Mitchell Shire.

5.7 Waste management group area summaries

This section summarises resource recovery infrastructure by the proposed WMG areas resulting from the Ministerial Advisory Committee on Waste and Resource Recovery Governance Reform's recommendations (see Section 1). The regional summaries also include where appropriate issues that need to be considered and addressed in the development of the *regional waste and resource recovery implementation plans (WRRIP)*.

5.7.1 Metropolitan Melbourne

Metropolitan WMG area amalgamates the current Mornington Peninsula Regional Waste Management Group (RWMG) and Metropolitan WMG.

Number and type

Table 5.6 shows there are 49 TS/RRCs, drop-off facilities and MRFs in the proposed Metropolitan WMG region. Of these, 12 are privately owned and 37 are publicly owned.

Materials accepted

Facilities in the Metropolitan WMG area accept commingled recyclables, garden organics, timber, concrete, bricks, metals, cork, polystyrene, white goods, textiles, mattresses, fluorescent tubes, batteries, gas bottles, household chemicals, paint, cooking oil, motor oil, car batteries, tyres, oil filters, TVs, computers, CD/DVDs, mobile phones, electrical cables and other electrical equipment.

Some facilities incorporate recycled goods shops (such as the Knox Transfer Station Recycled Goods Shop, the Darebin Resource Recovery Centre's Outlook Market and the resale shop at the Mornington Resource Recovery Centre). Materials resold include furniture, timber, bricks and building material, clothes, toys and games, tools, collectables and bric-a-brac, books and household items.

Mornington Peninsula has three drop-off sites with hoppers for residents to leave household waste and recycling. Rye and Tyabb also collect drumMUSTER containers.

Cross regional flows

Significant cross regional flows of materials to the Metropolitan WMG area include:

- an estimated 80,000 tonnes a year of commingled recyclables from regional areas for processing at metropolitan MRFs
- residual waste from Macedon Ranges TS/RRCs (Calder) to the Sunbury Landfill (Metropolitan Melbourne)
- residual waste from the Colac Resource Recovery Centre (Calder) to the Werribee Landfill
- residual waste from the City of Greater Geelong TS/RRC (Barwon) to the Werribee Landfill.

Significant cross regional flows of materials out of the Metropolitan WMG area include:

- an estimated 67,000 tonnes a year of organic material from transfer stations and kerbside collection to the Barro Quarries at Point Wilson (Barwon)
- an estimated 52,000 tonnes of organics to Dutson Downs at Longford (Gippsland)
- an estimated 10,000 tonnes of waste plasterboard to Western Gypsum (Highlands) for reprocessing
- an estimated 5,000 tonnes of out-of-date and off-specification food waste to Castlegate James in Ballarat (Highlands Region) for conversion to stock feed.

Regional considerations

- The resource recovery infrastructure for the south east metropolitan area will need to support the options developed to address the depletion of available landfill airspace in Clayton area. It is likely to involve the strengthening of existing hubs and developing new hubs to increase the recovery of resources and consolidation of the remaining residual waste prior to transport for landfill.
- The resource recovery infrastructure in the Mornington Peninsula catchment will need to support the options developed due to the closure of the Rye landfill in 2017 and the potential closure of the Devilbend Landfill in 2022.
- It is unlikely that a solution would include establishing hubs of regional significance for either resource recovery or landfill. The viability of these hubs would be dependent on flows of materials from the greater metropolitan area and would be competing with established existing hubs. A more viable solution is likely to include establishing local hubs feeding the spokes supporting existing hubs or new hubs being established in the metropolitan area supported by the volumes of materials that will establish the economies of scale.

TABLE 5.6
RESOURCE RECOVERY FACILITIES, BY LOCAL GOVERNMENT AREA (LGA), IN THE PROPOSED METROPOLITAN WASTE MANAGEMENT GROUP AREA

Local Government Area	TS/RRCs	Drop-Off	MRFs	Total by LGA
Banyule City Council	1	0	1	2
Bayside City Council	1	0	0	1
Boroondara City Council	2	0	0	2
Brimbank City Council	2	0	0	2
Cardinia Shire Council	1	0	0	1
Casey City Council	1	0	1	2
Darebin City Council	1	0	1	2
Frankston City Council	0	0	0	0
Glen Eira City Council	0	0	0	0
Greater Dandenong City Council	1	0	2	3
Hobsons Bay City Council	0	0	0	0
Hume City Council	2	0	1	3
Kingston City Council	3	0	0	3
Knox City Council	2	0	0	2
Manningham City Council	0	0	0	0
Maribyrnong City Council	0	0	0	0
Maroondah City Council	1	0	0	1
Melbourne City Council	1	0	0	1
Melton Shire Council	1	0	0	1
Monash City Council	1	0	0	1
Moonee Valley City Council	1	0	0	1
Moreland City Council	1	0	0	1
Mornington Peninsula Shire Council	4	3	0	7
Nillumbik Shire Council	1	0	0	1
Port Phillip City Council	1	0	0	1
Stonnington City Council	1	0	0	1
Whitehorse City Council	1	0	0	1
Whittlesea City Council	2	0	0	2
Wyndham City Council	1	0	1	2
Yarra City Council	0	1	0	1
Yarra Ranges	4	0	0	4
TOTAL	**38**	**4**	**7**	**49**

5.7.2 Barwon South West

The proposed Barwon South West RWMG area amalgamates the current Barwon RWMG and South Western RWMG.

Number and type

Table 5.7 shows there are 44 resource recovery facilities, including 38 TS/RRCs, four small drop-off facilities and two MRFs, in the proposed Barwon South West RWMG area.

Materials accepted

Facilities in the Barwon South West RWMG area accept commingled recyclables, garden organics, timber, metal, tyres, concrete/bricks, mattresses, e-waste, drumMUSTER farm chemical containers, batteries, oil, mattresses, hard plastics and tyres. Selected sites accept additional items such as mattresses, furniture, timber and fluorescent tubes.

Facilities in the Moyne and Corangamite shires provide services to residents in rural communities that do not have kerbside collection services, and provide waste services within 20 km of most residents.

Cross regional flows

Significant cross regional flows of materials to resource recovery facilities in the Barwon South West RWMG area include:

- an estimated 67,000 tonnes a year of organic material to the Barro Quarries at Point Wilson from transfer stations and kerbside collection systems in metropolitan Melbourne
- residual waste from the Colac Resource Recovery Centre to the Corangamite Landfill at Naroghid (South Western) and Werribee Landfill (Metropolitan Melbourne)
- residual waste from the City of Greater Geelong Resource Recovery Centre to the Werribee Landfill (Metropolitan Melbourne).

Regional considerations:

- There are significant inter-regional flows of materials to resource recovery facilities in the region include residual waste from the Colac Resource Recovery Centre to the Corangamite Landfill at Naroghid
- The proposed region has several growth areas (including around Armstrong Creek) which could put pressure on existing TS/RRCs and drop-off facilities.
- The draft *SWRRIP* has identified a potential opportunity to increase the recovery of garden organics utilising cross regional flows from Geelong, Ballarat, Bendigo and potentially Shepparton. If established this would need to be supported by the appropriate TS/RRC infrastructure.
- There are a number of landfills in the RWMG area scheduled for closure in the short term. *Barwon South West (WRRIP)* should facilitate where appropriate transition of these sites from landfill to TS/RRC activities.

TABLE 5.7
RESOURCE RECOVERY FACILITIES, BY LGA, BARWON SOUTH WEST RWMG AREA

Local Government Area	TS/RRCs	Drop-Off	MRFs	Totals
Colac Otway Shire Council	4	4	0	8
Greater Geelong City Council[2]	3	0	2	5
Queenscliffe Borough Council	0	0	0	0
Surf Coast Shire Council	4	0	0	4
Corangamite Shire Council	5	0	0	5
Glenelg Shire Council	3	0	0	3
Moyne Shire Council	9	0	0	9
Southern Grampians Shire Council	8	0	0	8
Warrnambool City Council	2	0	0	2
Totals	**38**	**4**	**2**	**44**

Notes

1 The Visy materials recovery facility in Geelong currently processes relatively small quantities of commercially sourced recyclables.

2 Resale shops operate at the Drysdale and North Geelong resource recovery centres.

5.7.3 Gippsland

Number and type

Table 5.8 shows there are 55 resource recovery facilities, including 37 TS/RRCs, 15 drop-off facilities and three MRFs, in the Gippsland RWMG area.

Materials accepted

Facilities in the Gippsland RWMG area accept commingled recyclables, garden organics, timber, metal, tyres, concrete/bricks, mattresses, e-waste, TVs and related items, furniture, mattresses, expanded polystyrene, hard plastics, oil, whitegoods and tyres. Some facilities also accept fluorescent tubes and batteries. A few locations offer drumMUSTER collection services.

Regional considerations

- The transfer trailers in East Gippsland for domestic waste are essential for residents in remote areas, who have no other waste management options.
- There are a number of landfills in the Gippsland RWMG area scheduled for closure in the short term. The *Gippsland WRRIP* should plan facilitate where appropriate transition of these sites from landfill to TS/RRC activities.

5.7.4 Goulburn Valley

Number and type

Table 5.9 shows there are 34 resource recovery facilities, including 31 TS/RRCs and three small drop-off facilities, in the Goulburn Valley RWMG area.

Materials accepted

Facilities in the Goulburn Valley RWMG area accept commingled recyclables, garden organics, mattresses, tyres, whitegoods, scrap metals, timber, drumMUSTER containers and silage wrap (through the Plasback farm plastics recycling program).

Facilities in larger municipalities also accept e-waste, TVs and related items, furniture, hard plastics, batteries, oil and metals.

Cross regional flows

Significant cross regional flows of materials to resource recovery facilities in the region include residual waste from the Buloke Shire Transfer Station (Central Murray) to the Patho Landfill.

Regional considerations

The draft *SWRRIP* has identified a potential opportunity to increase the recovery of garden organics utilising cross regional flows from Geelong, Ballarat, Bendigo and potentially Shepparton. If established if established this would need to be supported by the appropriate TS/RRC infrastructure.

TABLE 5.8
RESOURCE RECOVERY FACILITIES, BY LGA, GIPPSLAND RWMG AREA

Local Government Area	TS/RRC	Drop-Off	MRFs	Total
Bass Coast Shire Council[1]	4	0	1	5
Baw Baw Shire Council	4	0	0	4
East Gippsland Shire Council	12	13[2]	1	26
Latrobe City Council[3]	4	2	1	7
South Gippsland Shire Council	6	0	0	6
Wellington Shire Council	7	0	0	7
Total	**37**	**15**	**3**	**55**

Notes

1 The Bass Coast Resource Recovery Centre is co-located at the Grantville Landfill. Bass Coast Council is scheduled to close their transfer station at Rhyll in June 2013.

2 East Gippsland Shire Council has 13 transfer trailers for residents in remote areas as drop-off points for domestic waste only. There is also a resale shop at the Lakes Entrance Landfill.

3 The two drop-off centres are for garden organics.

TABLE 5.9
RESOURCE RECOVERY FACILITIES, BY LGA, GOULBURN VALLEY RWMG AREA

Local Government Area	TS/RRCs	Drop-Off	MRFs	Total
Campaspe Shire Council[1]	8	0	0	8
Greater Shepparton City Council	3	0	0	3
Mitchell Shire Council[2]	4	0	0	4
Moira Shire Council	8	0	0	8
Murrindindi Shire Council	4	0	0	4
Strathbogie Shire Council[3]	4	3	0	7
Total	**31**	**3**	**0**	**34**

Notes

1 Two unmanned transfer stations at Colbinabbin and Toolleen are operated by local residents.
2 There are resale shops at Wallan Landfill and Shepparton Resource Recovery Centre.
3 The Strathbogie Shire Council operates three drop-off points for household waste and recycling.

TABLE 5.10
RESOURCE RECOVERY FACILITIES, BY LGA, PROPOSED GRAMPIANS CENTRAL WEST RWMG AREA

Local Government Area	TS/RRCs	Drop-Off	MRFs	Totals
Ararat Rural City Council	8	0	0	8
Horsham Rural City Council[1]	6	2	1	9
Northern Grampians Shire Council[2]	6	0	1	7
Yarriambiack Shire Council[3]	9	0	0	9
Ballarat City Council	1	0	0	1
Central Goldfields Shire Council	4	0	0	4
Golden Plains Shire Council	0	0	0	0
Hepburn Shire Council[1]	3	0	1	4
Moorabool Shire Council	3	0	0	3
Pyrenees Shire Council[4]	3	1	0	4
Hindmarsh Shire Council	4	3	0	7
West Wimmera Shire Council	9	0	0	9
Totals	**56**	**6**	**3**	**65**

Notes

1 There are resale shops at Horsham, Stawell, Creswick, Daylesford and Trentham.
2 Two of the transfer station and resource recovery centres are co-located with landfills.
3 Three of the transfer station and resource recovery centres are co-located with landfills.
4 The Pyrenees Shire Council operates a drop-off bin for residents to leave household waste and recyclables.

5.7.5 Grampians Central West

The proposed Grampians Central West RWMG area amalgamates the current Dessert Fringe, Grampians and Highlands RWMGs.

Number and type

Table 5.10 shows there are 65 resource recovery facilities, including 56 TS/RRCs and six drop-off centres and three MRFs, in the proposed Grampians Central West RWMG area.

Materials accepted

Facilities in the Grampians Central West RWMG area accept commingled recyclables, garden organics, mattresses, tyres, whitegoods, e-waste, TVs and related items, furniture, timber, hard plastics, agricultural plastics (such as grain bags), drumMUSTER containers, batteries, oil and metals.

Silage wrap is collected at Yarriambiack.

Regional considerations

- Records show that in parts of the Grampians Central West RWMG area (Horsham, Northern Grampians and Yarriambiack Shire Councils) the garden organics collected are burnt. Alternative options should be explored through the development of the *Grampians Central West WRRIP*.
- The Daylesford MRF in the region is currently over capacity and cannot process the recyclables it receives. The council recently instructed the operator to transfer unsorted materials to a metropolitan MRF.
- Councils offer different services. For example, Ballarat accepts clean excavated materials at some sites; Golden Plains and Hepburn accept e-waste, TVs and expanded polystyrene. Some facilities across the region offer DrumMUSTER collection services.
- The draft *SWRRIP* has identified a potential opportunity to increase the recovery of garden organics utilising cross regional flows from Geelong, Ballarat, Bendigo and potentially Shepparton. If established if established this would need to be supported by the appropriate TS/RRC infrastructure
- There are a number of landfills in the Grampians Central West RWMG area scheduled for closure in the short term. The *Grampians Central West WRRIP* should plan facilitate where appropriate transition of these sites from landfill to TS/RRC activities.

5.7.6 Loddon Mallee

The proposed Loddon Mallee RWMG area amalgamates the current Calder, Central Murray and Mildura RWMGs.

Number and type

Table 5.11 shows there are 35 resource recovery facilities, including 33 TS/RRCs and two MRF, in the proposed Loddon Mallee RWMG area.

Materials accepted

Facilities in the Loddon Mallee RWMG area accept commingled recyclables, garden organics, scrap metal, tyres, concrete/bricks, e-waste, batteries, oil, mattresses, tyres, silage, household waste and unwanted furniture. DrumMUSTER services are available at selected landfills and transfer stations across the area.

The retail shop at Eaglehawk Landfill sells recovered materials from hard waste and other diverted items.

All the landfills in Buloke, Gannawarra, Loddon and Swan Hill Council areas accept e-waste for recycling. The resale centre at Swan Hill Landfill accepts timber, doors, window frames, tiles, pavers and bricks, furniture and other household items.

Cross regional flows

- Significant cross regional flows of materials to resource recovery facilities in the region include residual waste from the Macedon Ranges TS/RRCs to the Sunbury Landfill (Metropolitan Melbourne).
- Significant cross regional flows of materials to resource recovery facilities in the region include residual waste from the Buloke Shire Transfer Station to the Patho Landfill (Goulburn Valley).

Regional considerations

- The closed landfill sites at Manangatang, Piangil and Ultima now operate as transfer stations.
- The MRF facility in Mildura receives the most materials and is essential infrastructure for the municipality. The eight transfer stations service a smaller percentage of the municipality's population and accept fewer materials for recycling.
- The draft *SWRRIP* has identified a potential opportunity to increase the recovery of garden organics utilising cross regional flows from Geelong, Ballarat, Bendigo and potentially Shepparton. If established if established this would need to be supported by the appropriate TS/RRC infrastructure.
- The Eaglehawk Landfill servicing Bendigo is due for closure around 2018. A preferred solution would involve increased resource recovery reducing the amount of replacement landfill airspace required. Additional resource recovery infrastructure may be required.
- There are a number of landfills in the Loddon Mallee RWMG area scheduled for closure in the short term. The *Loddon Mallee WRRIP* should plan facilitate where appropriate transition of these sites from landfill to TS/RRC activities.

TABLE 5.11
RESOURCE RECOVERY FACILITIES, BY LGA, PROPOSED LODDON MALLEE RWMG AREA

Local Government Area	TS/RRCs	Drop-Off	MRFs	Totals
Greater Bendigo City Council[1]	3	0	1	4
Macedon Ranges Shire Council	3	0	0	3
Mount Alexander Shire Council	1	0	0	1
Buloke Shire Council	2	0	0	2
Gannawarra Shire Council[2]	4	0	0	4
Loddon Shire Council	2	0	0	2
Swan Hill Rural City Council[3]	7	0	0	7
Mildura Rural City Council[4]	11	0	1	12
Totals	**33**	**0**	**2**	**35**

Notes

1 A retail shop operates at the Eaglehawk Landfill Resource Recovery Centre.

2 Gannawarra Shire Council also operates a transfer station in New South Wales.

3 Swan Hill has no separate Resource Recovery Centre but the Swan Hill Landfill also operates a resale centre.

4 There are two resource recovery centres at Murrayville and a resale shop at the Mildura Resource Recovery Centre.

5.7.7 North East

Number and type

Table 5.12 shows there are 24 resource recovery facilities, including 22 TS/RRCs, one drop-off facility and one MRF, in the North East RWMG area.

Materials accepted

Larger facilities in the North East RWMG area accept commingled recyclables, garden organics, whitegoods, scrap metal, tyres, concrete, e-waste, TVs and related items, timber, batteries, oil, mattresses, tyres and silage wrap. Smaller, more remote facilities accept limited materials. DrumMUSTER services are available at selected landfills and transfer stations across the area.

TABLE 5.12
RESOURCE RECOVERY FACILITIES, BY LGA, NORTH EAST RWMG AREA

Local Government Area	TS/RRCs	Drop-Off	MRFs	Total
Alpine Shire Council[1]	4	0	0	4
Benalla Rural City Council[2]	1	0	0	0
Indigo Shire Council	2	0	0	2
Mansfield Shire Council	2	0	0	2
Towong Shire Council[3]	1	1	0	2
Wangaratta Rural City Council[4]	8	0	1	10
Mt Buller, Mt Hotham, Falls Ck	3	0	0	3
Wodonga City Council	1	0	1	1
Total	**22**	**1**	**1**	**24**

Notes

1 Myrtleford Resource Recovery Centre is co-located with the Myrtleford Landfill.

2 Benalla Resource Recovery Centre is co-located with the Benalla Landfill.

3 There is a resale centre at Eskdale.

4 There is a privately operated recycle shop/salvage business that primarily receives construction and demolition materials.

6. Materials reprocessing

Sustainability victoria
State Government Victoria

6.1 Introduction

Reprocessors are businesses that convert the physical nature of resources recovered from waste into saleable products. Examples include the conversion of:

- waste concrete into recycled aggregate (for road base or other applications)
- cardboard and paper into packaging or insulation
- waste plastic into new products of feedstock for other plastics for manufacturing businesses
- garden organics into compost
- timber into mulch products.

Victorian reprocessors are supported by a network of businesses that collect and sort waste materials into streams, then send them to reprocessors (or in some cases export materials directly overseas). There are also businesses that sort and resell materials, particularly from the demolition industry. In the draft *Statewide Waste and Resource Recovery Infrastructure Plan (SWRRIP)*, businesses that collect, sort or resell recovered materials are not defined as reprocessors.

6.2 Data considerations

The data for reprocessors comes from several sources, including Sustainability Victoria's (SV) annual reprocessing survey, information from the Metropolitan Waste Management Group (WMG) and regional waste management groups, old recycling databases, as well as phone conversations and site visits to businesses that collect and reprocess solid industrial waste (SIW). Most businesses that collect and reprocess SIW willingly provide information about the types and quantities of materials they handle: a small number do not provide this information and sometimes will not confirm they are in the resource recovery business.

The data concerns quantities of materials entering reprocessing facilities. There is no data available concerning how much is reprocessed (compared to stockpiled) or sent to landfill. For this reason, quantities are referred to as 'recovered', rather than 'reprocessed'.

The data for reprocessors and their collection and sorting activities is as complete as possible, but more businesses have already been identified for future inclusion in the infrastructure listing and maps.

6.3 Victoria

Table 6.1 shows there are 121 major reprocessors in Victoria: 34 construction and demolition (C&D) materials, 44 of organics and 43 of metals, plastics, paper fibre and other materials. Metropolitan WMG area is home to 64% of Victoria's reprocessing facilities. Gippsland, Barwon and Highlands have the highest number of regional reprocessors. There are also at least 50 facilities that collect and sort mixed waste materials, and 18 that recover and resell demolition items and timber.

TABLE 6.1
MAJOR REPROCESSORS IN WASTE MANAGEMENT GROUP AREAS

	C&D	Organics	Metal, Plastic, Cardboard & Other	Total Reprocessors	Est Tones p.a. Reprocessed (2010–11)
Metropolitan Melbourne	15	28	36	79	6,606,000
Barwon South West	3	3	3	9	561,000
Gippsland	7	2	1	10	143,000
Goulburn Valley	1	3	0	4	17,000
Grampians Central West	3	3	2	8	64,000
Loddon Mallee	2	3	1	6	173,000
North East	3	2	0	5	55,000
Total by facility type	**34**	**44**	**43**	**121**	**7,619,000**

Source: Data collected by Sustainability Victoria

Note Tonnages do not include organic materials mulched and used locally at transfer stations. The figures in this column represent the quantities actually reprocessed in each region (that is, excluding quantities exported interstate or overseas). Therefore, these figures do not reconcile with the figures from annual reprocessors surveys, which include imports and exports.

6.4 Material quantities

In 2010–11, 8.4 million tonnes of material was collected for recovery: 50% of recovered materials came from the C&D sector, 32% from commercial and industrial (C&I) and 15% from municipal solid waste (MSW).

Table 6.2 shows the main material streams reprocessed in 2010–11.

The greatest percentages of materials recovered were concrete and brick waste (83%), metal waste (96%) and paper and cardboard waste (73%).

TABLE 6.2
MAIN MATERIAL STREAMS REPROCESSED, 2010–11

Material		Landfilled (tonnes)	Recovered (tonnes)	Generated (tonnes)	Recovered %
Organics	Food waste	832,000	22,000	854,000	3
	Garden organics	242,000	815,000	1,057,000	77
	Wood/timber	285,000	107,000	393,000	27
	Textiles	146,000	5,000	150,000	3
	Other organic[1]	0	319,500	319,500	n/a
Commingled recyclables	Paper/cardboard	447,000	1,213,000	1,659,000	73
	Glass	76,000	196,000	271,000	72
	Plastics (codes 1–3)	178,000	146,000	324,000	45
	Other plastics	216,000	0	216,000	0
Metals		65,000	1,390,000	1,455,000	96
Concrete/bricks/asphalt		861,000	4,194,000	5,055,000	83
Tyres		6,155	55,000	61,155	90
Other		531,000	0	531,000	–
Total		**3,885,000**	**8,462,000**	**12,347,000**	**69**

Note

1 Includes agricultural waste.

6.5 Material flows

Most recovered resources are reprocessed in Victoria: only 10% are exported out of the state for reprocessing (mainly to overseas). While the total amount of recovered resources exported has increased since 2002–03, it has increased at the same rate as total growth in recovered resources, remaining at eight to 12% of total resources recovered. The major materials exported overseas in 2010–11 were:

- metals (343,000 tonnes)
- paper and cardboard (376,000 tonnes)
- plastics (79,000 tonnes)
- rubber (9,000 tonnes).

There are significant gaps in our understanding of the flow of individual materials from specific regions, other than for MSW garden organics, commingled recyclables and residual waste to landfill. However, we can conclude the following.

There is an extensive network of infrastructure throughout the state to collect and consolidate metal waste and scrap metals. This is transported in bulk to Melbourne where it is processed for feedstock in secondary smelting (such as by OneSteel) or for export to interstate and overseas. This reprocessing is mostly by Norstar, OneSteel and Sims Metal. The relatively high commodity value of metal, combined with its density, has resulted in Melbourne (particularly the Laverton area) being the processing hub, with collection spokes extending throughout Victoria.

Processing of C&D waste is more localised, with processing hubs in the Laverton/Brooklyn, Epping, Kingston and Dandenong areas in Melbourne, and in Geelong, Ballarat, Bendigo and Traralgon in regional Victoria. This is likely a result of the small margins that result from processing and selling recycled aggregate and related products. There are smaller regional hubs around Victoria, where reprocessors generally stockpile and periodically crush using mobile crushing equipment. For this stockpile-and-crush method to produce the best outcomes, producers must identify and manage asbestos, as well as develop and maintain local markets. The economically viable distance to transport waste concrete, brick and related demolition materials is in the range of 30–50 km.

Processing of organics (particularly garden organics) is spread throughout Victoria. Historically, garden organics processing facilities were close to the points of generation, and to end markets if possible. This changed, however, when the Australian Native Landscapes (at Coldstream), TPI (at Pakenham) and SITA (at Brooklyn) facilities closed in the past four years. The closures also reduced the reprocessing capacity of garden organics from metropolitan Melbourne.

As a result Metropolitan WMG had to make overflow arrangements, transporting garden organics to the Gippsland Water composting facility at Dutson Downs, Biogro in Mt Gambier (South Australia) and Barro Quarries near Point Wilson (for quarry rehabilitation). This established that garden organics can be transported significant distances if it can be back loaded (to reduce transport costs) or if it can be used as supplementary feed to help process another material (for example, biosolids from sewage treatment).

Victoria no longer transports garden organics to Mt Gambier due to concerns about importing myrtle rust into South Australia.

In tonnage terms, the other major materials collected in Victoria for reprocessing are paper and cardboard. Much of this material is C&I waste, and not collected through the kerbside collection system. Most of this material is transported to Melbourne for reprocessing by Visy or Amcor and smaller reprocessors or is exported overseas. Similarly, almost all glass is transported to Melbourne, where either Visy or SKM sort it before onselling it as feedstock to glass container manufacturers such as O-I Glass in Spotswood. There are also some smaller markets for glass fines.

6.6 Recovery by material stream

Victoria's recycling sector is continually expanding, with the total amount of materials recovered for reprocessing increasing to more than 8.5 million tonnes in 2010–11. Despite the challenges posed by, among other things, steady population growth and the closure of reprocessing facilities, Victoria's increased materials recovery and reprocessing in 2010–11 helped the state reduce demand for landfill, increase revenues from recycled materials and achieve significant savings in water, energy and greenhouse gas emissions.

Statistically, Victoria currently reprocesses around 90% of recovered materials within the state. This is however skewed by the large portion of C&D materials recovered, all of which is reprocessed locally. Of the MSW and C&D materials recovered as much as half may be exported for reprocessing. This highlights an increased reliance on overseas export markets for recovered products.

6.6.1 Organics

Table 6.3 shows the main categories of organic waste.

While paper and cardboard are technically organic materials, they are collected and managed separately to the other organics (mainly as commingled recyclables) and therefore the draft *SWRIPP* considers them separately.

Data collected to support the *Towards Zero Waste* strategy also included tyres as 'other organic' in data collections. The draft *SWRRIP* also considers these separately as the way tyres are managed and reprocessed is different to how other organic materials are managed and reprocessed. This should be noted when comparing data with that published previously.

Recovery of organic waste has increased from 651,000 tonnes in 2001–02 to 1,300,000 tonnes in 2010–11. The amount of organic waste recovered has increased at an average of 51,000 tonnes a year during that period, with significant annual variations, due in part to the influence of climatic conditions on the generation of garden organics (which dominate organic waste recovery).

Table 6.4 shows the tonnages of organic waste recovered, landfilled and generated, and the percentage recovered, in 2010–11.

About half (650,000 tonnes) of the organic material recovered is generated in metropolitan Melbourne, with about 310,000 tonnes coming from the C&I sector, 310,000 tonnes from the municipal sector and the remainder (about 30,000 tonnes) from the C&D sector. About 127,000 tonnes a year is exported out of Melbourne. The remainder is reprocessed in metropolitan Melbourne.

Table 6.5 shows the major organic waste reprocessors in Victoria.

TABLE 6.3
MAIN CATEGORIES OF ORGANIC WASTE

Category	Sources	
Food waste	Municipal food waste	Mainly from households, through kerbside collection systems
	Pre-consumer	Material from manufacturing and food processing plants
	Post-consumer	Material from restaurants and food services
Garden organics	Mainly from household and municipal activities	
Timber	Includes structural, packaging and treated timber, and sawdust, mainly from the C&I and C&D sectors	
Other	Waste from agricultural activities (including manure and crop residue)	

TABLE 6.4
ORGANIC WASTE RECOVERED, LANDFILLED AND GENERATED, VICTORIA, 2010–11[1]

Material		Recovered (tonnes)	Landfilled (tonnes)	Generated (tonnes)	Recovered %
Organics	Food waste	22,000	832,000	854,000	3
	Garden organics	815,000	242,000	1,057,000	77
	Wood/timber	107,000	285,000	393,000	27
	Textiles	5,000	146,000	150,000	3
	Other organic[2]	320,000	n/a	320,000	n/a
Total		**1,269,000**	**1,505,000**	**2,774,000**	

Notes

1 Waste generated equals waste recovered plus waste to landfill. Landfill data is from Environment Protection Authority Victoria landfill levy receipts (unpublished). Recovered data is from *Victorian Recycling Industry Annual Survey* (revised) 2010–11 (unpublished at the time of this draft).

2 Includes agricultural waste.

The draft *SWRRIP* has mapped the major organic reprocessors in Victoria. Most reprocessors (59%) are in Melbourne. Organic waste recovery and reprocessing covers a range of activities including composting, mulching, salvage (of timber) and resale. The map can be found in Section 10: Appendices Figure 10.3.

For more information on recovery by material stream, refer to SV's Technology Guide 2013. It includes a technology matrix which is a decision making tool that lists a range of attributes for each of the potential organics technologies, including technology, capacity, input materials and outputs.

TABLE 6.5
SHOWS MAJOR ORGANIC WASTE REPROCESSORS IN VICTORIA

	Poposed WMG Area	Company Name	Location
Food Waste	Metropolitan Melbourne	Peerless Holdings	Braybrook
	Grampians Central West	Castlegate James	Ballarat
Garden Organics	Metropolitan Melbourne	Enviromix	Kingston
		Natural Recovery Systems	Dandenong
		Sita	Epping
		Pinegro	Deer Park
		TPI	Dingley
		Mornington Peninsula Shire Council	Fingal & Tyabb
	Barwon South West	Barro Quarries	Point Wilson
		Bellarine Trees	Geelong
		Statewide (Austral Group)	Warrnambool
	Gippsland	Gippsland Water	Dutson Downs
		Pinegro	Morwell
	Goulburn Valley	Corio Waste (Western Composting)	Shepparton
	Grampians Central West	Calleja (Maddingley Brown Coal)	Bacchus Marsh
	North East	Greenchip	Wodonga
Timber	Metropolitan Melbourne	Bark King	Montrose
		Mossrock	Epping
		Plain Pallet Sales	Braeside
		Urban Timber	Brooklyn
		Waste Converters	Dandenong South
		Spotswood Holdings	Yarra Glen
	North East	DH Hendersons	Winton
Others	Loddon Mallee	Rivcow	Charlton
		Scatoplus	Newbridge

6.6.1.1 Food organics

Despite many potential opportunities for reprocessing, a large amount of Victoria's food waste goes to landfill (not including liquid food waste, which is usually prescribed industrial waste). Recovering food waste is more difficult than recovering garden and timber waste because it tends to break down more rapidly, becomes very odourous and can attract pests and vermin. Also, there is very little infrastructure for processing food waste. Small amounts of food waste are being combined with garden organics for both windrow and in-vessel composting.

Some food waste is suitable for stock feed, either directly or mixed with other feed. The data on quantities going to stock feed is poor, but anecdotal evidence suggests that food waste from manufacturing plants is attractive for stock feed, due to its low levels of contamination. This is likely to be significant in food manufacturing areas of the state, such as the Goulburn Valley.

Municipal food waste

Reprocessing food waste from households can be problematic because it is putrescible. Source separation is difficult, and research by Metropolitan WMG indicates that a best case scenario—even with extensive householder education—would be 50% of food waste diverted from the residual waste bin. As a result, mechanisms to recover food organics in residual waste need to be developed alongside mechanisms to recover source separated waste.

It is viable to compost MSW food waste: the ratios of food to garden organics in most MSW organic streams are favourable for composting. Food waste is already being used successfully in facilities such as Dutson Downs in Gippsland, which has adequate buffers and best practice management. However (and particularly in metropolitan areas), this would require in-vessel or controlled environment composting to reduce adverse amenity impacts.

Combined food and garden organics composting has the added advantage of using kerbside collection systems, though they would need to be designed to minimise adverse impacts. This option is being trialled in several regions, and is being implemented by some local governments. Some other regional local governments are planning trials, with the intention of moving to larger scale operations in future.

In metropolitan Melbourne, the south east cluster tender process will increase organic processing capacity. However, the volume of garden organics may limit capacity to process food waste (which appears to be the case with the Veolia facility, currently under construction). This means that the actual quantities of food waste recovered by these facilities may be a small proportion of the total generated.

The main options for increasing the recovery of MSW food organics are:

- composting by households and communities
- large scale, in-vessel composting of household food and garden organics combined, via kerbside collection systems
- leaving food in the household residual waste bin, processing it at advanced resource recovery facilities (which Victoria does not currently have) to recover energy, and sending the residual waste to landfill
- continuing to send the waste to well designed and properly managed landfills with best practice gas capture.

The use of food waste from MSW sources for waste-to-energy opportunities in the short term is probably limited to recovery from the residual waste stream, as explained earlier. This is mainly due to the high contamination rates and lack of collection services to collect source separated waste.

Increasing Organics Processing Capacity in Metropolitan Melbourne

Metropolitan WMG facilitated a competitive tendering process on behalf of 11 participating local governments in north west Melbourne, to provide organic waste processing services. Current organics processing contracts are due to expire and the new contract is for 15 years.

By approaching the market together, participating local governments will achieve better value for money and ensure sufficient volume of materials for reprocessors to invest in best practice organics processing technology, in this case in-vessel aerobic composting.

Participating local governments are Banyule, Brimbank, Darebin, Hobson's Bay, Hume, Maribyrnong, Melton, Moonee Valley, Moreland, Nillumbik and Wyndham.

Pre-consumer commercial and industrial food waste

Pre-consumer C&I food waste comes from two main sources.

The first is supermarkets, event facilities, hotels and related activities. This waste can have a high degree of contamination: this restricts recovery, because it needs additional screening. If the waste is composted, it can be screened either before or after composting, but screening increases costs. Additional recovery options from these sources are similar to those for residual MSW food waste.

The second source of pre-consumer C&I food waste is directly from food manufacturing processes. This waste is usually fairly homogenous, with lower levels of contamination. There are far more options for recovering this waste and it is often used for stock feed if it does not contain meat. The suitability of this waste for stock feed needs to be assessed on a case-by-case basis, only undertaken using best practice management procedures, and monitored.

Food waste streams with low levels of contamination are used to produce energy, processed derived fuels and other related product overseas, but not yet on a large scale in Victoria. Anaerobic digestion is the most likely technology, but its viability needs to be determined on a case-by-case basis as the economics of using it are influenced by the cost of transporting feedstocks, and by markets for the products (digestate and energy).

There may also be opportunities to use food waste to supplement other harder to manage organic wastes (such as biosolids from wastewater treatment plants) where existing buffers can be utilised. Yarra Valley Water is committed to an anaerobic digestion facility (potentially in Melbourne's north) that will treat combined biosolids and food waste.

A significant amount of food is wasted after manufacture but before it reaches the consumer (due to damage while being distributed and retailed, and by being past its due date or best before date). Castlegate James in Ballarat turns this waste into stock feed additives. Again, it must be meat free.

Post-consumer commercial and industrial food waste

Post-consumer food waste comes from restaurants, food services, pubs and clubs. It is generally collected by a commercial collection service. It is usually highly contaminated (for example, by disposable plastic containers and packaging). Some of this waste is recovered for human consumption, if suitable (for example, by Second Bite and FareShare), but the tonnages are very small.

Because it is difficult to reduce contamination, recovery options are very similar to the options for treating residual household food waste, explained earlier.

There is also an opportunity for small-to-medium enterprises (the vast majority of C&I businesses in Victoria) to use local government waste services.

Short term opportunities for processing large quantities of post-consumer C&I food waste are limited, due to the high cost of processing and the high risk of dedicated processing infrastructure. As noted earlier, large scale, in-vessel garden organics composting facilities across Melbourne could potentially process food waste from a separate collection.

On a smaller scale, on-site processing solutions for post-consumer food waste are emerging at a rapid pace. Units that quickly dehydrate or digest food are now readily available. These units may suit high intensity areas such as food markets, restaurant precincts and laneways. However, they are more expensive than waste collection services, and often energy intensive. It can also be difficult to dispose of the liquid digestate generated: it is not considered a compost product, often needs further treatment before use and markets for it are localised and limited.

There is currently insufficient reprocessing infrastructure to reprocess both pre-consumer and post-consumer food waste and substantial investment would be required to provide the capacity to recover a larger percentage of food waste. Due to their higher levels of waste generation, Melbourne and Geelong would be priority locations for investment.

EarthPower in NSW produces electricity using food waste: their experience is that great care is needed to ensure incoming waste is not contaminated.

6.6.1.2 Garden organics

Garden organics accounts for about half of all reprocessed organic material in Victoria. Garden organics is almost entirely composted and sold as soil conditioner, mulch and potting mix. Table 6.6 shows the most commonly used composting technologies. Wood and timber is also collected and shredded, then generally either sold as mulch or added to soil conditioner, compost and potting mix.

In 2010–11, 46 of Victoria's 79 local governments provided a garden organics collection service. Of these, 23 provided a regular service and 19 provided an optional, user pays collection service. The remainder provided an at-call service. Local governments collected 390,000 tonnes of garden organics from these kerbside services, and collected a further 175,000 tonnes at transfer stations and resource recovery centres (TS/RRC).

Of the 565,000 tonnes of garden organics recovered, an estimated 420,000 tonnes was by composting and land rehabilitation and 145,000 tonnes was by onsite shredding and reuse at TS/RRCs. Organic waste from municipal sources (kerbside and drop off) represented 51% of total organics recovery: 44% was sourced from the C&I sector and 5% from the C&D sector.

In the long term, infrastructure investment in organics recovery needs to move from open windrow composting to controlled environment composting and energy recovery. Open windrow composting can produce high quality compost products but management requirements (including quality control of incoming material) are rigorous. Some facilities have risked being unable to operate by accepting materials such as abattoir wastes, dead livestock and liquid wastes, due to the offensive odours they generate. This risk increases as urban development encroaches into buffer zones, which are essential if facilities are to operate successfully. It is essential to the future of organics processing in Victoria that land use planning protects buffers around existing and potential locations for organics processing facilities.

The use of garden organics for quarry rehabilitation is currently permitted under some circumstances in Victoria. However, it is less than optimal because it recovers very little value from the organics, can produce greenhouse gases if not managed adequately and adds little value to the site.

TABLE 6.6
COMPOSTING TECHNOLOGIES

Technology	Optimal Feedstocks	Products
Open windrow composting	› garden organics › biosolids › timber and sawdust	› Mulch compost › Soil conditioner › Potting mix › Blended products › Potentially, woody material for pyrolysis
Controlled environment open composting	› garden organics › biosolids › timber and sawdust › limited amounts of food and other wet organics	
In-vessel composting	› garden organics › food and other wet organics › biosolids › timber and sawdust	

On-farm composting of garden organics is a viable option but only under very controlled situations. It should only be considered when higher value options have been explored, and should not be seen as a way to circumvent Environment Protection Authority Victoria licensing and works approval requirements. Mechanisms need to be established to prevent substandard practices impacting on the viability of properly managed operations.

Potentially, farmers can benefit by using on-farm composting to produce soil enhancers—which supplement or replace fertilisers—provided farmers can access composting expertise to manage and control adverse environmental impacts. However, using organics sourced from municipal collections is problematic because they can be highly contaminated. On-farm composting is only an option if there are ongoing education programs, strict monitoring of the process and investment in infrastructure to reduce source material contamination to enable suitable compost to be produced.

Victoria's main garden organics processing facilities are:

- Corio Waste's Western Composting Technology Advanced Resource Recovery Technology facility at Shepparton
- the Soil and Organic Recycling Facility at Dutson Downs, Sale
- the Pinegro facility at Morwell
- Barro Quarries at Geelong
- in Melbourne, Natural Recovery Systems at Dandenong, Enviromix at Dingley, SITA at Epping and Pinegro at Ravenshall/Deer Park
- a Veolia facility at Bulla, currently under construction.

Future gaps

The Metropolitan WMG has defined three outer metropolitan local government procurement clusters (with similar kerbside collection systems) and one inner metropolitan cluster (municipalities with higher population densities, where a three bin system is not practical or viable because of lower generation rates of garden organics, limited space, greater traffic flows and more congestion).

The north west cluster went to tender in 2011 and was awarded to Veolia to construct in-vessel composting facilities at Bulla (with a capacity of 85,000 tonnes a year in 2013) and Wyndham (35,000 tonnes a year capacity in 2014). The south east cluster went to tender in mid-2012 and a tender is expected to be awarded in late 2013. Metropolitan WMG expects to put the eastern cluster to tender (for garden organics, with a food processing option) in 2014.

Modelling of garden organics processing for metropolitan Melbourne indicates that:

- processing capacity will be further constrained if Enviromix is required to close its Dingley facility (due to freeway construction), unless it can find an alternative site
- any increase in current levels of kerbside collections will require new processing capacity
- including food waste in garden organics collections would exceed the capacity of current infrastructure by around 2017.

Metropolitan WMG modelling—based on a scenario of selected local governments providing combined food and garden organics collection services over 15 years—indicates that kerbside collected organics would increase from 320,000 tonnes in 2010–11 to 683,000 tonnes in 2025 (and, including dropped off waste, to 796,000 tonnes).

On-Farm Composting

Trials to compost garden organic waste from kerbside collection on farms are currently underway in regional Victoria. If successful there will be:

- less organic waste going to landfill
- lower fertiliser costs for farmers
- long term improvements in soil health.

Early results suggest that contamination of the organic waste can disrupt the composting process. Contamination is largely due to poor sorting before the waste gets to the farm.

If on-farm composting is to be a viable alternative to landfilling organics, contamination levels must be significantly reduced. This would involve a combination of improved sorting infrastructure and ongoing education of households and businesses to improve sorting at the source of generation. Support to farmers to develop, establish and maintain the appropriate systems and quality control would be required.

6.6.1.3 Wood and timber

Significant amounts of treated and untreated timber currently go to landfill, particularly from C&I businesses. Timber is easy to identify and separate, making physical recovery options straightforward. Options include source separation into a timber bin, manual sorting a resource recovery centre and automated separation at a materials recovery facility (MRF).

Despite recovery options being straight forward, most untreated timber is chipped for mulch or woodchips, or shredded for animal bedding. There are some localised markets for high quality recycled timber (such as hardwood flooring and structural timber). However, recovery is generally only considered viable when large volumes are available (for example, when a warehouse, rather than a residential house, is demolished).

The C&I and C&D sectors both generate high volumes of untreated timber waste. There are currently no viable options for reusing it, due to uncertainty about the types of chemicals used in the treatment process, and the environmental and human health risks associated with reuse (for example, wood may have been treated with arsenic).

The industry consensus is that due to its toxic nature, all treated timber waste in Victoria is sent to landfill as the recovery amount and process is not commercially viable.

It is very difficult to obtain data on quantities of treated timber landfilled. Recent research estimates around 65,000 tonnes of treated timber entered the Victorian waste system in 2012 mainly from the C&I and C&D sectors. Treated timber is currently either part of mixed waste collection or contamination in non-treated timber waste streams.

The versatility of timber makes it attractive as a fuel source through waste-to-energy technologies. Non-structural, untreated timber (such as packaging pallets) can be used as a cheap and effective fuel source in traditional thermal processes and in low oxygen thermal processes, such as pyrolysis and gasification that extract a highly combustible synthetic gas (syngas).

Timber can be processed into secondary products, depending on the properties of the thermal treatment for which it is destined. For example, waste timber can be shredded for use in industrial processes; cut down for use in domestic heating; or shredded and compacted into wood briquettes and wood pellets.

There are opportunities to improve source separation and recovery of timber in residential construction, commercial fitouts (and refits), all demolition sectors, and C&I packaging. Recent work by the federal Department of Sustainability, Environment, Water, Population and Communities indicates that in Australia timber packaging waste makes up a significant amount of waste generated across the entire C&I sector. Designated C&I collection services would require substantial volumes (that is, more than 50 pallets) to be economically viable. Areas of high activity, such as industrial estates, retail precincts and homemaker centres, may offer the greatest opportunities.

The traditional markets for timber waste are mulch (both home garden and landscaping markets, where coloured mulches are popular, the colour being added during or just after mulching) and large road projects (such as with VicRoads, which uses it on roadside batters to help stabilise and revegetate them). Road projects are the larger market, but it is also prone to boom-bust cycles. Therefore, mulch is a mature market with some growth opportunity but probably not enough for the increased timber recovery we are looking for. Emerging technologies around pyrolysis (biochar) and gasification are of interest, especially as they appear to be small-to-medium scale and modular.

6.6.2 Paper, cardboard, glass and plastics (commingled recyclables)

Table 6.7 shows the tonnages of commingled paper, glass and plastic waste recovered, landfilled and generated, and the percentage recovered, in 2010–11.

A total of 61% of these materials come from the C&I sector and 31% from the MSW sector. Paper, cardboard glass and plastics are grouped together primarily because they are collected from the MSW sector through the commingled kerbside collection system, which influences the way the data is managed. This commingled MSW is then separated at materials recovery facilities MRFs, as discussed in Section 5.

When it is sourced from the C&I sector it is more likely to be source separated material where the business producing the waste separates it at their business and places it in a dedicated bin. Some material is collected as a mixed recyclable stream which is then sorted in a similar way to the MRFs used for household commingled recyclables.

TABLE 6.7
COMMINGLED RECYCLABLE WASTE RECOVERED, LANDFILLED AND GENERATED, VICTORIA, 2010–11[1]

Material	Recovered (tonnes)	Landfilled (tonnes)	Generated (tonnes)	Recovered %
Paper/cardboard	1,213,000	447,000	1,659,000	73
Glass	196,000	76,000	271,000	72
Plastics (codes 1–3)	146,000	178,000	324,000	45
Other plastics	0	216,000	216,000	0
Total	**1,555,000**	**917,000**	**2,470,000**	

Note

1 Waste generated equals waste recovered plus waste to landfill. Landfill data is from Environment Protection Authority Victoria landfill levy receipts (unpublished). Recovered data is from *Victorian Recycling Industry Annual Survey* (revised) 2010–11 (unpublished at the time of this draft).

6.6.2.1 Paper and cardboard

Overall, recovery of cardboard and paper is good, at 73% across Victoria. This reflects strong local and international markets for recycled fibre.

Table 6.8 shows the major paper and cardboard reprocessing facilities in Victoria. As identified from their locations metropolitan Melbourne is the major reprocessing hub in Victoria for paper and cardboard.

The main categories of paper and cardboard recovered for reprocessing in Victoria are cardboard and paper used for packaging (boxes), newspapers, magazines, and printing and writing paper. The C&I sector collects waste paper and cardboard with:

- dedicated collection services (often using front lift bins or collection cages)
- compactors and packers (in the case of large generators, such as shopping centres)
- 240 litre bins (in the case of small generators), often combined with the household commingled collection service
- mixed recyclables collection services (often using front lift bins).

The Visy plant at Coolaroo is the major Victorian reprocessor of paper and cardboard fibre. It uses the recovered paper fibre as feedstock for the production of new corrugated cardboard packaging. Another significant reprocessor is Amcor, which has historically operated a recycled fibre process at its Fairfield plant. This plant recently closed after Amcor upgraded its facility at Botany in Sydney. Significant tonnages of old newsprint are also sent to Albury, New South Wales for reprocessing in the Norske Skog paper mill. There are several smaller reprocessors in metropolitan Melbourne: these convert paper and cardboard into other packaging or insulation products.

Recovery of paper and cardboard has increased from 746,000 tonnes in 2001–02 to 1,213,000 tonnes in 2010–11. The amount recovered has increased at an average of 40,000 tonnes a year, although the amount fluctuates significantly in some years.

Generally, the reprocessing sector has kept pace with the increasing generation of cardboard and paper waste. Tonnages exported to overseas markets are also significant, representing 31% of the total amount recycled in 2010–11.

The major reprocessing hub for paper and cardboard is in Melbourne with the majority of the material collected in Victoria being transported to Melbourne for processing or export. Paper fibre is a sufficiently valuable commodity and recovered paper and cardboard can be economically transported considerable distances.

TABLE 6.8
MAJOR PAPER AND CARDBOARD REPROCESSORS IN VICTORIA

Proposed WMG Area	Company Name	Suburb
Metropolitan Melbourne	Amcor	Alphington
	Huhtamaki	Preston
	Visy Paper	Clayton

6.6.2.2 Glass

Most glass recovered for reprocessing is container glass collected through the municipal kerbside collection system. It usually arrives for reprocessing as a mix of cullet (broken glass) and fines (small particles) due to breakage during collection and sorting.

Table 6.9 shows the major glass reprocessing facilities in Victoria. As identified from their locations metropolitan Melbourne is the major glass reprocessing hub for Victoria.

Sheet and laminated glass is also collected for reprocessing and is generally received whole. It presents its own problems from delamination. There is an opportunity to develop systems and infrastructure to reprocess sheet glass.

Recovered container glass is generally sorted by colour, using an optical sorting process called beneficiation. There are two glass beneficiation plants in Victoria (Visy and SKM Recycling). They automatically sort glass—recovered by MRFs or collected from the C&I sector—into three colour groups (flint, amber and green). This cullet is then sold to container glass manufacturers such as O-I Glass in Spotswood, which use it as feedstock to manufacture new container glass.

The efficiency of the glass beneficiation process is determined by the age of the equipment, its throughput and the size of the glass being sorted. Pieces of glass as small as 5–10 mm can be sorted by colour. Smaller pieces (called 'fines'), which are left over after beneficiation, can be further processed to produce a glass sand product for several uses (such as non-slip paint and glass wool insulation). In Victoria, Colmax Glass and Potters do this.

Glass recovery has increased from 114,000 tonnes in 2001–02 to 196,000 tonnes in 2010–11. The amount of glass recovered has increased at an average of 12,000 tonnes a year, although this varies significantly in some years (for example, glass recovery peaked at 202,000 tonnes in 2006–07). Generally, the reprocessing sector has kept pace with the generation of container glass waste and this is expected to continue. Tonnages of glass exported for reprocessing are insignificant. There is very limited recovery of sheet glass from the building industry.

Container glass is collected throughout Victoria and transported to Melbourne for reprocessing. The current price for mixed glass makes transporting glass waste from the furthest parts of the state to Melbourne a marginal proposition, and local markets for crushed glass products are emerging. It is also likely that some glass containers from western Victoria are going to South Australia to claim the redeemable container deposit, but there is no evidence that is happening in significant tonnages.

Reprocessing of glass in Victoria largely depends on the ability of O-I Glass to take colour sorted glass as feedstock to manufacture new container glass. If O-I Glass could no longer do so, most recovered glass would have to be exported to an interstate glass manufacturer. There are currently significant stockpiles of glass fines in Melbourne, mainly from Visy's old glass beneficiation plant in Laverton, which needs attention. Opportunities to address the generation of glass fines include:

- investment in new colour sorting technologies which can sort down to smaller sizes (to reduce the generation of fines, and so stockpiles of fines can be processed to recover usable cullet)
- agreeing specifications with container glass manufacturers, and investing in required infrastructure, so that fines and glass sand can be used as feedstock for manufacturing new glass
- developing new markets for glass sand products (which could replace sand in asphalt production or concrete, or trench and pipe fill for residential and other developments).

TABLE 6.9
MAJOR GLASS REPROCESSING FACILITIES IN VICTORIA

Proposed WMG Area	Company Name	Suburb
Metropolitan Melbourne	Visy Glass	Laverton
	SKM	Coolaroo
	Potters Australia	Laverton
	Colmax Glass	Dandenong
	O-I Glass (Owens Illinois)	Spotswood

6.6.2.3 Plastics

Victoria is home to about half of Australia's plastics reprocessors and recycles a significant proportion of Australia's recovered plastic. Most plastics are recovered from the C&I and MSW sectors in the form of plastic containers (types 1–7), and packaging film plastics.

The Plastics and Chemical Industries Association (PACIA) identified 37 plastic reprocessors in Victoria, 35 of which were in the Melbourne metropolitan area. Metropolitan Melbourne is therefore the major reprocessing hub for plastics in Victoria.

The recovery of plastics has increased from 92,000 tonnes in 2001–02 to 146,000 tonnes in 2010–11. The amount of plastics recovered has increased at an average 8,500 tonnes a year, although there are variations in some years (for example, glass recovery peaked at 202,000 tonnes in 2006–07). Generally, the reprocessing sector has kept pace with the increased recovery of plastics. However, as local reprocessing of plastics is closely associated with local manufacturing, the sector is likely to continue experiencing strong competitive pressures from imports and the high Australian dollar.

Tonnages of plastics exported for reprocessing are significant, with 79,000 tonnes exported in 2010–11. This was 54% of total plastics recovery in Victoria. The rest is mostly sorted, shredded, chipped and turned into a range of plastic products.

Film plastics in general and agricultural film in particular, present a challenge for recovery. It is difficult to collect and process agricultural film plastics because it is contaminated with dirt and there is no process to collect and consolidate it to achieve economically viable volumes. The C&I sector is a significant source of plastics, particularly packaging waste.

The current trend of increasing use of soft plastics for packaging will provide further impetus for infrastructure to aggregate and process this plastic.

Plastics have a high calorific value and could be used as feedstock for process-engineered fuels for an energy plant, if they could not be mechanically recovered and reprocessed into feedstock for plastics manufacturers. Research is needed by industry to identify commercially viable options.

Additional infrastructure is required to collect, sort and reprocess a range of plastics including:

- film plastics (used for consumer packaging, and in the logistics sector)
- rigid plastics (used in the construction sector) which can be recovered during renovation, refurbishment and demolition of residential and commercial buildings
- automotive plastics (from manufacturing, servicing, repair and at end-of-life).

6.6.3 Tyres and rubber

Table 6.10 shows the major tyre reprocessors in Victoria. As can be seen from their locations, metropolitan Melbourne is the major tyre and rubber reprocessing hub in Victoria.

While there is little data for the quantity of tyres and rubber products generated and landfilled each year:

- the *Victorian Recycling Industry Annual Survey* reported 55,000 tonnes of tyres and rubber were reprocessed in 2010–11, of which 34,000 tonnes were tyres
- anecdotal research estimates that some 85,000 tonnes of waste is generated each year from tyres that reach their end of life in Victoria.

Nationally, an estimated 16% of tyres are reprocessed, 21% are exported overseas for use as tyres and 63% are stockpiled, illegally exported or the destination is unknown. This suggests that about 51,000 tonnes a year of tyres are unaccounted for, and are probably being stockpiled (see the boxed story on this page) or illegally exported. The lack of environmental controls in some destination countries is a concern.

In Victoria, whole tyres are not allowed in landfills. Current processing includes shredding to recover the metal and rubber which is used to make soft surfaces (such as playground surfaces) or exported (legally) for reuse overseas.

Stockpiled Tyres

Apart from the loss of visual amenity, non-recovered tyres pose two major problems.

First, stockpiled or illegally dumped end-of-life tyres can be of environmental and public health concerns. Tyres are flammable and pose a fire risk when they are in a concentrated mass. When tyres burn, they break down and release toxic materials including mutagens, carcinogens and heavy metals. Tyre fires in stockpiles and illegal dumps are also costly: in fire control, clean-up, residential evacuation and property damage costs. Whole tyres in landfills, illegal dumps and stockpiles are also breeding grounds for vermin and mosquitos, which transmit disease. For example, a US study showed that 80% of children suffering from mosquito disease lived within 30 metres of a tyre dump.

Second, non-recovered tyres represent lost, valuable resources. Tyres are generally produced from a blend of natural rubber, synthetic rubber, steel and reinforcing fabrics. The rubber also contains additives including zinc oxide and carbon black. These incorporate non-renewable resources that are lost if the end-of-life tyres are landfilled or not recycled or reused. Also, using recycled tyre derived products in end markets displaces a number of non-renewable virgin materials. For example, using recycled rubber in athletics tracks displaces the use of polyurethane, which is derived from crude oil.

TABLE 6.10
MAJOR TYRE AND RUBBER REPROCESSORS IN VICTORIA

Proposed WMG Area	Company Name	Suburb
Metropolitan Melbourne	Tyrecycle	Somerton
	Tyre Crumb	Broadmeadows
	C&N Ruggiero	Footscray
	GP Embelton	Coburg
	Flexitec	Oakleigh South

6.6.4 Metals

Metals reprocessing facilities in Victoria receive metals in many forms (such as aluminium cans, batteries, car bodies, steel cans and lead pipes). Reprocessing ranges from simply crushing and baling for export, to shredding and blending into end products such as alloys and ingots.

Table 6.11 shows the tonnages of metal waste recovered, landfilled and generated, and the percentage recovered, in 2010–11.

Table 6.12 shows the major metal reprocessors in Victoria; all are located in Laverton North in Melbourne which is the only metals reprocessing hub in Victoria.

Metals recovery and reprocessing in Victoria has increased from 729,000 tonnes in 2001–02 to 1,390,000 tonnes in 2010–11. There has been quite some volatility in the quantities, particularly a big dip in 2008–09 during the global financial crisis. The average annual increase in metals recovery over this period was 59,000 tonnes. Almost all metal waste (98%) is recovered and the industry has invested in the recovery infrastructure needed to keep pace with the growth in generation of waste metals. This is expected to continue for the foreseeable future, due to the high commodity value of ferrous and non-ferrous metals.

The metals reprocessing sector is a significant contributor of C&I waste to landfill, due to all the non-metal components—such as plastics, glass and rubber from end-of-life items such as cars and white goods—sent for shredding. This material is known as shredder flock, an estimated 140,000 tonnes of which is generated each year.

TABLE 6.11
METAL WASTE RECOVERED, LANDFILLED AND GENERATED, VICTORIA, 2010–11[1]

	Recovered (tonnes)	Landfilled (tonnes)	Generated (tonnes)	Recovered %
Metals	1,390,000	65,000	1,455,000	96

Note

1 Waste generated equals waste recovered plus waste to landfill. Landfill data is from Environmental Protection Authority Victoria landfill levy receipts (unpublished). Recovered data is from *Victorian Recycling Industry Annual Survey* (revised) 2010–11 (unpublished at the time of this draft).

TABLE 6.12
MAJOR METAL REPROCESSING FACILITIES IN VICTORIA

Proposed WMG Area	Company Name	Suburb
Metropolitan Melbourne	Norstar Steel Recyclers	Laverton North
	OneSteel	Laverton North
	Sims Aluminium	Laverton North
	Sims Australian Refined Alloys	Laverton North
	Sims Metal	Laverton North

6.6.5 Concrete, brick and asphalt

Facilities that reprocess concrete, brick and asphalt in Victoria mostly crush and screen it to produce recycled aggregate materials which are then blended for end uses such as road base. Plasterboard is a related material that is also collected. It can be crushed to create more plasterboard, or sold to the agricultural sector as a soil conditioner.

Table 6.13 shows the tonnages of concrete, brick and asphalt waste recovered, landfilled and generated, and the percentage recovered, in 2010–11.

The concrete, brick and asphalt recovery rate is currently at 83%. Current recovery focuses on commercial demolition. Metal reinforcing used in concrete is also recovered during the crushing process, and improves the financial viability of concrete recycling operations. Over the past decade, the industry has written specifications for its recycled aggregates, which VicRoads have adopted for using recycled aggregates as road base in major road construction projects. The industry has also developed and implemented inspection protocols and systems to minimise asbestos contamination of C&D waste sent for recycling.

Table 6.14 shows the major concrete and related materials reprocessors in Victoria. As can be seen from their locations they are distributed across the state.

The recovery of concrete, brick and asphalt has increased from 1,715,000 tonnes in 2001–02 to 4,194,000 tonnes in 2010–11. The amount of these materials recovered has increased at an average of 247,000 tonnes a year. The total increase of 2,478,000 tonnes between 2001–02 to 2010–11 is 63% of the increase in total resource recovery in Victoria over the same period.

Concrete, brick and asphalt reprocessing is a high volume, low margin business that faces competition from virgin quarry materials. it is probable, however, that recovery rate of these very heavy materials has probably occurred in tandem with increases to the landfill levy. The industry has invested significantly in reprocessing capacity over the past decade, with all the major reprocessors investing in new facilities at existing and new sites.

As Melbourne's population grows, especially in the south east (Cardinia and Casey) and north and west (Whittlesea, Hume, Melton and Wyndham), there is likely to be demand for further infrastructure investment.

In regional Victoria, the major population centres have reasonable infrastructure for processing concrete, brick and related materials, although some challenges remain. These include:

- large stockpiles of unprocessed materials in the Ballarat region, which may in part be due to the lack of a strong market for recycled aggregate products
- further investment in recycling infrastructure in the Gippsland region, particularly in Latrobe
- development of further facilities in regional Victoria to collect and stockpile concrete, with periodic processing by mobile crushing and screening equipment (although these facilities will only be viable if they can identify and manage asbestos-contaminated material, especially from residential demolition and renovation projects).

TABLE 6.13
CONCRETE, BRICK AND ASPHALT WASTE RECOVERED, LANDFILLED AND GENERATED, VICTORIA, 2010–11[1]

Material	Recovered (tonnes)	Landfilled (tonnes)	Generated (tonnes)	Recovered %
Concrete/bricks/asphalt	4,194,000	861,000	5,055,000	83

Note

1 Waste generated equals waste recovered plus waste to landfill. Landfill data is from Environment Protection Authority Victoria landfill levy receipts (unpublished). Recovered data is from *Victorian Recycling Industry Annual Survey* (revised) 2010–11 (unpublished at the time of this draft).

TABLE 6.14
MAJOR CONCRETE, BRICK OR ASPHALT REPROCESSORS IN VICTORIA

WMG Area	Company Name	Location
Metropolitan Melbourne	Alex Fraser Group	Laverton North, Kingston and Epping
	Barro Group	North Sunshine
	Boral Limited	Deer Park, Port Melbourne, Somerton
	City Circle Demolition Pty Ltd	Brooklyn, Dandenong
	CityWide Service Solutions Pty Ltd	Campbellfield
	Delta Group	Sunshine
	Ecobricks	Clayton
	SITA	Hampton Park
	Sunshine Groupe	Brooklyn
	Waste Converters	Dandenong
Barwon South West	Regional Recycle	Geelong
	Local Mix	Geelong
Gippsland	Gippsland Concrete Recycling	Traralgon
Grampians Central West	ChrisBev	Ballarat
Loddon Mallee	Hopley	Bendigo
North East	Mansfield Construction	Mansfield
	Trevor Jackson	Wodonga

7. Landfill

Sustainability victoria
State Government Victoria

7.1 Introduction

Getting Full Value: the Victorian Waste and Resource Recovery Policy, while recognising the importance of landfills, defines their long term purpose as only to receive treated residual waste (waste that remains after all resources that can be economically recovered have been extracted).

Environment Protection Authority Victoria (EPA) closely regulates landfills through its licensing system. Licensed landfills are required to comply with EPAs guidelines in its publication *Best Practice Environmental Management: Siting, Design, Operation and Rehabilitation of Landfills (BPEM)*, so they do not impact on human health and the environment or leave an unacceptable legacy for future generations.

EPA guidelines state that the disposal of materials to landfill is the least preferred waste management option, while noting that landfills will continue to be needed in the future for waste that cannot be economically recovered.

As management costs increase, landfills that are not financially viable may need to be rationalised, particularly smaller landfills in regional Victoria that are moving to comply with EPA requirements. Closing some landfills and replacing them with transfer and resource recovery infrastructure may result in better environmental and economic outcomes for some regional communities. It may also result in economically viable quantities of materials for reprocessing that will attract industry investment, providing economic benefits to these communities.

Scheduling of new landfills is currently managed through the Metropolitan Landfill Schedule in the *Metropolitan Waste and Resource Recovery Strategic Plan* and *regional waste management plans*. These identify the location and sequence for filling and operating landfill sites. The Metropolitan Landfill Schedule is incorporated into planning schemes across the state through the State Planning Policy Framework. It provides local governments, state planning agencies and other responsible authorities with a strategic framework to approve and provide landfills, to ensure there is enough capacity to meet Melbourne's landfill disposal needs. The analysis in the draft *Statewide Waste and Resource Recovery Infrastructure Plan (SWRRIP)* provides a statewide view to inform the development of metropolitan and regional schedules.

EPAs *BPEM* guidance sets out the objectives and outcomes for all licensed landfills which accept fill, putrescible, solid inert and Category C prescribed industrial wastes.

Getting Full Value: Goal 7.3

Facilitate the long term purpose of landfills to be for receiving and treating residual waste and ensure a range of support mechanisms for closed landfills.

Landfill operators are required to have an auditor acknowledge that the design and construction of new cells and landfills comply with EPAs *BPEM* requirements. Operators must allow sufficient time to design, construct and obtain approvals for new cells to ensure the ongoing provision of adequate airspace. In the past, this process has taken longer than expected and has led to less-than-optimal temporary arrangements (such as overtaking existing cells and transporting some waste to another landfill).

The cost of designing, constructing, operating, and the eventual closure and rehabilitation of landfills has increased largely due to the community expectations that landfills minimise their impact on the environment and surrounding community. As a consequence many local governments are reviewing the financial viability of their landfills, particularly small landfills in regional Victoria. In 2012–13[12], the EPA reviewed the financial viability and environmental risks of regional licensed landfills. This research has been used as part of the draft *SWRRIP* analysis when considering options for the future management of landfills, particularly in regional Victoria.

Siting new landfills can be challenging. Strong community opposition is common and the planning approval processes can take years. Many metropolitan landfills, particularly in south east Melbourne, face amenity challenges (often related to odour) as a result of residential encroachment into areas previously considered to be buffers. This can result in significant lead times in securing new sites. The increase in wet weather conditions from 2009 to 2012 created other landfill management issues including inadequate leachate management and the accelerated breakdown of organic materials, resulting in strong odours carrying across neighbouring communities before cells were full and gas capture systems could be fully installed.

12 Environment Protection Authority Victoria, *Rural Landfill Risk Assessment*, (unpublished), 2013

7.2 Data considerations

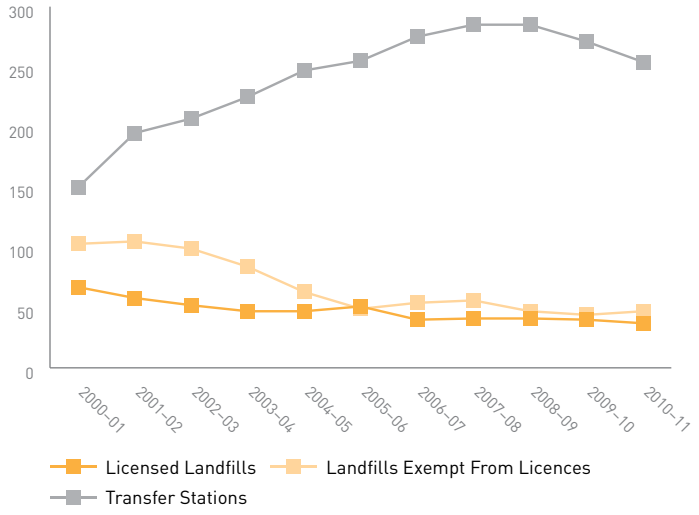
Planning for future landfills is based on an estimate of available landfill airspace, future landfill airspace needs and the rate at which remaining available airspace will be used. Estimates of remaining airspace for each landfill use data from *regional and metropolitan waste management plans* (where they are current), information provided by waste management groups (WMG), landfill owners and EPA.

The draft *SWRRIP* also uses data from EPA landfill levy returns. Data is not adjusted for the 15% allowance for daily cover and cannot, therefore, be directly compared with historical data in the annual *Towards Zero Waste* summary and other reports. In estimating available landfill airspace, we also factored in prescribed industrial waste (PIW) received by landfills as this reduces the available airspace as landfills that accept PIW, as well as municipal solid waste (MSW) or solid industrial waste (SIW).

SIW is the term used in this section to represent the sum of commercial and industrial (C&I) and construction and demolition (C&D) waste. This is because landfill levy data is split into MSW and SIW. Tonnage data is from 2010–11, unless otherwise stated.

Landfill numbers only include operational landfills at the time of publication and not those awaiting approval. For this reason, numbers may vary from those in *metropolitan and regional waste management plans*, as they also include planned and some closed landfills.

FIGURE 7.1
NUMBER OF LANDFILLS AND TS/RRCS IN VICTORIA, 2000–01 TO 2010–11



Source: Sustainability Victoria, *Victorian Local Government Annual Survey*

Note

No data was collected for 2003–04; the trend was extrapolated from existing data and is shown as a dashed line.

7.3 Victoria

There are 90 landfills operating in Victoria: 51 licensed and 39 operating that are exempt from licencing. All 36 of these landfills exempt from licencing are located in regional Victoria.

Figure 7.1 shows that the number of licensed and unlicensed landfills has steadily decreased in the past 10 years and that, until the past few years, the numbers of decreased in the past 10 years and that, until the past few years, the numbers of transfer station and resource recovery centres (TS/RRC) were steadily increasing. This is due to:

- increased government and community interest in recycling and resource recovery from waste materials
- greater provision of recycling services to households and businesses
- increased regulatory requirements for environmental performance by landfills, leading to the closure of smaller landfills and waste being transferred to larger regional facilities.

The draft *SWRRIP* analysis identified all the operating landfills in Victoria as of March 2013. A map of these facilities can be found in Section 9, Figure 9.4.

7.3.1 Licensed landfills

Table 7.1 shows the location and ownership type of the 51 licensed, operating landfills in Victoria. There are another 10 private landfills which the draft *SWRIPP* does not include: they receive waste exclusively from a single source, usually a manufacturer.

Another 25 landfills are licensed by EPA, but do not currently receive waste. From a planning perspective, these landfills are considered to be closed.

Sixteen of the licensed, operating landfills are in metropolitan Melbourne and the remaining 35 are located across regional Victoria. Of the 18 in metropolitan Melbourne, 14 are privately owned and four are local government owned. One of the privately owned landfills (the Daameeli Landfill, operated by the Hi Quality Group in Sunbury) only accepts PIW.

Most licensed, operating landfills in regional Victoria are owned by local governments. These landfills tend to be much smaller than those in metropolitan Melbourne, where most of the state's waste is generated and landfilled. The most notable exception is the (private) Maddingley Brown Coal Landfill at Bacchus Marsh that accepts, almost exclusively, SIW from metropolitan Melbourne.

TABLE 7.1
LICENSED, OPERATING LANDFILLS IN 2010–11 FOR EACH OF THE PROPOSED WMG AREAS

WMG Area	Local Gov't Owned	Privately Owned	Total
Metropolitan Melbourne	4	14	18
Barwon South West	6	1	7
Gippsland	7	0	7
Goulburn Valley	4	1	5
Grampians Central West	2	3	5
Loddon Mallee	5	0	5
North East	3	1	4
Total	**31**	**20**	**51**

Source: Sustainability Victoria, draft *Statewide Waste and Resource Recovery Infrastructure Plan,* data set (unpublished), 2013

7.3.2 Landfills exempt from licences

Landfills servicing populations of less than 5,000 people are exempt from licensing requirements. Table 7.2 shows there are 36 of these operating landfills exempt from licencing in Victoria, all in regional areas and owned by local governments. The largest is the Heathcote Landfill in the Calder area, which takes in about 3,000 tonnes a year. Most others take in less than 1,000 tonnes a year. This amounts to a very small proportion of the total waste landfilled in Victoria.

7.3.3 Important regional landfills

Table 7.3 shows the location of important regional landfills in Victoria and who owns them. These are important because of their location, cross regional flows, current and projected waste tonnages, and available airspace.

7.3.4 The future viability of landfills

Whilst it is recognised that landfills will continue to be an important part of the waste and resource recovery system for some time, it is expected that the number of smaller landfills, both licensed and unlicensed will continue to decrease. Increased pressure to meet best practice landfill management requirements is particularly likely to result in the closure of smaller landfills and their replacement with transfer stations and resource recovery infrastructure servicing larger regional landfill hubs.

In 2012, the EPA conducted an environmental and financial risk assessment of 31 of the 35 licensed landfills in regional Victoria, including all local government owned landfills[13]. This high level assessment focused on the financial modelling of operations under a number of potential future scenarios taking into account the environmental risk profile of each site. It did not include any analysis of the community impact of the various scenarios.

13 Fox-Lane Consulting and URS, *Rural Landfill Risk Assessment,* commercial in confidence, 2012

TABLE 7.2
OPERATING LANDFILLS EXEMPT FROM LICENCING, BY PROPOSED WASTE MANAGEMENT GROUP AREAS, AT APRIL 2013[1]

	Number of Landfills Exempt From Licencing
Metropolitan Melbourne	0
Barwon South West	5
Gippsland	7
Goulburn Valley	0
Grampians Central West	9
Loddon Mallee	14
North East	1
Total	**36**

Source: Sustainability Victoria, draft *Statewide Waste and Resource Recovery Infrastructure Plan,* data set (unpublished), 2013

Note

1 Tonnages per region are not included in the table, due to a lack of data.

The research found, as a general rule that operating costs were likely to be higher if a landfill:

- has shallow cell depth
- accepts less than 25,000 tonnes per year
- only accepts waste from their local area.

These findings suggest that further investigations into future operating models for these landfills could identify options with improved outcomes for the operating councils and community. This assessment should explore alternatives to continuing landfill operations including establishing TS/RRCs, with disposal of residual waste to a larger regional landfill. The research should also recognise that locally placed landfills can have a community benefit that is hard to evaluate on purely economic terms and the ultimate decision to maintain a local landfill lies with the operating council. However such a decision needs to be informed by the appropriate research.

Table 7.4 shows the local government operated landfills that are planned for closure in the short term. Many of these closures are in regional Victoria and planning to ensure local needs are met will be undertaken through the development of the regional waste and resource recovery implementation plans. Where appropriate, this will include transitioning the site to TS/RRC activities prior to transporting the remaining consolidated residual waste to a regional landfill.

TABLE 7.3
IMPORTANT LANDFILLS BY PROPOSED WASTE MANAGEMENT GROUP AREAS

Proposed WMG Area	Landfill	Owner
Metropolitan Melbourne	Werribee Landfill	Wyndham City Council
	Boral Landfill, Ravenshall	Boral
	Hanson Landfill, Woolert	Hanson Quarries
	SITA Landfill, Hallam	SITA
Barwon South West	Drysdale Landfill	City of Greater Geelong
	Corangamite Landfill (Naroghid)	Corangamite Shire Council
Gippsland	Bairnsdale	East Gippsland Shire Council
Goulburn Valley	Patho Landfill, Echuca	Ellwaste Echuca
	Cosgrove Landfill, Shepparton	Greater Shepparton City Council
	Hildene Landfill, Seymour	Mitchell Shire Council
Grampians Central West	Statewide Landfill, Stawell	Statewide Waste
	Dooen Landfill, Horsham	Horsham Rural City Council
	Maddingly Brown Coal	Calleja
	Smythesdale Landfill	Ballarat City Council
Loddon Mallee	Mildura Landfill, Mildura	Mildura Rural City Council

TABLE 7.4
LOCAL GOVERNMENT OWNED LANDFILLS PLANNED FOR CLOSURE, IN THE SHORT TERM

Proposed WMG Area	Local Government Area	Landfills Exempt From Licences	Licensed Landfills
Metropolitan Melbourne	Mornington Peninsula Shire Council		Rye
Barwon South West	Glenelg Shire Council	Casterton	
		Dartmoor	
		Nelson	
	Southern Grampians Shire Council	Glenisla	
	Colac Otway		Alvie
	Surf Coast Shire		Anglesea
	Moyne Shire Council	Killarney	
Gippsland	East Gippsland Shire Council	Benambra	
		Bendoc	
		Bonang	
		Cann River	
		Mallacoota	
		Orbost	
Grampians	Northern Grampians Shire Council	Hard Hills	
		Marnoo	
Loddon Mallee	Swan Hill Rural City Council	Boundary Bend	
	Buloke Shire Council	Charlton	
		Wycheproof	
	Mildura Rural City Council	Murrayville	
		Ouyen	

Key Findings of EPA Risk Assessment of Regional Landfills

- The landfills examined had a diversity of environmental risk profiles, considering their siting; the type of liner used in cell construction; the depth to, and quality of, groundwater; subsoil and rock permeability; distance to sensitive land uses (such as residential housing); leachate management; and amenity management.
- The effective operating cost per tonne of waste depends on many different factors, some of which are site specific. However, as a general rule, landfills accepting less than 25,000 tonnes a year, or with a shallow cell depth, are likely to have a higher operating cost per tonne of waste than other landfills.
- Complying with the landfill *BPEM* requirements has increased the cost of constructing and operating new cells.
- Cost and revenue projections for some landfills show their predicted costs will be higher than revenues. These landfills will need to reduce costs, increase revenue or, in the case of local government landfills, subsidise landfill operations by increasing rates. The waste component of residential rates cross subsidises landfill operations, and residential ratepayers often pay more for waste disposal than the stated landfill gate fee.
- Some landfills have legacy costs associated with past practices (such as costs to rehabilitate closed cells or address groundwater contamination) that could further erode their financial viability. These legacy costs were not included in the rural landfill risk assessment modelling.

TABLE 7.5
APPROXIMATE QUANTITIES DEPOSITED AT LANDFILLS
IN THE PROPOSED WASTE MANAGEMENT GROUP AREAS, 2010–11

WMG Area	Approximate Tonnage Per Year
Metropolitan Melbourne	3,205,000
Barwon South West	338,000
Gippsland	116,000
Goulburn Valley	143,000
Grampians Central West	597,000
Loddon Mallee	160,000
North East	35,000
Total	**4,592,000**

Source: Data source from Environment Protection Authority Victoria landfill levy receipts.

Note

Figures do not include prescribed industrial waste and have not been adjusted for a daily cover allowance.

7.4 Waste quantities

The amount of solid waste (excluding PIW) landfilled in Victoria has remained relatively constant for the past decade, at around 3.8 million tonnes a year[14]. In 2010–11, a total of 3,885,000 tonnes was sent to landfill.

About another 434,000 tonnes of PIW went to licensed landfills throughout Victoria in 2010–11. In most cases, this was Category C contaminated soil which can go to landfill.[15] PIW is outside the scope of the draft *SWRRIP*, except in its impact on available landfill airspace.

Regional waste-to-landfill quantities vary considerably, with the main influence being population. The data collected from each area is collected for a number of purposes and is influenced by the amount of PIW collected at individual landfills and the amount of daily cover used.

Table 7.5 shows all material landfilled, including some daily cover and PIW[16].

14 This is a net figure determined from the landfill levy receipts and has been corrected to remove the 15% daily cover allowance.

15 All prescribed industrial wastes intended for landfill disposal must be classified into one of three categories, depending on the level of hazard. Category A is the highest hazard and Category C is the lowest hazard.

16 Landfill figures used in discussions do not include prescribed industrial waste unless stated and have not been corrected to allow for daily cover.

7.5 Waste flows

In the past there were numerous landfills, each serving their local population. As landfill regulations increased, so too did management costs. This has resulted in a smaller number of larger, strategically located facilities. Consequently, landfill waste is often transported away from where it is generated.

The flow of residual MSW to landfill can be mapped, because local governments and service providers define where the residual waste is landfilled in their contracts. Cross regional flows of residual SIW are harder to map because of the high numbers of waste generators, each of whom have their own arrangements with a service provider. Generators or service providers are not required to report on solid waste movements.

SIW waste generally, but not always, follows the same flow as MSW. Disposal of SIW is generally by short term contracts, which means that service providers can change frequently and waste tends to follow the 'lowest cost at the time' solution, taking into account gate fees and transport costs.

The percentage of MSW verses SIW received at landfills can indicate movement of landfill waste in and out of an area. EPA data from landfills shows that SIW comprises about 58% of all waste disposed of at metropolitan Melbourne landfills and 42% in non-metropolitan landfills. If the percentage of SIW in a particular area varies significantly from this, it suggests movement of waste in or out of the area.

Available data on flows of waste-to-landfill across the state indicates that waste travels up to 120 km from its point of generation to disposal: roughly, about a three hour round trip.

7.6 Landfill capacity

Landfill planning and management must consider the rate at which remaining available airspace will be depleted through disposal of waste in the landfill. This is important, given that siting and obtaining the required planning and EPA approvals for a new landfill can take up to five years. A number of landfills operate in conjunction with operational quarries, and estimates of available airspace, needs to be periodically updated.

Figure 7.2 shows the estimated time it will take Victoria's regions to use remaining available airspace. Figure 7.2 uses the available information from landfill operators and includes existing cells and any others that have EPA works approval. It does not include those without works approval.

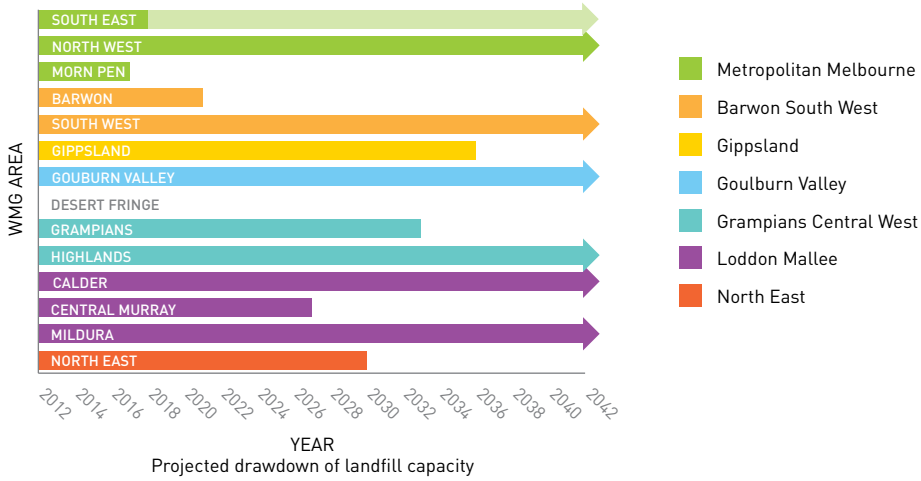
The data indicates that Victoria has enough airspace for projected landfill tonnages for another 30 years, assuming a business as usual (BAU) approach to resource recovery and accurate estimates of existing airspace at each landfill. Increasing the amount of resources recovered, and reducing the amount of waste sent to landfill, would slow the drawdown of landfill airspace.

There are a number of localities within the proposed WMG areas that are projected to have landfill capacity issues in the short term. Options for these areas will be explored through the development of the *regional waste and resource recovery implementation plans (WRRIP)*. These areas include:

- Metropolitan WMG (Metropolitan WMG) – south east catchment
- Metropolitan WMG – Mornington Peninsula catchment
- Loddon Mallee Regional Waste Management Group (RWMG) – Bendigo
- Barwon South West RWMG – Anglesea.

A shortage of landfill airspace does not necessarily require a new landfill. In some cases, efficient transfer of waste to another landfill may be the most cost effective, and preferred, environmental solution. For example, the current Desert Fringe RWMG area does not currently have any landfills. It exports waste to the Dooen Landfill in the neighbouring Grampians Grampians area, which is a high capacity landfill predicted to remain open until 2042.

FIGURE 7.2
LANDFILL AIRSPACE, BY PROPOSED WMG AREA, 2012 TO 2042, BY YEAR



Source: Sustainability Victoria, *Regional Waste and Resource Recovery Projection Model*, v 1.1, 2013

Notes

1 Based on kilotonnes remaining at the end of the financial year. Modelling of airspace drawdown is based on waste projection modelling, assumptions about future annual tonnages to landfill and cross regional movements of waste.

2 The current Desert Fringe Regional Waste Management Group area does not have any landfills.

7.7 Waste management group area summaries

This section summarises landfill infrastructure and landfill waste flows, by the proposed WMG boundaries[17]. The estimated amount of waste generated in each WMG area for disposal to landfill in 2010–11 and projections for 2041–42, are included to indicate the amount of future airspace needed, noting that the 2041–42 are modelled amounts and assume the current rate of resource recovery continues. As recovery rates are expected to increase, these amounts are most likely overestimated. Given the lack of data on landfills exempt from licences, this section primarily examines licensed landfills.

The regional summaries also include where appropriate, issues that need to be considered and addressed in the development of the areas *WRRIPs*. These recommendations have been identified through the analysis undertaken to develop the draft *SWRRIP*. Information on the data sources can be found in Section 1.

Maps showing WMG infrastructure infrastructure, including landfills, are found in Appendix 8.3.

17 See Chapter 1, recommendation of the Ministerial Advisory Committee on Waste and Resource Recovery Governance Reform.

7.7.1 Metropolitan Melbourne

The proposed Metropolitan WMG area amalgamates the current Mornington Peninsula RWMG and Metropolitan WMG. This area generated an estimated 3,205,000 tonnes of waste requiring disposal to landfill in 2010–11. Under a BAU approach, this is projected to increase to about 3,621,000[18] tonnes in 2041–42.

Table 7.6 shows there are 18 licensed, operational landfills and no unlicensed landfills in metropolitan Melbourne. The Metropolitan WMG area has two main catchment areas: the south east and north west. Currently, the south east catchment has about eight years of landfill capacity remaining; the north west catchment has considerably more. The Mornington Peninsula RWMG area currently operates as a smaller catchment of its own.

The Barrow Group at Kealba has works approval for a new landfill and the first cell has been constructed. At the time of publication, the group was awaiting EPA approval (via a licence) to commence operations.

18 The estimated amounts of waste landfilled and projected amounts do not include prescribed industrial waste and have not been adjusted to make allowance for daily cover.

TABLE 7.6
LANDFILLS IN METROPOLITAN WASTE MANAGEMENT AREA GROUP

Catchment	Site Name and EPA Licence Number	Town/ Suburb	Owner	Wastes Accepted	Anticipated Close Date
North west	Altona North Landfill (ES 26227)	Altona North	Alton North Landfill P/L	Solid inert	2024
	Boral (ES 37288)	Ravenhall	Boral	Putrescible and solid inert	2090
	BTQ Group Sunbury (ES21321)	Bulla	BTQ Group	Solid inert	2024
	Hanson Landfill (ES41808)	Wollert	Hanson	Putrescible, solid inert and PIW	2080
	Riddell Rd Landfill (ES465)	Sunbury	Hume City Council	Putrescible and solid inert	2022
	Werribee Landfill (ES 492)	Werribee	Wyndham City Council	Putrescible and solid inert	2066
	Western Land Reclamation (ES26594)	Brooklyn	Sunshine Corporation	Solid inert	2024
	Hi Quality (ES4279)*	Bulla	Hi Quality	Cat C soils	2020
South east	Clayton Regional Landfill (ES 20872)	Clayton South	Jointly owned by four surrounding local gov'ts	Putrescible and solid inert	2016
	Glen Landfill (ES 22749)	Langwarrin	Glen	Solid inert	2014
	TPI – Fraser Rd (EM 28818)	Clayton South	TPI	Putrescible and solid inert	2017
	TPI – Heatherton Sands (ES 552)	Moorabbin	TPI	Solid inert	2017
	TPI Clarinda Landfill (ES45017)	Clarinda	TPI	Solid inert	2020
	Baxter, Victory Road (ES419)	Clarinda		Solid inert	2017
	SITA – Hallam (ES33144)	Hampton Pk	SITA	Putrescible and solid inert	2038
	SITA – Lyndhurst – (ES511)	Lyndhurst	SITA	Putrescible, solid inert and PIW	2030
Mornington Peninsula	Devilsbend	Tuerong	Grosvenor Lodge	Primarily inert	2022
	Rye	Rye	Mornington Peninsula Shire Council	Putrescible	2017

Source: Sustainability Victoria, *Regional Waste and Resource Recovery Projection Model*, v 1.1, 2013

Note

Category C soils and prescribed industrial waste are outside the scope of the draft *Statewide Waste and Resource Recovery Infrastructure Plan*.

7.7.1.1 Landfill waste flows

There is significant movement of landfill waste across metropolitan Melbourne. For MSW, there are clear catchments based around the SITA Hallam, Boral Ravenhall, Wollert and Werribee landfills. The Rye Landfill is predominately used for disposal of MSW from the Mornington Peninsula area.

There is insufficient data to map SIW landfill flows within the Metropolitan WMG area. It is likely that some SIW moves from the east side of Melbourne to landfills on the west side, as waste generators and transport businesses seek to minimise transport costs and gate fees. Devils Bend Landfill is primarily an inert landfill receiving materials from the Mornington area and from metropolitan Melbourne.

Significant amounts of waste flows into the metropolitan WMG area for disposal at landfill. These include:

- about 50% of Geelong's MSW is transported to the Werribee Landfill for disposal, following the closure of the Corio Landfill in Geelong at the end of 2011: it is also likely that a significant amount of SIW from Geelong also goes to Werribee
- Macedon Ranges Shire Council transports its MSW to the Sunbury Landfill for disposal; SIW from the Macedon Ranges area is also likely to be transferred to Melbourne for disposal, although the landfill destinations are not known
- Moorabool Shire Council transports its MSW to the Werribee Landfill for disposal
- Baw Baw Shire Council transports its MSW to the SITA Hallam Landfill for disposal following the closure of the Trafalgar Landfill in 2011–12: it is also likely that SIW from Baw Baw is also transported to Melbourne for disposal
- in 2012, SIW was transported from the Smythesdale Landfill to Melbourne for disposal as a result of the delay in developing a new landfill cell at the Smythesdale Landfill
- no waste from Metropolitan WMG area is currently transported for disposal into regional Victoria, except for the substantial movement of SIW (mainly from the north west metropolitan area) to the Maddingley Brown Coal Landfill in Bacchus Marsh

7.7.1.2 Regional considerations

South east metropolitan area

Due to the expected landfill closures in the south east metropolitan area of Melbourne it is projected there will be a reduction of available airspace of around 1,200,000 tonnes per annum by 2020. As a result there is an immediate capacity issue required to be addressed to ensure effective management of this residual waste from the south east of metropolitan Melbourne.

The evaluation of options will be considered in the draft *Metropolitan Waste and Resource Strategic Plan* currently under development. All options to be considered should include mechanisms to reduce the volumes of material requiring landfill through increasing resource recovery from the residual stream.

Solutions to be explored should include utilising appropriate sites within the south east metropolitan area for consolidation and resource recovery prior to transport to large regional landfills. These landfills could be located either within the metropolitan boundary or in a neighbouring regional area such as Gippsland.

The Metropolitan WMG is undertaking an expression of interest process to identify the most viable option to manage this volume of material. This will be underpinned by the joint procurements for services by a number of councils in the south east of Melbourne utilising long term contracts for MSW waste streams to establish volumes that attract industry investment.

Developing the most appropriate solution will require an evaluation of the impact and potential benefits to the statewide system. This should include:

- the potential opportunities for regional areas to access resource recovery and landfill hubs
- the impact of a large landfill servicing the metropolitan area but located in a regional area on the existing landfill hubs in the area
- the potential impact on the transport network.

Mornington Peninsula area

The expected closure of the Rye Landfill in 2017 and Devilbend Landfill in 2022 presents an immediate capacity need in this area. The current *Mornington Peninsula Regional Waste Management Plan 2010–2015* identifies a potential new landfill site at the former Hillview Quarries operation.

However, given its close proximity to a number of landfills in south east metropolitan Melbourne and potential new landfill sites in Gippsland, replacing the Rye Landfill with one of the same or similar size may not provide the best outcomes for the community and council. Support should be provided to the Mornington Peninsula Council to evaluate the costs and benefits to them and their community on a range of options including:

- reducing residual waste volumes through increased resource recovery prior to disposal to a new local landfill
- participating in joint procurement for services with neighbouring councils
- reducing residual waste volumes through increased resource recovery prior to transport to a large regional landfill.

It is unlikely that a solution would include establishing hubs of regional significance for either resource recovery or landfill. The viability of these hubs would be dependent on flows of materials from the greater metropolitan area and would be competing with established existing hubs. A more viable solution is likely to include establishing local hubs feeding the spokes supporting existing hubs or establishing new hubs in the metropolitan area supported by the volumes of materials that will establish the economies of scale. The research needs to recognise that local landfills can provide benefits to the community that are hard to evaluate on purely economic terms.

The recent recommendation of the Ministerial Advisory Committee on waste and Resource Recovery Governance Reform to amalgamate the Mornington Peninsula RWMG with the Metropolitan WMG provides a timely opportunity for the Mornington Peninsula Shire Council to investigate opportunities to participate in the joint procurement process.

TABLE 7.7
LANDFILLS IN THE PROPOSED BARWON SOUTH WEST RWMG AREA

	Landfill	Location	Owner	LGA Serviced by Landfill	Anticipated Close Date
Licensed landfills	Alvie	Alvie	Colac Otway Shire Council	Colac Otway Shire Council	2022
	Anglesea	Anglesea	Surf Coast Shire Council	Surf Coast Shire Council	2017
	Moltoni	Fyansford	Moltoni Corporation Pty Ltd	Greater Geelong City Council	2018
	Drysdale	Drysdale	Greater Geelong City Council	Borough of Queenscliffe, Greater Geelong City Council	2028
	Corangamite	Naroghid	Corangamite Shire Council	Colac Otway Shire Council, Corangamite Shire Council, Golden Plains Shire Council, Moyne Shire Council, Warrnambool City Council	2060
	Hamilton	Hamilton	Southern Grampians Shire Council	Southern Grampians Shire Council	2037
	Portland	Portland	Glenelg Shire Council	Glenelg Shire Council	2037
Landfills exempt from licences	Casterton	Casterton	Glenelg Shire Council	Glenelg Shire Council	2016
	Dartmoor	Dartmoor	Glenelg Shire Council	Glenelg Shire Council	2014
	Glenisla	Glenisla	Southern Grampians Shire Council	Southern Grampians Shire Council	2014
	Killarney	Killarney	Moyne Shire Council	Moyne Shire Council	2013
	Nelson	Nelson	Glenelg Shire Council	Glenelg Shire Council	2013

7.7.2 Barwon South West

The proposed Barwon South West RWMG area amalgamates the current Barwon RWMG and South West RWMG. The area generated an estimated 338,000[19] tonnes of waste requiring disposal to landfill in 2010–11. Under a BAU approach, this is projected to increase to about 368,000 tonnes in 2041–42.

Table 7.7 shows the seven licensed landfills in the proposed Barwon South West RWMG area and the five unlicensed landfills.

7.7.2.1 Landfill waste flows

Significant inter-regional flows:

- MSW from Colac Otway Shire, Golden Plains Shire, Moyne Shire and Warrnambool City goes to the Corangamite Landfill at Naroghid.
- SIW from outside Corangamite Shire goes to Naroghid, based on the high percentage of SIW received at the landfill: this could be due to the low gate fee and available airspace, compared to other landfills in south western Victoria.

Major cross regional waste flows:

- About 50% of MSW from Geelong is transported to the Werribee Landfill for disposal following the closure of the Corio Landfill in Geelong at the end of 2011.
- A significant amount of SIW from Geelong is also transported to the Werribee Landfill.

7.7.2.2 Regional considerations

- The main landfill in the Geelong region (Corio Landfill operated by the City of Greater Geelong) closed at the end of 2011. Corio Landfill received around 150,000 tonnes a year of solid waste plus a significant quantity of PIW. Closing this landfill has increased the tonnages received at the Drysdale and Moltoni Fyansford landfills, as well as increased transport to the Werribee Landfill in the metropolitan area. The Drysdale Landfill is a key regional landfill and could be an option when the Anglesea Landfill closes in 2017.
- The Alvie Landfill is scheduled for closure in 2020. The draft *SWRRIP* analysis suggests that further investigation into the long term activities at the site may identify options with improved outcomes for the community and council. The Colac Shire Council has commenced this process. It is recommended that the investigation should identify the costs, benefits, risks and long term security for the council and rate payers of a range of options including:
  - transitioning the site to a TS/RRC and organics reprocessing facility and transporting the remaining consolidated residual waste to regional landfills
  - establishing TS/RRCs and organic reprocessing in other suitable locations and transporting the remaining consolidated residual waste to regional landfills
  - establishing a replacement landfill in the area.
- The Anglesea Landfill is due for closure in 2017 resulting in an immediate priority to identify solutions for the residual waste stream currently going to the site. Options explored should include transitioning the site to TS/RRC activities and transporting the remaining consolidated residual waste to a larger regional landfill.
- The Moltoni Landfill is a privately operated inert landfill at Fyansford. Whilst its current capacity is due to be filled by 2018 it is thought that the operator is in the process of applying to EPA for future capacity.
- The Naroghid Landfill near Camperdown is a medium sized rural landfill. *The Landfill Risk Assessment Report* identified a potential for the landfill to expand to become regionally significant. The development of the *Barwon South West WRRIP* should include an analysis of options to transition smaller landfills in the WMG area to TS/RRC activities and transporting the remaining consolidated residual waste to Naroghid.
- The Portland Landfill has available airspace until 2037. However the draft *SWRRIP* analysis identifies the need for further investigation into the long term activities at the site to identify options that may improve the outcomes to the council and community. This should include evaluating options to:
  - transition the site to TS/RRC activities and transport the remaining consolidated residual waste to an existing larger regional landfill, potentially Naroghid
  - transition the site to TS/RRC activities and transport the remaining consolidated residual waste to a new landfill that would service the area, enabling the closure of a number of smaller landfills
  - increase resource recovery activities at the current site and dispose of the remaining residual waste at the current site.

19 The estimated amounts of waste landfilled and projected amounts do not include prescribed industrial waste and have not been adjusted to make allowance for daily cover.

TABLE 7.8
LANDFILLS IN GIPPSLAND RWMG AREA

	Landfill	Location	Owner	LGA Serviced by Landfill	Anticipated Close Date
Licensed landfills	Bairnsdale	Bairnsdale	East Gippsland Shire Council	East Gippsland Shire Council	2052
	Grantville	Grantville	Bass Coast Shire Council	Bass Coast Shire Council	2047
	Hyland	Traralgon	Latrobe City Council	Latrobe City Council	2030
	Kilmany	Kilmany	Wellington Shire Council	Wellington Shire Council	2062
	Koonwarra	Koonwarra	South Gippsland Shire Council	South Gippsland Shire Council	2037
	Lakes Entrance	Lakes Entrance	East Gippsland Shire Council	East Gippsland Shire Council	2016
	Maffra	Maffra	Wellington Shire Council	Wellington Shire Council	2050
Landfills exempt from licences	Benambra	Benambra	East Gippsland Shire Council	East Gippsland Shire Council	2015
	Bendoc	Bendoc	East Gippsland Shire Council	East Gippsland Shire Council	2015
	Bonang	Bonang	East Gippsland Shire Council	East Gippsland Shire Council	2015
	Cann River	Cann River	East Gippsland Shire Council	East Gippsland Shire Council	2020
	Mallacoota	Mallacoota	East Gippsland Shire Council	East Gippsland Shire Council	2020
	Orbost	Orbost	East Gippsland Shire Council	East Gippsland Shire Council	2020
	Rosedale	Rosedale	Wellington Shire Council	Wellington Shire Council	2023

7.7.3 Gippsland

The Gippsland RWMG area generated an estimated 160,000[20] tonnes of waste requiring disposal to landfill in 2010–11. Under a BAU approach, this is projected to increase to about 164,000 tonnes in 2041–42.

Table 7.8 shows there are seven licensed landfills in the Gippsland RWMG area and seven unlicensed landfills.

7.7.3.1 Landfill waste flows

Major cross regional flows:

- A significant amount of C&I waste probably transported to metropolitan Melbourne or the Kilmany Landfill for disposal: the Hyland Highway Landfill in Traralgon accepts a significantly lower percentage (31%) of SIW than the state average (42%), which is notable given the strong industrial base in the Latrobe Valley.

20 The estimated amounts of waste landfilled and projected amounts do not include prescribed industrial waste and have not been adjusted to make allowance for daily cover.

7.7.3.2 Regional considerations

- The Mallacoota, Benambra, Bendoc, Bonang, Orbost and Lakes Entrance landfills are scheduled for closure in the short term by the East Gippsland Shire Council. The intent is to replace them with TS/RRCs and transport the remaining consolidated residual waste to a larger regional landfill, most likely Bairnsdale. As a result, the Bairnsdale Landfill is likely to become more regionally significant. These changes should be supported as part of the development of the *Gippsland WRRIP*.
- The Maffra Landfill has available airspace until around 2050. However the draft *SWRRIP* analysis identifies the need for further investigation into the long term activities at the site to identify options that may improve the outcomes to the community and council. These investigations should include evaluating the costs and benefits of:
- maintaining current landfill activities at the site
- increasing resource recovery activities to reduce landfill volumes prior to disposal at the site
- increasing resource recovery activities to reduce landfill volumes prior to transport toa larger regional landfill.

TABLE 7.9
LANDFILLS IN THE GOULBURN VALLEY RWMG AREA

	Landfill	Location	Owner	LGA Served by Landfill	Anticipated Close Date
Licensed landfills	Alexandra	Alexandra	Murrindindi Shire Council	Murrindindi Shire Council	2027
	Cobram	Cobram	Moira Shire Council	Moira Shire Council	2040
	Cosgrove	Shepparton	Greater Shepparton City Council	Greater Shepparton City Council	2037[1]
	Hildene	Seymour	Mitchell Shire Council	Mitchell Shire Council, Strathbogie Shire Council	2030
	Patho	Patho	Ellwaste Echuca	Buloke Shire Council, Campaspe Shire Council, Central Goldfields Shire Council, City of Greater Bendigo	2050

Note

1 Contingent on expansion of landfill into adjacent quarry area, otherwise landfill will be at capacity by 2018.

7.7.4 Goulburn Valley

The Goulburn Valley RWMG area generated an estimated 116,000[21] tonnes of waste requiring disposal to landfill in 2010–11. Under a BAU approach, this is projected to increase to about 169,000 tonnes in 2041–42.

Table 7.9 shows there are five licensed landfills in the Goulburn Valley RWMG area and no unlicensed landfills.

7.7.4.1 Landfill waste flows

Major cross regional flows:

- The Patho Landfill receives cross regional flows including:
  - a small tonnage of MSW from Buloke Shire Council and Central Goldfields Shire Council RRCs
  - significant tonnage of MSW waste from parts of the Loddon Mallee and Grampians Central West RWMG areas, as well as from within the Campaspe Shire
  - SIW from outside the Campaspe Shire Council to the Patho Landfill. This is based on anecdotal evidence from the Gannawarra Shire Council and the very low percentage of SIW (0.06%) received at the Kerang Landfill.
- C&I waste from Benalla and Wangaratta probably goes to the Cosgrove Landfill in Shepparton, based on the low percentages of SIW received at the Benalla and Bowser landfills. The percentage of SIW accepted at the Cosgrove Landfill is 60% being higher than the regional average of 42%.

21 The estimated amounts of waste landfilled and projected amounts do not include prescribed industrial waste and have not been adjusted to make allowance for daily cover.

7.7.4.2 Regional considerations

- The Cosgrove Landfill in Shepparton is regionally significant, serving a large population centre and the significant food processing industry in the greater Shepparton region. While there is adequate airspace for the medium term, there is limited airspace associated with the current operation of the Cosgrove Landfill. This landfill is sited adjacent to an operational quarry and there is potential for considerable new airspace in the quarried areas. It is recommended that the City of Greater Shepparton and Goulburn Valley RWMG develop a long term management plan for the Cosgrove Landfill, as a priority.
- The Patho Landfill near Echuca is changing from being a medium sized regional landfill to an important cross regional facility. The draft *SWRRIP* analysis suggests that regional benefits from this could include the transition of the Swan Hill and Kerang landfills to TS/RRC activities and the transportation of consolidated residual waste to Patho.
- The Hildene Landfill has available airspace till around 2030. However the draft *SWRRIP* analysis suggests a potential for Hildene to become a regional landfill accepting materials from both within and outside the area, in particular from Alexandra and Castlemaine. Further analysis is required into the design requirements, cost and benefits to the council and local community and advantages at the regional level of upgrading Hildene Landfill.

TABLE 7.10
LANDFILLS IN THE PROPOSED GRAMPIANS CENTRAL WEST RWMG AREA

	Landfill	Location	Owner	LGA Serviced by Landfill	Anticipated Close Date
Licensed landfills	Dooen	Dooen, via Horsham	Horsham Rural City Council	Hindmarsh Shire Council, Horsham Rural City Council, West Wimmera Shire Council, Yarriambiack Shire Council	2042
	Statewide	Bellellen	Statewide Waste	Ararat Rural City, Central Goldfields Shire Council, Northern Grampians Shire Council	2032
	Bamganie	Lethbridge	Bamganie P/L	Golden Plains Shire	No data
	Maddingley Brown Coal	Bacchus Marsh	Calleja	Metropolitan Melbourne	2030
	Smythesdale	Smythesdale	Ballarat City Council	Ballarat City Council, Hepburn Shire Council, Pyrenees Shire Council	2037
Landfills exempt from licences	Hard Hills	St Arnaud	Northern Grampians Shire Council	Northern Grampians Shire Council	2015
	Lah	Lah	Yarriambiack Shire Council	Yarriambiack Shire Council	No data
	Marnoo	Marnoo	Northern Grampians Shire Council	Northern Grampians Shire Council	2013
	Patchewollock	Patchewollock	Yarriambiack Shire Council	Yarriambiack Shire Council	no data
	Sheep Hills	Sheep Hills	Yarriambiack Shire Council	Yarriambiack Shire Council	No data
	Tempy	Tempy	Yarriambiack Shire Council	Yarriambiack Shire Council	No data
	Warracknabeal	Warracknabeal	Yarriambiack Shire Council	Yarriambiack Shire Council	no data
	Yaapeet	Yaapeet	Yarriambiack Shire Council	Yarriambiack Shire Council	No data
	Rokewood	Rokewood	Golden Plains Shire Council	Parts of the Golden Plains Council area	No data

7.7.5 Grampians Central West

The proposed Grampians Central West RWMG area amalgamates the current Desert Fringe, Grampians and Highlands RWMGs. The area generated an estimated 597,000[22] tonnes of waste requiring disposal to landfill in 2010–11. Under a BAU approach, this is projected to increase to about 799,000 tonnes in 2041–42.

Table 7.10 shows there are five licensed landfills in the proposed Grampians Central West RWMG area and nine unlicensed landfills.

7.7.5.1 Landfill waste flows

Significant inter-regional flows:

- There are no licensed landfills in the Hindmarsh and West Wimmera shire council areas (the current Desert Fringe RWMG area). Hindmarsh and West Wimmera councils export their MSW to the Dooen Landfill in Horsham. It is highly likely that SIW from these council areas is also transported to the Dooen Landfill.
- MSW from Ararat Rural City Council and Central Goldfields Shire Council goes to the Statewide Landfill.
- The Statewide Landfill receives 61% SIW which is higher than the state average of 42%, suggesting SIW from outside Northern Grampians Shire Council area is being received.
- The Smythesdale Landfill accepts putrescible waste from the most of the Highlands area.

Major cross regional flows:

- The Maddingley Brown Coal Landfill accepts significant volumes of SIW from the metropolitan Melbourne area.
- The Bamganie Landfill is a specialist landfill for disposal of waste from the veterinary sector (deceased animals). The site recently received a planning permit for an 80,000 tonnes-per-annum gasification facility.

7.7.5.2 Regional considerations

- The Dooen Landfill in Horsham is a significant regional landfill servicing the landfill needs of a number of the surrounding councils for MSW and most likely some SIW.
- The Statewide Landfill at Bellellen is of regional significance particularly for SIW.
- The Smythesdale Landfill is of regional significance accepting putrescible waste from a number of councils in the area.
- The Maddingley Brown Coal Landfill in Bacchus Marsh is of state importance due to its close proximity to the Melbourne metropolitan area and the volumes of SIW from Melbourne accepted.
- The unlicensed landfills at Hardhills and Marnoo are scheduled for closure in the short term. Support should be provided to establish TS/RRC activities at these sites prior to transport of the remaining consolidated residual waste to a larger regional landfill.
- The Northern Grampians, Yarriambiack and Golden Plains shire councils should be supported to investigate the options for their remaining unlicensed landfills to transition towards TS/RRC activities prior to transportation of the remaining consolidated residual waste to a larger regional landfill where it improves the economic and social outcomes to the council and community.

22 The estimated amounts of waste landfilled and projected amounts do not include prescribed industrial waste and have not been adjusted to make allowance for daily cover.

TABLE 7.11
LANDFILLS IN THE PROPOSED LODDON MALLEE RWMG AREA

	Landfill	Location	Owner	LGA Serviced by Landfill	Anticipated Close Date
Licensed landfills	Castlemaine	Castlemaine	Mount Alexander Shire Council	Mount Alexander Shire Council	2034
	Eaglehawk	Bendigo	Greater Bendigo City Council	Greater Bendigo City Council	2017
	Mildura	Mildura	Mildura Rural City Council	Mildura Rural City Council	2042
	Denyers Pit[1]	Kerang	Gannawarra Shire Council	Gannawarra Shire Council	2050
	Swan Hill [1]	Swan Hill	Swan Hill Rural City Council	Swan Hill Rural City Council	2037
Landfills exempt from licences	Heathcote	Heathcote	Greater Bendigo City Council	Greater Bendigo City Council	2028
	Murrayville	Murrayville	Mildura Rural City Council	Mildura Rural City Council	2017
	Ouyen	Ouyen	Mildura Rural City Council	Mildura Rural City Council	2017
	Birchip[1]	Birchip	Buloke Shire Council	Buloke Shire Council	2023
	Boort[1]	Boort	Loddon Shire Council	Loddon Shire Council	2023
	Boundary Bend[1]	Boundary Bend	Swan Hill Rural City Council	Swan Hill Rural City Council	2015
	Charlton[1]	Charlton	Buloke Shire Council	Buloke Shire Council	2015
	Culgoa[1]	Culgoa	Buloke Shire Council	Buloke Shire Council	2023
	Donald[1]	Donald	Buloke Shire Council	Buloke Shire Council	2025
	Inglewood[1]	Inglewood	Loddon Shire Council	Loddon Shire Council	2023
	Newbridge[1]	Newbridge	Loddon Shire Council	Loddon Shire Council	2023
	Pyramid Hill[1]	Pyramid Hill	Loddon Shire Council	Loddon Shire Council	2023
	Robinvale[1]	Robinvale	Swan Hill Rural City Council	Swan Hill Rural City Council	2023
	Wycheproof[1]	Wycheproof	Buloke Shire Council	Buloke Shire Council	2014

1 These landfills accept e-waste for recycling

7.7.6 Loddon Mallee

The proposed Loddon Mallee RWMG area amalgamates the existing Calder, Central Murray and Desert Fringe RWMGs. This area generated an estimated 143,000[23] tonnes of waste requiring disposal to landfill in 2010–11. Under a BAU approach, this is projected to decrease to about 115,000 tonnes in 2041–42.

Table 7.11 shows there are five licensed landfills and 14 unlicensed landfills in proposed the Loddon Mallee RWMG area.

7.7.6.1 Landfill waste flows

Major cross regional flows:

- About half of the 90,000 tonnes a year of residual waste generated in Bendigo goes to the Patho Landfill (which is owned and operated by Ellwaste in the Goulburn Valley RWMG area) due to delays in obtaining approval to construct the final cell at Eaglehawk Landfill and a desire to prolong the available airspace at Eaglehawk.
- It is likely that the SIW from the Buloke, Gannawarra, Loddon and the Swan Hill Rural City councils are transported to the Patho Landfill.
- Macedon Ranges Shire Council transports MSW to Sunbury Landfill in the Metropolitan WMG area for disposal; SIW from the Macedon Ranges area is also likely to be transferred to Melbourne for disposal, although the landfill destinations are not known.
- Up to 90% of SIW from Mildura goes to the Buronga Landfill in NSW: Mildura Landfill accepts a low percentage[24] of SIW, which may be due to regional NSW landfills not applying a levy.

7.7.6.2 Regional considerations

- The Eaglehawk Landfill in Bendigo is near the end of its life. A final cell is being built and is due for completion early in 2013–14. This will increase the life of the site by about three and a half years.[25] The City of Greater Bendigo owns land at Bagshot, about 15 km to the north east of Bendigo that is a potential location for a new landfill. However, locating a new landfill there may not provide the best financial outcome and further research needs to be undertaken to identify the best options to manage the residual waste stream currently going to Eaglehawk. Options explored should include utilising the existing site to increase resource recovery activities that reduce the amount of residual waste ultimately requiring disposal to landfill.
- The Heathcote Landfill has available airspace until 2028. However the draft *SWRRIP* analysis suggests that further investigation is required in the medium term to the benefits of transitioning activites to TS/RRC prior to transporting the remaining consolidated residual waste to either Bendigo or the Hildene Landfill at Seymour.
- Central Murray unlicensed landfills collectively accept about 50% of what goes to the two licensed landfills, equivalent to 7,500 tonnes based on 2010–11 landfill receipts. The unlicensed landfills at Manangatang, Piangil and Ultima have now closed and the sites have transitioned to transfer stations. Four more unlicensed landfills are planned for closure over the next four years, which could reduce the number of years of available capacity at licensed landfills.
- As more landfills exempt from licences close in the area, Swan Hill and Kerang will probably take more material than previously accepted. Alternatively, the waste could be transported to a landfill outside the area.
- The Denyers Pit Landfill in Kerang is not open to the public and is used almost exclusively to dispose of MSW collected in Gannawarra Shire; it has a very low (0.06%) percentage of SIW, compared to the regional average of 42%, suggesting PIW is moved out of the area, probably to Patho.
- The Castlemaine Landfill has available airspace until 2034. However the draft *SWRRIP* analysis recommends that further research into the future options for the Castlemaine Landfill may identify options with improved outcomes for the council and community. This research should recognise that local landfills can have community benefits that cannot be evaluated based on economics alone. The decision to keep the landfill operating is one for the council and should be based on informed research including the costs and benefits of:
  - increasing resource recovery and maintaining the landfill at the current site
  - transitioning the site to TS/RRC activities and transporting the consolidated residual waste to a larger regional landfill.

23 The estimated amounts of waste landfilled and projected amounts do not include prescribed industrial waste and have not been adjusted to make allowance for daily cover.

24 The Mildura landfill accepts about four times as much MSW as it does SIW which is unexpected for a regional centre the size of Mildura.

25 J Fagan, 'Eaglehawk tip set for expansion', *Bendigo Advertiser*, 22 January 2013, accessed on 14 March, *www.bendigoadvertiser.com.au/story/1249621/eaglehawk-tip-set-for-expansion/*

TABLE 7.12
LANDFILLS IN THE NORTH EAST RWMG AREA

	Landfill	Location	Owner	LGA Serviced by Landfill	Anticipated Close Date
Licensed landfills	Benalla Landfill	Benalla	Benalla Rural City Council	Benalla Rural City Council, Mansfield Shire Council	2042
	Bowser Landfill	Wangaratta	Wangaratta Rural City Council	Wangaratta Rural City Council	2022
	Cobungra Landfill	Cobungra	Mount Hotham Resort Management Board	Mount Hotham Resort Management Board	No data
	Myrtleford Landfill	Myrtleford	Alpine Shire Council	Alpine Shire Council	2030
Landfills exempt from licences	Corryong	Corryong	Towong Shire Council	Towong Shire Council	No data

7.7.7 North East

The North East RWMG area generated an estimated 35,000[26] tonnes of waste requiring disposal to landfill in 2010–11. Under a BAU approach, this is projected to decrease to about 30,000 tonnes in 2041–42.

Table 7.12 shows there are four licensed landfill in the North East RWMG and one unlicensed landfill.

The very small Cobungra Landfill is owned and operated by the Mount Hotham resort. It is used solely for disposal of waste from the resort due to low viability of other options including transport to a larger regional landfill.

In the medium term, it is not clear whether having two relatively small landfills in close proximity to each other (at Benalla and Bowser) is beneficial, especially given the Hume Highway connection between the two towns. Analysis is required to investigate options including rationalisation of the two landfills, increasing resource recovery activities and potential streaming of material types between landfills.

26 The estimated amounts of waste landfilled and projected amounts do not include prescribed industrial waste and have not been adjusted to make allowance for daily cover.

7.7.7.1 Landfill waste flows

Major cross regional flows:

- MSW from Wodonga, Indigo and parts of Towong Shire go to the Albury Landfill in NSW for disposal: the Albury Landfill does not pay a landfill levy.
- Significant quantities of SIW from the area also probably go to the Albury Landfill.
- Significant quantities of C&I waste are probably transported to the Cosgrove Landfill near Shepparton, based on the low percentage of SIW received at Benalla (23%).

7.7.7.2 Regional considerations

- The Benalla and Bowser landfills are both relatively small and geographically close. A long term plan for both landfills should be develop exploring future options that could achieve improved outcomes for the operating councils and communities. Options to be explored should include:
  - increasing the resource recovery activities at both sites before disposal of the residual waste
  - transitioning of one site to that of TS/RRC activities prior to transporting the consolidated residual waste to the other site
  - focussing one site on resource recovery and organics reprocessing and establishing a landfill hub for the area at the other site.

8. Acronyms and Glossary

8.1 Acronyms

Acronym	Phrase or Word
ABS	Australian Bureau of Statistics
AD	Anaerobic digestion
BAU	Business as usual
BPEM	Best practice environmental management
C&D	Construction and demolition
C&I	Commercial and industrial
DEPI	Department of Environment and Primary Industries
EPA	Environment Protection Authority Victoria
LGA	Local government area
MAC	Ministerial Advisory Committee on Waste and Resource Recovery Governance Reform
MBT	Mechanical biological treatment
MRF	Materials recovery facility
MSW	Municipal solid waste
PIW	Prescribed industrial waste
RWMG	Regional waste management group
SIW	Solid industrial waste
SME	Small to medium enterprises
SV	Sustainability Victoria
SWRRIP	Statewide Waste and Resource Recovery Infrastructure Plan
TS/RRC	Transfer station/resource recovery centre
TZW	Towards Zero Waste
VLGAS	Victorian Local Government Annual Survey
VRIAS	Victorian Recycling Industry Annual Survey
WMG	Waste management group
WRRIP	Waste And Resource Recovery Implementation Plan

8.2 Glossary

Term	Explanation
Advanced Resource Recovery Technology (ARRT)	Technology that processes solid waste to recover resources such as energy, or recyclables. ARRT has historically been called 'advanced waste treatment' but that does not clearly communicate that the technology doesn't simply treat waste, it recovers resources.
Advanced Thermal Technology (ATT)	An umbrella term for waste treatment technologies that use thermal processes. ATT technologies are most suited to treating pre-prepared waste, where recyclates (such as metals) have been extracted to produce a homogenous waste stream. They are generally not suited to processing mixed waste streams.
Airspace	The remaining capacity of a landfill.
Anaerobic digestion	A process of biologically degrading organic materials in the absence of oxygen, yielding methane gas (which may be combusted to produce energy) and stabilised organic residues (which may be used as a soil additive).
Beneficiation	An optical sorting process used to separate different colours of container glass to produce cullet for reprocessing and mixed fines.
Best practice environmental management (BEPM)	Facility management in line with the Environment Protection Authority Victoria publication in *Best Practice Environmental Management – Siting, Design, Operation and Rehabilitation of Landfills*.
Biogas	A gas generated by breaking down organic matter in the absence of oxygen, such as occurs in landfills. Biogas is typically comprised of 60% methane and 40% carbon dioxide, and can be used as an energy source.
Biomass	Biological material that is not fossilised, including forest and mill residues, agricultural crops and waste, wood and wood waste, animal waste, livestock operation residues, aquatic plants, fast growing trees and plants, and municipal solid waste and SIW.
Biosolids	Organic solids or semi solids produced by wastewater treatment processes. Some biosolids are co-composted with garden organics and/or residual wood and timber to produce a range of recycled organic products.
Buffer zone	A buffer zone is an area of land outside the operating area of a facility that is set aside to maintain an adequate distance between the facility and sensitive land uses (such as residential development) so those uses are not adversely affected by noise, odour or dust. The land may or may not be owned by the facility owner.
Collection system	System for collecting materials from the kerbside, including bin type and collection frequency.
Commingled recyclables	Materials combined generally for the purposes of collection, mainly through municipal collection services. Includes plastic bottles, other plastics, paper, glass and metal containers. Commingled recyclable materials require sorting after collection before they can be recycled. Can also be called commingled materials.
Commercial and industrial (C&I) waste	Solid waste generated from trade, commercial and industrial activities including the government sector. It includes waste from offices, manufacturing, factories, schools, universities, and state and government operations and small to medium enterprises, e.g. food waste.
Composting	The biological processing of organic matter in the presence of oxygen, yielding carbon dioxide, heat and stabilised organic residues that may be used as a soil additive. Composting can be undertaken using an open windrow or in-vessel system.
Construction and demolition (C&D) waste	Solid waste generated from residential and commercial construction and demolition activities e.g. bricks and concrete.
Clean fill	Material that has no harmful effects on the environment. This material is a natural soil material and does not contain any other materials such as concrete rubble.

Term	Explanation
Cullet	Sorted glass feedstock resulting from the beneficiation process of mixed container glass. Generally consists of sorted streams of amber, flint and green glass of particle size greater that 5–10 mm depending on the capacity of the beneficiation plant.
Daily cover	The layer of compressed soil or earth which is laid on top of a day's deposition of waste on an operational landfill site. The cover helps prevent interaction between waste and air, reducing odours and creating a firm base for vehicles to work on.
Delamination	The process of splitting a composite material into its component parts i.e. laminated glass.
Digestate	The material remaining after the anaerobic digestion of a biodegradable feedstock.
Drop-off centre/site	A facility where households can drop off selected materials and household items for recycling and reuse. Also called drop-off facilities.
Energy from waste	Processing technologies that use waste as a feedstock for generating energy, which can be used for heat or for generating electricity. Also called waste to energy.
Environmental Protection Authority Victoria (EPA)	Established under the under the auspices of the *Environment Protection Act* 1970, the EPA's role is to be an effective environmental regulator and an influential authority on environmental impacts.
Feedstock	Raw material used to manufacture products. Material varies depending on what is being produced.
Fines (glass)	Unsorted sub 5–10 mm glass material left over from the glass beneficiation process. It can contain contamination including plastics and small pieces of metals. These fines can be further processed to produce a glass sand product which has a number of potential uses.
Food organics	Food waste from households or industry, including food processing waste, out-of-date or off-specification food, meat, fruit and vegetable scraps. Excludes liquid wastes.
Garden organics	Organics derived from garden sources, e.g. grass clippings, tree prunings. Also known as green organics.
Gasification	Advanced thermal technology that converts organic material into combustible gases by partial oxidation under the application of heat, leaving an inert residue.
Green organics	See garden organics.
Greenhouse gases	Gases, including carbon dioxide and methane that trap heat in the earth's atmosphere, affecting weather and climate patterns.
Hard waste	The term applied to household garbage that is not usually accepted into kerbside garbage bins by local councils, e.g. old fridges and mattresses.
Incinerator	A site that facilitates the disposal of waste streams through incineration without producing another useful end product or capturing value from the waste material.
Hazardous waste	See Prescribed industrial waste.
Hubs	The concentration of reprocessing facilities where there is sufficient waste derived feedstock to support viable reprocessing options. The location of hubs will vary for individual material streams.
Illegal dumping	Illegal dumping is the deliberate or unauthorised dumping, tipping or burying of waste on land that is not licensed or fit to accept that waste.
In-vessel composting	System of composting involving the use of an enclosed chamber or vessel in which the composting process is controlled by regulating the rate of mechanical aeration. Aeration assists in heat removal, temperature control and oxygenation of the mass. Aeration is provided to the chamber by a blower fan which can work in a positive (blowing) and/or negative (sucking) mode. Rate of aeration can be controlled with temperature, oxygen or carbon dioxide feedback signals.

Term	Explanation
Kerbside waste/collection	Waste collected by local councils from residential properties, including garbage, commingled recyclables and garden organics, but excluding hard waste.
Landfill	A site for the disposal of waste to land that cannot currently be recycled or reused.
Landfill levy	A levy applied at differential rates to municipal, commercial and industrial and prescribed wastes disposed of at licensed landfills in Victoria. Landfill levies are used solely for the purposes of environment protection and fostering environmentally sustainable use of resources and best practice in waste management. They fund the activities of regional waste management groups, Sustainability Victoria and Environment Protection Authority Victoria, helping to establish waste management infrastructure, industry waste-reduction programs, education programs, regulatory controls and enforcement regimes. Levies also provide an incentive to minimise the generation of waste, sending a signal to industry that the government supports efforts to develop alternatives to disposal to landfill.
Leachate	Liquid material that moves through, or drains, from a landfill.
Litter	A form of pollution, considered the most visable. Anything left where it is not meant to be.
Materials recovery facility (MRF)	A centre for the receipt, sorting and transfer of materials recovered from the waste stream. At an MRF, materials are also sorted by type and treatment, which may include cleaning and compression.
Mechanical biological treatment (MBT) plant	MBT plants combine mechanical sorting (such as in a materials recovers facility) with biological treatment of organic waste to process residual organic waste. This could include technology such as anaerobic digestion to stabilise the material and generate heat and power. Material remaining after further treatment (often referred to as 'digestate') can be added to compost or used as fuel in a thermal waste-to-energy facility.
Metropolitan Waste Management Group (Metropolitan WMG)	Statutory body established on 1 October 2006 under the provision of the *Environment Protection Act* 1970. The Metropolitan Waste Management Group works with the Victorian Government and local councils to plan for solid waste management in Melbourne.
Municipal solid waste (MSW)	Solid waste generated from municipal and residential activities, and including waste collected by, or on behalf of, a municipal council. In this document, MSW does not refer to waste delivered to municipal disposal sites by commercial operators or waste from municipal demolition projects.
Open windrow composting operation	Composting process where incoming organic materials are shredded, mixed and managed so they decompose aerobically in windrows or piles that are fully exposed to the air.
Optical sorting	Technologies used to sort glass by colour type, and plastics by polymer type.
Organic material	Plant or animal matter originating from domestic or industrial sources, e.g. grass clippings, tree prunings, food waste.
Prescribed waste and prescribed industrial waste (PIW)	Those wastes listed in the *Environment Protection (Prescribed Waste) Regulations 1998* and subject to requirements under the *Industrial Waste Management Policy (Prescribed Industrial Waste) 2000*. Environment Protection Authority Victoria closely regulates these wastes because of their potential adverse impacts on human health and the environment. Prescribed wastes carry special handling, storage, transport and often licensing requirements, and attract substantially higher disposal levies than non-prescribed solid wastes. Also known as Hazardous Waste.
Process derived fuels	Fuels derived from non-hazardous organic waste with high calorific value for energy use in industry.
Processing facilities	Facilities which either receive materials directly from collection systems or from recovery facilities for further sorting and/or processing to provide material for use in the generation of new products.

Term	Explanation
Product stewardship	A concept of shared responsibility by all sectors involved in the manufacture, distribution, use and disposal of products, which seeks to ensure value is recovered from products at the end of life.
Public place recycling	Recycling facilities found in public areas, such as parks, reserves, transport hubs, shopping centres and sport and entertainment venues that allow the community to recycle when away from home.
Putrescible waste	Waste that readily decomposes. Includes food waste and organic waste from gardens.
Pyrolysis	Advanced thermal technology involving the thermal decomposition of organic compounds in the complete absence of oxygen, under pressure and at elevated temperatures.
Recyclables	While this term strictly applies to all materials that may be recycled, in this document the term is generally used to refer to the recyclable containers and paper/cardboard component of kerbside waste, i.e. it excludes garden organics.
Recycling	A term that may be used to cover a wide range of activities, including collection, sorting, reprocessing and manufacture into new products.
Refuse derived fuels	Fuels produced from the stabilised organics and other residuals from mixed-waste Advanced Resource Recovery Technologies.
Regional waste management groups	Statutory authorities established under the *Environment Protection Act 1970* responsible for planning for municipal solid waste in each region other than Melbourne Metropolitan.
Reprocessing	Changing the physical structure and properties of a waste material that would otherwise have been sent to landfill to add financial value to the processed material. Without reprocessing the beneficial use of waste materials would be lost.
Reprocessing facilities	See Reprocessor
Reprocessor	Facility that changes the physical structure and properties of a waste material that would otherwise be sent to landfill to add financial value to the processed material. Without reprocessing the beneficial use of the material would be lost.
Resale centre/shop	A centre/shop that enables the sale and subsequent re-use of good quality, saleable products and materials that were disposed of by their previous owner.
Residual waste	Residual material that remains after any source separation or reprocessing activities of recyclable materials or garden organics.
Resource recovery	The process of obtaining matter or energy from discarded materials. Occurs at resource recovery centres.
Resource recovery centre	Facilities established to receive and/or recover re-usable and recyclable materials that would otherwise be destined for disposal. Can be combined with a transfer station and may include resale centres.
Re-use	Recovering value from a discarded resource without processing or remanufacture, e.g. garments sold though opportunity shops are, strictly speaking, a form of re-use, rather than recycling.
Sectors, industry sectors	Groupings of industries used to generalise patterns in waste generation and disposal, e.g. construction and demolition; food services, food retail and food manufacturing; small to medium enterprises.
Solid industrial waste (SIW)	Solid waste generated from commercial, industrial or trade activities, including waste from factories, offices, schools, universities, state and federal government operations and commercial construction and demolition work. Excludes municipal solid waste, wastes that are prescribed under the *Environment Protection Act 1970* and quarantine wastes.
Solid waste	Non-hazardous, non-prescribed, solid waste materials, ranging from municipal garbage to industrial waste.

Term	Explanation
Source separation	The practice of segregating materials into discrete material streams prior to collection by, or delivery to, processing facilities.
Spokes	The sequence of activities that move materials from waste generators to (and from) hubs, for example, collection, transport and sorting. The length of the spoke and hence the location of the hub for a particular material stream is influenced by the impact of transport on the margin of return for that particular material stream.
Stockpiling	Storage of materials.
Sustainability Victoria (SV)	Statutory authority established in October 2005 (*Sustainability Victoria Act 2005*) with the key objective of 'facilitating and promoting environmental sustainability in the use of resources'. SV works across the areas of energy, waste and water with communities, industries and government applying the best ideas and encouraging action to enable change in environmental practices.
Transfer station	A facility allowing the drop off and consolidation of garbage and a wide range of recyclable materials. Can be combined with a resource recovery centre and may include resale centres. Do not undertake processing activities.
Waste	Anything that is no longer valued by its owner for use or sale and which is, or will be, discarded. In this document, the term 'solid waste' refers to non-hazardous, non-prescribed, solid waste materials ranging from municipal garbage to industrial waste.
Waste management industry	Applies to those involved in managing waste, i.e. Collectors, sorters, processors and landfill operators.
Waste minimisation	The concept of, and strategies for, waste generation to be kept to a minimum level in order to reduce the requirement for waste collection, handling and disposal to landfill. Also referred to as waste avoidance.
Waste to energy	Process that use waste as a feedstock to produce a useful end product with market value, such as heat, electricity and process derived fuels. Technologies can include anaerobic digestion and heat processing such as pyrolysis and gasification.