METROPOLITAN WASTE AND RESOURCE RECOVERY IMPLEMENTATION PLAN 2016

METROPOLITAN WASTE AND RESOURCE RECOVERY GROUP

State Government

Published by the Metropolitan Waste and Resource Recovery Group
September 2016

Printed on 100% post-consumer recycled paper
ISBN 978-0-992-3062-6-7 (Print)
ISBN 978-0-992-3062-7-4 (Online)

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CHAIR FOREWORD

It is with great pleasure that I introduce the Metropolitan Waste and Resource Recovery Implementation Plan. This plan provides a roadmap that will shape Melbourne's network of waste and resource recovery infrastructure for the next 30 years.

This important piece of work indicates a major shift in our approach to waste planning and management. Waste should no longer be seen as a problem to be managed, instead it is a valuable resource to be harnessed and in doing so will create new industries, new jobs and promote a sustainable and liveable Melbourne.

This plan seeks to reduce the amount of waste we send to landfill, particularly organic waste, and seeks a large improvement in our recycling rates. As a result of this plan, we expect to see a range of new infrastructure to recover materials established right across the metropolitan region. We received widespread support for this approach through the public consultation. This approach will require new, more efficient technologies and will see only the bare minimum of waste sent to landfill. However some waste will continue to require safe management in landfills. The existing landfills across Melbourne can continue to provide this safe disposal service for all of Melbourne. This Metropolitan Implementation Plan does not schedule additional landfills. However new landfill capacity will be required if sufficient resource recovery infrastructure is not coming through the pipeline. We will make this assessment in 2019, when we review the progress of this plan. Our stakeholders will be invited to participate in this review and we will provide various ways for communities, businesses, local and state governments to get involved.

Like all businesses, governments and individuals the waste and resource recovery sector has a role to play in addressing climate change. Solid waste disposal accounted for 1.2% of Victoria's total greenhouse gas emissions in 2013[1] . The decomposition of organic waste in landfills creates greenhouse gases including the potent greenhouse gas methane and it can also produce odours and leachate.

This plan seeks to reduce the amount of organic waste going to landfill – in particular the amount of food and garden waste going to landfill. By doing so, the waste and resource recovery sector can make a meaningful contribution to addressing climate change and we can better protect the environment and amenity of communities living near landfills.

In developing this plan we drew on information, opinions and ideas from a range of stakeholders including the collective knowledge of our staff, our portfolio partners, industry representatives, local councils and the broader community. This input was invaluable and allowed for the development of a plan that is robust, innovative and ambitious. I invite all our stakeholders to visit our website to read through the Response to Comments document to understand more deeply how we have used the feedback themes we received.

We know from this feedback that waste avoidance and minimisation are important to many stakeholders. I acknowledge and applaud the many households, businesses and local governments who actively avoid producing waste in the first place through their purchase choices or the way they work with neighboring businesses; who minimise producing waste through home composting or smart business operations. These activities complement the focus of this Metropolitan Implementation Plan which is about creating value from our waste, building new industries and new jobs and seeing waste not as a problem but as a resource.

To ensure our success in delivering the strategic objectives set out in this plan we cannot work in isolation. It will be critical that community, government and industry work together, sharing information, leveraging ideas and building new relationships.

I would like to thank all individuals, agencies and businesses who contributed to the development of this plan and look forward to a continued and strong working relationship with our stakeholders and the community.

Les Willmott
Chair Metropolitan Waste and Resource Recovery Group

[1] Australian National Greenhouse Accounts State and Territory Greenhouse Gas Inventories, 2013

EXECUTIVE SUMMARY

One of the essential roles of a modern city is managing waste – the materials that are no longer wanted, such as food and garden waste, electronic waste like old phones and computers, plastics, paper and construction materials.

The infrastructure that manages these materials provides an essential community service. Getting the right infrastructure in the right location, at the right time will make sure greater metropolitan Melbourne remains liveable and vibrant.

The metropolitan region of Melbourne is facing both challenges and opportunities. If we don't make any changes to the way we manage waste we won't be able to keep up with the growing waste volume.

Every year in the metropolitan region we put around 805,000 tonnes of food and garden waste into landfill, which is approximately 28% of everything we send to landfill. As organic waste in landfill breaks down it generates methane, a potent greenhouse gas. Solid waste disposal accounted for 1.2% of Victoria's total greenhouse gas emissions in 2013[2]. Sending organic waste to landfill also generates other gases and liquids that can impact both the environment and local communities.

Landfills in the Clayton South precinct that have served Melbourne for many years have reached capacity, and are closing. The scale of this challenge alone compels us to find better solutions.

The metropolitan region is a city of 4.4 million people that is growing; by 2051 population is projected to increase to 7.8 million people[3]. This means our waste volumes will grow too. By 2042 it is projected waste volumes will grow by 63%, meaning we will need to manage 16.5 million tonnes each year. If we don't make any changes it's anticipated that around one million tonnes of this extra waste will need to be landfilled. That's the equivalent of needing two more large landfills over this 30 year period.

However it's not just about having too much waste or relying on landfills to manage those wastes. We have a great opportunity to create value from waste, transforming what we throw away back into something useful and in the process creating new jobs and fueling the development of new industries. Similarly, we have an opportunity to reduce the greenhouse gas contribution of the waste sector.

By planning for and supporting new technologies and processes we can do more with many of the materials we currently throw away. We can create valuable compost, soil conditioners or energy from organic waste. We can use recycled glass in the construction of road bases or recycled plastic content in boardwalks and street furniture. There are opportunities too with other materials – plastics, polystyrene, timber, textiles to name a few. And new technologies will enable other opportunities for getting more value from the materials we currently throw away.

MWRRG has extensively analysed our future needs to understand the volumes of waste we expect to generate over the next thirty years, the capacity of existing infrastructure, and the infrastructure gaps that will need to be addressed. MWRRG also commissioned an economic and transport analysis, and conducted a market assessment to gather information from industry about their plans and aspirations. MWRRG consulted widely with community and stakeholders, and extensive feedback has been considered in preparing this Metropolitan Waste and Resource Recovery Implementation Plan.

This plan is about turning waste into value which will create new industries and new jobs - seeing waste not as a problem but as a resource to keep our city liveable into the future.

The greater Melbourne community has demonstrated their commitment to recycling with current resource recovery rates being 73% in 2013/14[4]. We will build on this solid foundation and will make a step change to our thinking, to the waste and resource recovery network and to the infrastructure and technologies we use. Education is an important part of achieving this step change and this plan includes actions to help households and businesses to use the waste and resource recovery system to maximise resource recovery. There is no single solution for reducing Melbourne's reliance on landfills, and some of the challenges we need to tackle will be more difficult than others.

The priority of this Metropolitan Implementation Plan – where we can make the most impact – is to reduce the need for landfilling by making use of resource recovery infrastructure and alternative technologies as well as working to reduce the impact of landfills on communities. We will do this by working with all of our partners and stakeholders.

Community

The Metropolitan Implementation Plan will support the community by:

- boosting resource recovery infrastructure including transfer stations, resource recovery facilities and alternative waste technology facilities, to reduce the pressure on existing landfills and the need for future ones
- providing more opportunities to minimise and recycle household waste, particularly garden and food waste
- encouraging household recycling through education
- ensure new apartments and units provide recycling facilities
- engaging the community in waste and resource recovery decisions.

Local government

The Metropolitan Implementation Plan will support local government by:

- helping local government tender for facilitated group contracts for managing household residual waste (i.e. waste that is currently not being recycled). These contracts will boost infrastructure by recovering 25% of all household residual waste, and by establishing Melbourne's first alternative waste technology facility
- assisting local government to expand the collection of food and garden waste, and to progress with the rollout of new organic processing facilities across Melbourne

[2] Australian National Greenhouse Accounts State and Territory Greenhouse Gas Inventories, 2013
[3] Victoria in Future DELWP 2015
[4] Metropolitan Waste and Resource Recovery Strategic Plan, Metropolitan Waste Management Group, 2009

- encouraging planning authorities to use land use planning measures to protect essential infrastructure, protect communities, and ensure multi-unit developments support residents to recycle
- continuing to support local government to deliver waste minimisation and recycling education programs.

Industry

The Metropolitan Implementation Plan will support industry by:

- increasing certainty and transparency for industry, and community, through defining the future role of waste and resource recovery hubs, and taking measures to establish and protect buffers and separation distances
- opening up commercial collection and recovery opportunities through local government joint contracts
- working with businesses (including restaurants and supermarkets) to recover food waste
- working with commercial waste generators and the waste and resource recovery industry to find new opportunities for aggregating materials
- encouraging the use of innovative, small, on site organic processing infrastructure
- working with operators of waste and resource recovery facilities to minimise amenity impacts through best practice operations and community engagement.

Victorian Government organisations

The Metropolitan Implementation Plan will support other Victorian Government organisations, in particular Environment Protection Authority Victoria (EPA Victoria), Sustainability Victoria, and the Department of Environment, Land Water and Planning by:

- identifying the type, general location and timeframe for new resource recovery infrastructure
- identifying existing and required landfill infrastructure
- encouraging a culture of best practice and continual improvement to guide operations at waste and resource recovery facilities
- helping implement a range of Victorian Government strategies including the *Victorian Organic Resource Recovery Strategy (2015)*
- realising the long term directions of the Statewide Waste and Resource Recovery Infrastructure Plan (State Infrastructure Plan) within metropolitan Melbourne
- helping the land use planning system acknowledge and support long term operations of waste and resource recovery facilities whilst also protecting communities and the environment.

These combined resource recovery initiatives and others in the plan will help us boost recycling, reduce the amount of waste we send to landfills, and help prevent the need to schedule new landfills.

Despite these actions some landfilling will still be needed over the life of this 30 year plan, and beyond. Thirteen landfills are expected to close during the next 10 years, with a total of 16 closing over the 30 year life of this plan. This leaves four significant landfills to meet Melbourne's needs in the long term that can accept putrescible waste and an additional landfill that is currently licensed to accept only prescribed industrial waste. These landfills are of state importance and critical waste infrastructure for the entire metropolitan Melbourne region. Closure of any of these major landfills would result in insufficient landfill supply and would require new replacement facilities to be established.

The Metropolitan Implementation Plan has scheduled new resource recovery infrastructure to manage the closure of landfills in the south east of Melbourne. New organics facilities, advanced resource recovery facilities and the establishment of transfer stations in the south east will reduce the amount being sent to landfill and will increase our recycling levels.

To achieve a step change in how Melbourne manages waste, we must move towards new alternative technologies and we need to make this change now. Technologies that can transform our waste to green energy, such as anaerobic digesters are likely to feature as part of our future integrated waste and resource recovery network. We are already seeing the establishment of waste to energy facilities in the north of Melbourne, and expect to see a range of new alternative technologies established across the entire metropolitan region to provide an integrated network that can manage our future waste and resource recovery needs. Proven technologies such as those that convert waste to green energy have the potential to significantly reduce the amount of waste we send to landfill and still offer a cost effective, safe, reliable service that protects the community and environment. Ultimately it is up to the market to determine which technology types they will seek to establish to achieve increased resource recovery. We know from the Market Assessment process used to help inform this plan, that there is considerable interest from the resource recovery sector to establish waste to energy and other advance resource recovery facilities as part of the integrated network.

We need to allow the resource recovery sector time to invest and build new infrastructure and to support and develop markets for the products manufactured out of waste materials. MWRRG will review the Metropolitan Implementation Plan in 2019 to:

- assess the impact of the metropolitan and regional implementation plans on the resource recovery market
- assess whether new resource recovery infrastructure will be delivered within the 10 year timeframe
- determine the need for long term landfilling and, if needed, schedule a new landfill.

MWRRG will only recommend a new landfill for Melbourne if it is absolutely necessary.

This is an exciting time, perhaps even a tipping point, in the way we think about and manage our waste. The Metropolitan Implementation Plan is about creating value from our waste and building new industries and new jobs to ensure Melbourne remains liveable. The actions in this plan will boost recycling levels by using new, efficient technologies, (like technologies that convert waste to green energy) and minimise the amount of waste we send to landfill, reducing the pressure on existing ones and the need for new landfills.

By using new technologies, alongside supporting activities like developing markets for recycled products and educating businesses and community, we will send only the bare minimum to landfill. This will help the communities who live close to these facilities as well as our environment.

Achieving this step change to our recycling levels will need everyone's help:

- the people and businesses who produce waste
- the local governments who collect and process residential waste and plan for how land is used
- the waste and resource recovery industry who invest in technologies to consolidate, treat and recycle materials and to safely manage the waste that must go to landfill
- state government departments and organisations who manage our land use planning and transport systems, who regulate and protect the environment and the amenity of local communities, and who plan for our future waste and recycling needs.

MWRRG is proud to present this Metropolitan Implementation Plan to the metropolitan Melbourne community and commits to achieving its objectives.

SECTION 1: STRATEGY

1 INTRODUCTION

This section at a glance:

- The purpose of the Metropolitan Implementation Plan is to set out how the waste and resource recovery infrastructure needs of the greater Melbourne region will be met over at least a 10 year period.

1.1 Purpose of the plan

The purpose of the Metropolitan Implementation Plan is to set out how the waste and resource recovery infrastructure needs of the greater Melbourne region will be met over at least a 10 year period. This plan looks out to a 30 year horizon to align with other metropolitan planning strategies and plans.

This plan covers the wider metropolitan region, represented by the 31 municipalities shown in Figure 1.

Figure 1. The 31 metropolitan Melbourne municipalities

1.2 Scope of Metropolitan Implementation Plan

The *Environment Protection Act 1970* (EP Act) sets out the full scope and requirements of the Metropolitan Implementation Plan including:

- a description and analysis of waste and resource recovery infrastructure within the metropolitan Melbourne region
- a description of how the long term directions in the State Infrastructure Plan will be implemented to meet local and regional infrastructure needs within the metropolitan Melbourne waste and resource recovery region
- a schedule of existing and required waste and resource recovery infrastructure within the metropolitan Melbourne waste and resource recovery region
- matters required by the *Ministerial Guideline: Making, amending and integrating the Statewide Waste and Resource Recovery Infrastructure Plan and Regional Implementation Plans*.

Appendix A provides a summary of EP Act requirements. In line with the State Infrastructure Plan, the Metropolitan Implementation Plan addresses solid waste only. The State Infrastructure Plan acknowledges that the management of prescribed industrial waste and other waste (liquid or gaseous) can intersect with the management of solid waste, however the strategic planning for liquid, gaseous and prescribed industrial waste are outside the scope of both the State Infrastructure Plan and the Metropolitan Implementation Plan.

MWRRG is responsible for preparing the Metropolitan Implementation Plan in collaboration with Sustainability Victoria (SV), Environment Protection Authority Victoria (EPA Victoria), and all other regional Waste and Resource Recovery Groups (WRRGs) and Department of Environment, Land, Water and Planning (DELWP). There are a number of requirements relating to consultation that must be undertaken in preparing the Metropolitan Implementation Plan. Appendix B provides a description of the consultation processes that informed the development of the Metropolitan Implementation Plan.

The Metropolitan Implementation Plan must align with the six Regional Waste and Resource Recovery Implementation Plans (Regional Implementation Plans). As the EP Act sets different delivery dates for these plans, regional Waste and Resource Recovery Groups (WRRGs) are currently preparing to release public consultation drafts.

This Metropolitan Implementation Plan integrates with the Regional Implementation Plans to the extent possible at the time of publishing. Appendix B outlines some of the ways MWRRG has worked with regional WRRGs to align the Metropolitan Implementation Plan with the Regional Implementation Plans. MWRRG will continue to work with SV, DELWP and regional WRRGs to ensure the Victorian planning framework delivers an integrated network of waste and resource recovery infrastructure for Victoria.

1.3 Strategic objectives

The strategic objectives for the Metropolitan Implementation Plan are:

1. **Reduce waste sent to landfill**. This objective seeks to increase the supply of viable resource recovery infrastructure to reduce pressure on existing landfills and to reduce the need for new facilities
2. **Increase organic waste recovered**. This objective seeks to reduce the environmental and community impact of organics in landfill by minimising food waste and by recovering more food and garden waste
3. **Deliver community, environmental and economic benefits**. This objective seeks to support a liveable and productive Melbourne with a resource recovery and waste network that provides jobs and economic opportunities, while reducing environmental and community impact
4. **Plan for Melbourne's growing population**. This objective seeks to ensure Melbourne has the right resource recovery and waste infrastructure it needs in the right place, at the right time.

1.4 Legislative and policy context

1.4.1 Legislation

In 2014 legislative amendments to the EP Act established the Victorian Waste and Resource Recovery Infrastructure Planning Framework (the Framework).

As amended, the EP Act provides the legislative underpinning for Regional Implementation Plans. The legislative objectives are:

- to ensure long term strategic planning for waste and resource recovery infrastructure at state and regional levels
- to facilitate the integration of statewide directions for the management of waste and resource recovery infrastructure and regional infrastructure needs
- to enable waste and resource recovery infrastructure planning to be:
  - i. effectively integrated with land use and development planning and policy
  - ii. effectively integrated with transport planning and policy
- to ensure SV and WRRGs work together to integrate the State Infrastructure Plan and Regional Implementation Plans to enable waste and resource recovery infrastructure planning decisions to be made at the appropriate level of the Framework.

The Framework, and the Regional Implementation Plans, are primarily governed by the EP Act, but regard has also been given to other relevant legislation in the preparation of this document, as appropriate, including the *Planning and Environment Act 1987* (Vic) and the *Transport Integration Act 2009* (Vic).

1.4.2 The Victorian Waste and Resource Recovery Framework

This Metropolitan Implementation Plan, together with the State Infrastructure Plan and the six Regional Implementation Plans forms the Victorian Waste and Resource Recovery Infrastructure Planning Framework. This framework enables Victoria to establish a waste and resource recovery system that:

- effectively manages the expected mix and volumes of waste
- reflects the principles of environmental justice to ensure the impacts on the environment and public health are not disproportionately felt across communities
- supports a viable resource recovery industry
- reduces the amount of valuable materials going to landfill.

The strategic directions listed in the State Infrastructure Plan (Figure 2) guide the development and delivery of the Metropolitan Implementation Plan. The long term strategic directions are to:

- maximise the diversion of recoverable materials from landfills
- support increased resource recovery
- achieve quantities for reprocessing
- manage waste and material streams
- maximise economic outcomes, provide cost effective service delivery and reduce community, environment and public health impacts (based on evidence)
- facilitate a cost effective statewide network of waste and resource recovery infrastructure.

The Victorian Waste and Resource Recovery Framework is supported by complementary strategies that guide the development and delivery of this plan. At the time of writing this Metropolitan Implementation Plan:

- the *Victorian Organics Resource Recovery Strategy, the Victorian Market Development Strategy for Recovered Resources and the Victorian Waste Education Strategy* were published
- the state's second *Climate Change Adaptation Plan* (required under the *Climate Change Act 2010*) was being prepared.

Victorian Organics Resource Recovery Strategy

This strategy sets out the government's vision for organic resources, and the steps needed to achieve this vision. The strategy's goals are:

- reduce the impact of climate change
- protect the environment, human and animal health and amenity
- risk based and proportionate approach
- strong and sustainable markets.

Victorian Market Development Strategy for Recovered Resources

The *Victorian Market Development Strategy for Recovered Resources* is a key element in the delivery of the Statewide Waste and Resource Recovery Infrastructure Plan. It has been developed to support Victoria to:

- Meet community expectations for resource recovery activities that improve the environment, community amenity and public health, while stimulating markets for the use of recovered materials for positive economic return
- Support conditions for the resource recovery and manufacturing sectors to grow and create jobs, by maximising the value of recovered materials and developing quality products for end markets
- Increase investment in and the purchase of products made from recovered materials by promoting their qualities and functionality
- Provide a 30 year vision, 10 year strategic outlook, and five year action plan.

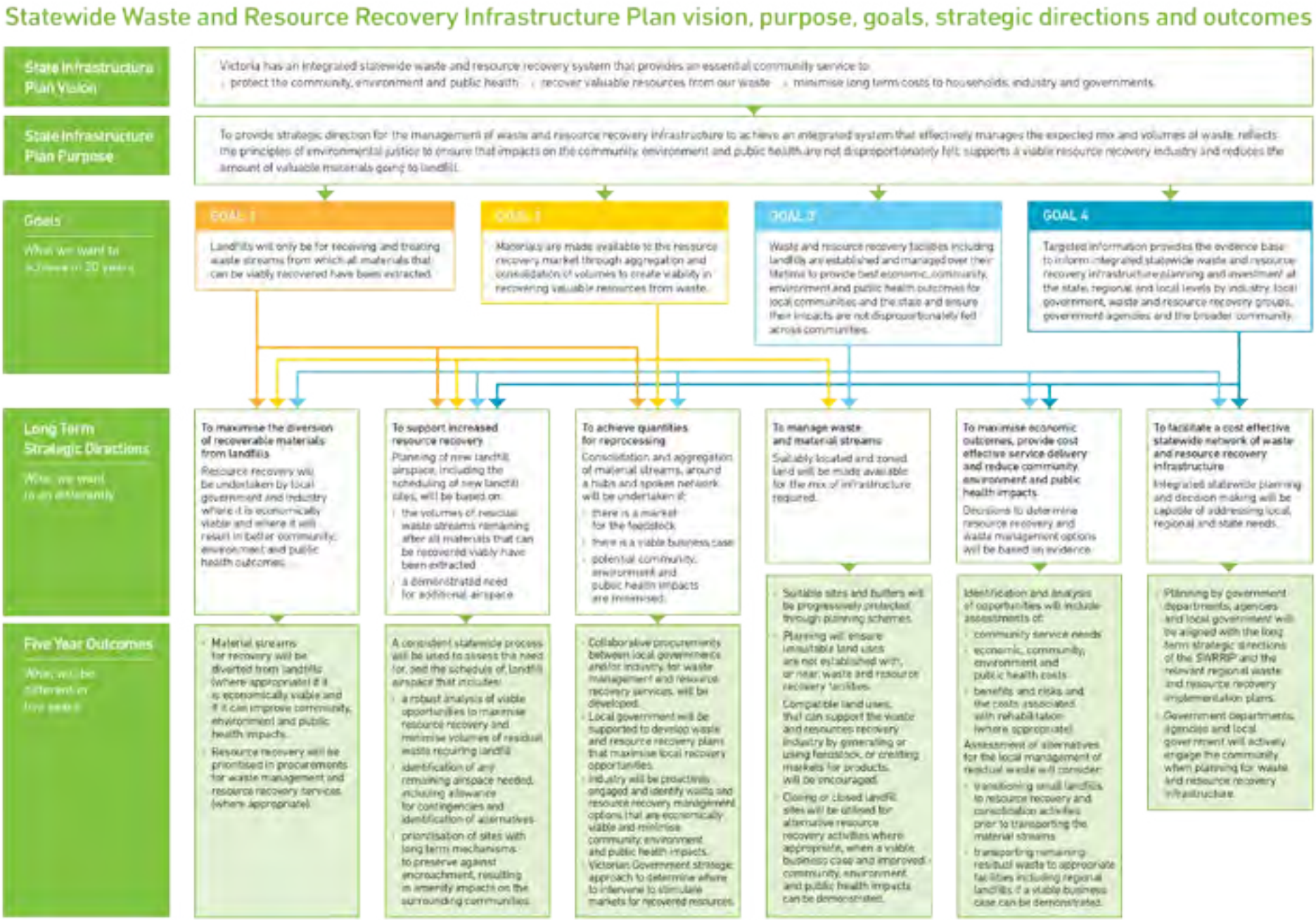
Victorian Waste Education Strategy

The strategy provides a consistent and coordinated approach to waste and resource recovery education. It supports best practice programs so that Victorians:

- are well informed and taking practical action to reduce waste, minimise its environmental impact and maximise its value
- understand the importance of effective waste management and recovery of valuable resources.

The Metropolitan Implementation Plan aligns to and supports these strategies.

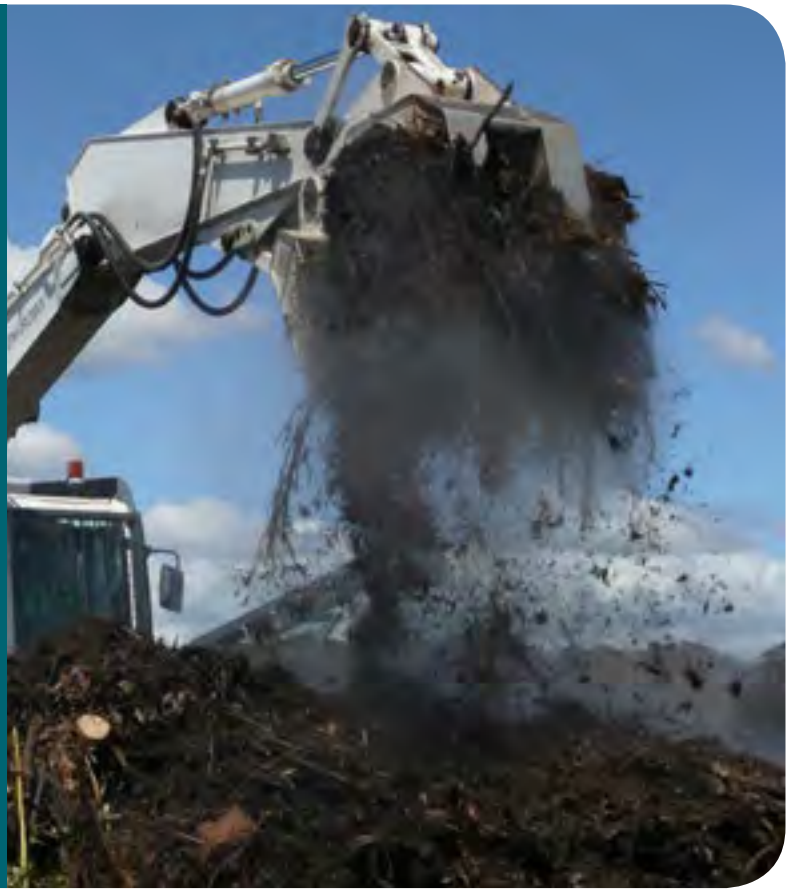
Figure 2. State Infrastructure Plan



2 RESOURCE RECOVERY AND WASTE ACTION PLAN FOR MELBOURNE (ACTION PLAN)

This section at a glance:

- This Metropolitan Implementation Plan sets out how we can meet the recycling and waste needs of metropolitan Melbourne over the next 10 years, and provides a vision and strategy for moving Melbourne towards a future in which landfills are the last option.
- MWRRG will work to reduce the need for scheduling new landfills, and to reduce reliance on existing metropolitan landfills. The pathway to achieve this is to:
  - avoid scheduling additional landfills
  - establish new transfer station and resource recovery facilities to recover large quantities of residual household waste materials, and to reduce the volumes of remaining waste (and therefore transport) through compaction. MWRRG will target a 25% recovery of all municipal residual waste material that is received through its facilitated group landfill contracts
  - establish an alternative technology facility that processes residual waste to recover materials for reprocessing
  - establish new municipal food and garden waste processing plants, complemented by commercial food waste processing facilities
  - optimise use of existing landfills to meet needs and address community expectations of amenity and environmental outcomes.
- Four strategic objectives guide this plan.



One of the essential roles of a modern city is managing its waste – the materials that are no longer wanted by its residents. The infrastructure that supports the management of waste provides an essential community service. Getting the right infrastructure in the right location, at the right time will make sure metropolitan Melbourne remains liveable and vibrant.

Our population is growing, and this means our waste will grow in volume too. In 30 years' time we expect to need to manage 16.5 million tonnes a year – 63% more than we manage in Melbourne today. Our network of infrastructure is also changing. Landfills in the south east of Melbourne that have served the city for many years have reached their full capacity, and are closing. And the waste sector has an important contribution to make to reduce greenhouse gas emissions, particularly methane which is produced in landfills when putrescible waste decomposes.

These changes challenge us to continue to safely manage our waste, but are also an opportunity. The community, industry and government share a goal of reducing reliance on landfill. Landfill closures provide an opportunity to do things differently, and to achieve a major step change in how we manage Melbourne's waste.

This Metropolitan Implementation Plan sets out how we can meet the recycling and waste needs of metropolitan Melbourne over the next 10 years, but it also sets out a vision and strategy for moving Melbourne towards a future in which landfills are the last option.

MWRRG will work to reduce the need for scheduling new landfills, and to reduce reliance on existing metropolitan landfills. The pathway set out in this plan for managing the expected waste tonnages for the metropolitan region is to:

- avoid scheduling additional landfills
- establish new transfer station and resource recovery facilities to recover large quantities of residual household waste materials, and to reduce the volumes of remaining waste (and therefore transport) through compaction. MWRRG will target a 25% recovery of all municipal residual waste material that is received through its facilitated group landfill contracts
- establish alternative technology facilities that process residual waste to recover materials for reprocessing
- establish new municipal food and garden waste processing plants, complemented by commercial food waste processing facilities
- optimise use of existing landfills to meet needs and work with the community and operators to reduce the impact of existing landfills on communities and improve environmental outcomes.MWRRG will review the Metropolitan Implementation Plan in 2019 to:
- assess the impact of the Metropolitan and Regional Implementation Plans on the resource recovery market
- assess whether new resource recovery infrastructure will be delivered within the specified 10 year timeframe
- determine the need for long term landfilling and, if needed, schedule a new landfill.

Scheduling landfills is MWRRG's least preferred option for providing Melbourne with the infrastructure it needs to manage its waste. MWRRG will only recommend a new landfill for Melbourne if it is absolutely necessary.

In delivering the key actions above, we will work with local government and other planning authorities, waste generators (households and businesses), the waste and resource recovery industry, communities living near waste and resource recovery sites and our Victorian Government environment portfolio partners.

There are 13 actions described in the tables below that bring together the infrastructure listed in Section 2: Infrastructure Schedule, and the opportunities explored in Section 4 of this plan. They are also mapped to the applicable State Infrastructure Plan strategic long term directions.

Table 1 shows how these actions will achieve the strategic objectives to:

1. reduce waste sent to landfill
2. increase organic waste recovery
3. deliver community, environmental and economic benefits
4. plan for Melbourne's growing population.

These strategic objectives will together achieve the long term directions of the State Infrastructure Plan in metropolitan Melbourne. The alignment of the actions to the State Infrastructure Plan's long term directions is shown in Table 2.

Climate change and the waste and resource recovery sector

The waste and resource recovery sector has an important role to play in addressing and responding to climate change.

As a result of climate change, Victoria faces a warmer and drier future*, resulting in:

- harsher fire weather and longer fire seasons
- fewer frosts
- more frequent and more intense downpours
- more hot days and warm spells
- less rainfall in winter and spring south of the Great Dividing Range; less rainfall in autumn, winter and spring north of the Great Dividing Range
- sea storm surges and coastal erosion that are expected to increase with sea level rise

Climate change is already being experienced in Victoria, with a rise in temperature and fall in rainfall across the state since 1950; and the sea level around the Victorian coast is approximately 225mm higher than in 1880.

A changing climate presents us with risks and opportunities. The risks include things such as hotter days and sea level rise, the opportunities include the creation of new jobs and a skilled workforce, boosting new economic sectors and reducing our emissions while growing our economy.

Every year in the metropolitan region we put around 805,000 tonnes of food and garden waste into landfill, or just under half (42%) of all municipal solid waste and commercial industrial waste we send to landfill. As organic waste in landfill breaks down it generates methane, a potent greenhouse gas. Solid waste disposal accounted for 1.2% of Victoria's total greenhouse gas emissions in 2013**.

The waste and resource recovery sector (encompassing government and commercial entities) has a number of opportunities to contribute towards action on climate change including:

- incorporating climate resilient considerations into the design and management of waste infrastructure
- contributing to effective reductions in Victoria's greenhouse gas emissions from the waste sector across operations and facilities, landfills and reprocessing of materials such as organics
- assisting the development of markets for reprocessed materials
- reviewing the risk factors and current assumptions about remediation and containment methods in light of climate change impacts
- considering current waste management capacity, including interim capacity, to handle surges in treatment and disposal of waste generated from climate events (floods, bushfires etc)
- contributing to improvements in soil quality through the provision of compost
- continuing to engage to increase the community's adaptive capacity and resilience to climate change impacts.

The impacts of climate change on Victoria's waste and resource recovery industry will be varied and may include issues such as changes in the timing, form and amount of precipitation, as well as potential increases in extreme events such as droughts and floods. These impacts can affect waste infrastructure, remediation and containment strategies as well as local water quality. Managing these risks is discussed in Chapter 17.

This Metropolitan Implementation Plan helps to position the waste and resource recovery sector to make a meaningful contribution to addressing and responding to climate change.

Notes
*DELWP, www.climatechange.vic.gov.au, 2016
** Australian National Greenhouse Accounts State and Territory Greenhouse Gas Inventories, 2013

2.1 Objectives and actions

Table 1. Metropolitan Implementation Plan actions and objectives

State Infrastructure Plan Long Term Strategic Directions					
To maximise diversion of recoverable materials from landfill	To support increased resource recovery	To achieve quantities for reprocessing	To manage waste and material streams	To maximise economic outcomes, provide cost effective service delivery, and reduce community, environment and public health impacts	To facilitate a cost effective statewide network of waste and resource recovery infrastructure

Metropolitan Implementation Plan Objectives and Actions				
Objectives	**Reduce waste sent to landfill**	**Increase organic waste recovered**	**Deliver community, environmental and economic benefits**	**Plan for Melbourne's growing population**
Actions	1. Facilitate and establish new infrastructure that can recover resources from residual municipal waste through the re-tendering of MWRRG's landfill services contracts 2. Create opportunities for aggregating priority commercial waste material streams and other place based recovery solutions 3. Support local government to progressively increase recovery of materials from municipal waste streams 4. Facilitate the growth of the metropolitan resource recovery centre/transfer station (RRC/TS) network in order to manage future waste volumes and increase resource recovery	5. Build the metropolitan organic recovery and processing network and maximise the network's productivity by: • accepting household and commercial food waste • engaging and educating Melburnians	6. Encourage best practice operations for the resource recovery and waste network 7. Engage community and stakeholders in waste and resource recovery decision making 8. Support the implementation of best practice litter prevention programs	9. Identify the roles and functions of waste and resource recovery hubs across the metropolitan network 10. Facilitate appropriate land use planning protection of sites of strategic importance for metropolitan Melbourne's waste and resource recovery system 11. Facilitate and support aligning waste and resource recovery system needs with land use planning and transport systems 12. Ensure the metropolitan network of landfills has sufficient capacity to accommodate an emergency or unexpected event (contingency capacity) 13. Review the Metropolitan Implementation Plan in 2019 to assess whether new resource recovery infrastructure will be delivered within 10 year timeframe

Table 2. Alignment of Metropolitan Implementation Plan actions to long term directions of the State Infrastructure Plan

State Infrastructure Plan long term directions	Metropolitan Implementation Plan												
	Reduce waste sent to landfill				Increase organic waste recovered	Deliver community, environmental and economic benefits			Plan for Melbourne's growing population				
	1	2	3	4	5	6	7	8	9	10	11	12	13
To maximise diversion of recoverable materials from landfill	✓	✓	✓	✓	✓								
To increase resource recovery	✓											✓	✓
To achieve quantities for reprocessing	✓	✓	✓	✓	✓				✓				
To manage waste and material streams					✓				✓	✓	✓		
To maximise economic outcomes, provide cost effective service delivery, and reduce community, environment and public health impacts	✓			✓	✓	✓	✓	✓			✓	✓	
To facilitate cost effective statewide network of waste and resource recovery infrastructure	✓			✓	✓		✓			✓	✓		

2.2 Strategic Objective 1: Reduce waste sent to landfill

This strategic objective seeks to increase the supply of viable resource recovery infrastructure to reduce pressure on existing landfills and to reduce the need for new landfills. It directly aligns to the State Infrastructure Plan's long term directions to:

- maximise the diversion of recoverable materials from landfill
- support increased resource recovery
- achieve quantities for reprocessing
- maximise economic outcomes, provide cost effective service delivery, and reduce community, environment and public health impacts
- facilitate a cost effective statewide network of waste and resource recovery infrastructure.

Finding ways to maximise resource recovery is a central goal of the State Infrastructure Plan. There is considerable scope to make valuable goods from our waste, to grow industry and to create jobs. It is estimated that recycling creates 9.2 jobs for every 10,000 tonnes of waste processed in comparison to creating only 2.8 jobs if this waste is landfilled[5].

Work undertaken by *IBISWorld* reports that revenue generated from waste disposal is estimated to be decreasing[6], while recycling revenue has been increasing. In Melbourne, around 73% of all waste produced and managed is recycled, leaving 27% (around 2.8 million tonnes a year) still being landfilled. It is projected that recycling volumes will continue to grow.

Landfills play a central role in protecting human health and the environment by safely managing materials that residents and businesses no longer want or that can't be recycled. However, landfills can cause amenity impacts like odour for surrounding communities, and have environmental impacts including being a source of greenhouse gases. Solid waste disposal accounted for 1.2% of Victoria's total greenhouse gas emissions in 2013[7]. Climate change is further discussed in section 11.3. And even after landfills stop taking waste, they can present risks to the environment and local communities. To manage these and other potential risks, landfills must be managed to the highest standards and are regulated by EPA Victoria to ensure this occurs.

As waste generation continues to grow and many of the older landfills in the south east of Melbourne close, we need to look for new ways of managing our waste. The priority of this plan, and where we can make the most impact, is to reduce the need for landfilling by making use of advanced resource recovery infrastructure, such as technologies that convert waste to green energy.

The actions described in Table 3 will collectively reduce the amount of waste sent to landfill over the lifetime of this Metropolitan Implementation Plan.

[5]Access Economics, Employment in waste management and recycling, 2009
[6]IBIS World Waste Treatment and Disposal Services Market Research Report | ANZSIC D2921 | Jul 2015
[7]Australian National Greenhouse Accounts - State and Territory Greenhouse Gas Inventories, 2013

Table 3: Actions to achieve Strategic Objective 1

Actions	State Infrastructure Plan - Strategic Direction/s	Responsibility
1. Facilitate and establish new infrastructure that can recover resources from residual municipal waste through the re-tendering of MWRRG's landfill services contracts		

Implementation
• Develop and implement a procurement strategy for local governments to engage service providers to receive and manage residual waste from the municipal sector that includes:
  • establishing resource recovery targets
  • provision for accepting residual waste from the commercial sector
• Enter into Memoranda of Understandings with local governments as a precursor to releasing procurement tenders
Outcome by 2021
• New municipal contract/s commenced.
Outcome by 2026:
• 25% of all municipal residual waste collected through facilitated group procurement will be recovered (current level in 2016 is 0%)
	• To maximise the diversion of recoverable materials from landfill
	• To support increased resource recovery
	• To achieve quantities for reprocessing
	• To maximise economic outcomes, provide cost effective service delivery, and reduce community, environment and public health impacts
	• To facilitate a cost effective statewide network of waste and resource recovery infrastructure
		Lead: MWRRG
		Support: SV, local government

2. Create opportunities for aggregating priority commercial waste material streams and other place based recovery solutions		

Implementation
• Work with commercial waste generators and reprocessors to identify priority materials for recovery, which sectors to work with and how MWRRG can best add value. In the immediate future, organic waste will be the priority, but others would expect to become a priority over the life of this plan
• Partner with businesses and manufacturers to identify systemic barriers and ways to support:
  • source separation and aggregation of waste materials at the point of generation that can be used as feedstock for reprocessors
  • investment in expanded and/or new resource recovery and processing infrastructure
• Facilitate the development of precinct based approaches that provide for cost effective recovery and diversion
• Identify and broker opportunities for generators to connect with reprocessors to maximise the benefits of waste and resource recovery
Outcome by 2026
• There is a 25% increase in the recovery of priority materials (tonnes) from residual waste from the commercial sector (baseline 2013-14)
• New, local place based infrastructure established to recycle commercial waste including an increase in small on site organics processing across Melbourne and energy from waste
	• To maximise the diversion of recoverable materials from landfills
	• To achieve quantities for reprocessing
		Lead: MWRRG
		Support: SV, local government, industry

Actions	State Infrastructure Plan - Strategic Direction/s	Responsibility
3. Support local government to progressively increase recovery of materials from waste streams		
Implementation • Review the full suite of local government/MWRRG partnership projects that have been delivered, and support the implementation of projects across metropolitan Melbourne that demonstrate cost effective resource recovery from the residual waste bin • Support local government to deliver waste minimisation programs • Facilitate collective procurements to increase recovery of key hard waste materials (e.g. mattresses) • Implement relevant actions within complementary government strategies (e.g. *Victorian Organics Resource Recovery Strategy*) • Develop a resource recovery and waste planning guide and template, and support councils to develop local resource recovery and waste management plans *Outcome by 2021* • More metropolitan councils are implementing best practice kerbside collection • Council waste and resource recovery plans are aligned to the Metropolitan Implementation Plan and other relevant state strategies *Outcome by 2026* • All metropolitan councils have a higher diversion rate compared to 2015 levels, as reported by the *Victorian Local Government Annual Survey** *Excluding municipalities that have low diversion rates due to existing housing stock constraints, for example, large number of multi-unit dwellings with limited recycling provision	• Maximise diversion of recoverable materials from landfill • To achieve quantities for reprocessing	*Lead*: MWRRG *Support:* SV, local government

Actions	State Infrastructure Plan - Strategic Direction/s	Responsibility
4. Facilitate the growth of the metropolitan resource recovery centre/transfer station (RRC/TS) network in order to manage future waste volumes and increase resource recovery solutions		
Implementation • Deliver the metropolitan resource recovery centre/transfer station growth strategy in partnership with local government and industry operators • Prioritise the aggregation and collection of priority materials such as organics and e-waste, identified as local issues or in support of product stewardship schemes • Identify and facilitate opportunities for local employment and economic participation through social enterprise and boutique businesses • Partner with local government to fill the gaps in local drop off services *Outcome by 2021* • New resource recovery/transfer station facility/s initially established in the south east region with a metropolitan wide uplift in resource recovery capacity *Outcome by 2026* • Waste generators and waste transporters report increased satisfaction with availability of RRC/TS network infrastructure • There is a measurable increase in diversion rates above 2015 levels • Infrastructure is sufficient to accommodate increased volumes of diverted materials due to delivery of product stewardship, market development and other policy programs	• Maximise diversion of recoverable materials from landfill • To achieve quantities for reprocessing	*Lead*: MWRRG *Support*: SV, local government, RRC/TS network, industry, local communities

2.3 Strategic Objective 2: Increase organic waste recovered

This strategic objective seeks to reduce the environmental and community impact of organics in landfill by minimising food waste and by recovering more food and garden waste. It directly relates to the State Infrastructure Plan long term strategic directions to:

- maximise the diversion of recoverable materials from landfills
- achieve quantities for reprocessing
- manage waste and material streams
- maximise economic outcomes, provide cost effective service delivery, and reduce community, environment and public health impacts
- facilitate a cost effective statewide network of waste and resource recovery infrastructure.

A large proportion of the waste we send to landfill is organic waste. In metropolitan Melbourne, approximately 42% of municipal solid waste and commercial and industrial waste sent to landfill is food and garden organic waste. This represents a sizeable opportunity to reduce the amount of waste we send to landfill.

In landfill, organic waste breaks down to produce methane, a potent greenhouse gas. It can also cause odour and produce leachate that can negatively affect local communities and the environment. The Victorian Government's vision is to increase recovery of organics to deliver a vibrant, functioning recovery market to minimise health and amenity impacts on communities, and contribute to climate change adaptation through improved soil productivity and provision of feedstock for bioenergy generators. A priority focus of the Metropolitan Implementation Plan is to recover organics for reprocessing to reduce the challenges this material presents in landfill.

We need to grow and support an integrated system of diverse facilities that process municipal and commercial food and garden waste so that the Victorian Government's vision for the recovery of organic resources can be realised. This will also reduce the need for additional landfills to manage metropolitan Melbourne's waste.

The actions described in Table 4 will collectively result in more food and garden waste being recovered for productive uses, thereby reducing the environmental and community impacts it can cause when disposed to landfill.

Table 4: Actions to achieve Strategic Objective 2

Actions	State Infrastructure Plan - Strategic Direction/s	Responsibility
5. Build the metropolitan organic recovery and processing network and maximise the network's productivity by: • **accepting household and commercial food waste** • **engaging and educating Melburnians**		
Implementation • Develop a metropolitan municipal organics procurement strategy to receive and process food organics, in line with the *Victorian Organics Resource Recovery Strategy* • Build new capacity or expand the capacity and function of existing facilities (including those outside the metropolitan region) to process additional food organics from the municipal and commercial sectors • Investigate and support opportunities to co-locate and/or co-process organic waste with waste water treatment plants • Provide guidance and support to local government and commercial and community food waste generators about on site food waste treatment options • Support continued roll out and delivery of the Back to Earth Initiative education program to engage Melburnians on how to use the organics recycling system correctly and achieve acceptance of the practice of putting food into the garden waste bin • Continue to support and educate food waste generators (households and businesses) on how to reduce and manage their food waste, e.g. through Sustainability Victoria's Love Food Hate Waste program *Outcome by 2021* • Melbourne has infrastructure processing capacity in place to manage up to 400,000 tonnes municipal food and garden waste per annum • Regional reprocessing arrangements continue and/or expand to include food waste as a principal or supplementary feedstock • There is an increase in recycling of food waste by commercial and industrial food waste generators • Improved understanding of the future needs and capacity for increasing commercial food waste recovery • Reduced contamination of food and garden waste collected • An increased number of councils providing kerbside collection of food waste for recycling *Outcome by 2026* • Melbourne has access to at least 600,000 tonnes per annum of food and garden waste processing capacity for the municipal sector • Minimal contamination rates in food and garden waste collected. • An increased number of households use their councils' organic kerbside collection service	• To maximise the diversion of recoverable materials from landfills. • To achieve quantities for reprocessing • To manage waste and material streams • To maximise economic outcomes, provide cost effective service delivery, and reduce community, environment and public health impacts • To facilitate a cost effective statewide network of waste and resource recovery infrastructure.	*Lead*: MWRRG *Support*: Regional WRRGs, local government, contracted parties, SV, DELWP (Environment), EPA Victoria

2.4 Strategic Objective 3: Deliver community, environmental and economic benefits

This strategic objective seeks to support a liveable and productive Melbourne with a resource recovery and waste network that provides jobs and economic opportunities, while reducing environmental and community impact. It directly relates to the State Infrastructure Plan long term strategic directions to:

- maximise economic outcomes, provide cost effective service delivery and reduce community, environment and public health impacts
- facilitate a cost effective statewide network of waste and resource recovery infrastructure.

Increasing resource recovery within the metropolitan Melbourne region can create new industries and jobs, grow the economy and protect the health of communities, while generating positive environmental outcomes.

Achieving this objective will require the involvement of everyone who produces waste, manages waste and uses products made from recycled materials. We need to ensure all decisions are informed by the views and interests of stakeholders, and consider the needs of community. This aligns with the principle of environmental justice in the State Infrastructure Plan, which requires the community to be involved in determining waste and resource recovery priorities for the whole of metropolitan Melbourne, and to have opportunities to participate in decisions and planning needed to establish a safe and integrated system.

Residents and businesses who use resource recovery and waste services need support to better understand and get the best out of our metropolitan network. And, the operators of the resource recovery and waste network need clarity on the standards expected of them – i.e. best practice operations and a culture of continuous improvement.

The actions listed in Table 5 will result in the waste and resource recovery network delivering community, environmental and economic benefits.

Table 5: Actions to achieve Strategic Objective 3

Actions	State Infrastructure Plan - Strategic Direction/s	Responsibility
6. Encourage best practice operations for the resource recovery and waste network		
Implementation • Recommend best practice and continuous improvement expectations be a requirement of all MWRRG facilitated collective procurement contracts • Input into statutory approvals (planning and works approvals) to ensure objectives and actions of the Metropolitan Implementation Plan are understood and acknowledged • Implement statewide best practice guides, including guides tailored to regional needs. E.g. for the operation of resource recovery centres/transfer stations and hubs *Outcome by 2021* • Operators have a clear understanding of the best practice standards expected of them *Outcome by 2026* • Metropolitan network establishes a reputation as a leader in delivering community and economic benefits by going beyond compliance • Reduction of licensed waste management facilities with environmental breaches	• To maximise economic outcomes, provide cost effective service delivery and reduce community, environment and public health impacts	*Lead*: MWRRG *Support*: SV, EPA Victoria, responsible state authorities, industry, community leaders

Actions	State Infrastructure Plan - Strategic Direction/s	Responsibility
7. Engage community and stakeholders in waste and resource recovery decision making		
Implementation • Include effective community engagement as a requirement of all MWRRG facilitated procurement contracts • Support the achievement of the *Victorian Waste Education Strategy*, including the implementation of the Victorian Government's social licence program • Develop and deliver a MWRRG stakeholder and engagement policy • Continue to partner with EPA Victoria and relevant planning authorities to encourage the use of best practice stakeholder engagement in regulatory approval processes *Outcome by 2021* • Best practice engagement practices in place to support the metropolitan network *Outcome by 2026* • Deliberative engagement process are established as key processes for reviewing and developing the Metropolitan Implementation Plan 2026–36 • There is a measured increase in business and community awareness of and engagement with resource recovery and waste services and infrastructure	• To maximise economic outcomes, provide cost effective service delivery and reduce community, environment and public health impacts • To facilitate a cost effective statewide network of waste and resource recovery infrastructure	*Lead*: MWRRG *Support*: SV, industry, local government, EPA Victoria, planning authorities
8. Support the implementation of best practice litter prevention programs		
Implementation • Support existing partnerships including Victorian Litter Action Alliance and Councils Litter Environment Action Network to help develop and implement best practice litter prevention programs, including delivering the Litter Hotspots program *Outcome by 2026:* • Best practice litter prevention programs are in place	• To maximise economic outcomes, provide cost effective service delivery and reduce community, environment and public health impacts	*Lead*: MWRRG *Support*: SV, Victorian Litter Action Alliance, local government, Councils Litter Environment Action Network

2.5 Strategic Objective 4: Plan for Melbourne's growing population

This strategic objective seeks to ensure Melbourne has the right resource recovery and waste infrastructure it needs in the right place, at the right time, with the right protections. It directly relates to the State Infrastructure Plan's long term strategic directions to:

- achieve quantities for reprocessing
- manage waste and material streams
- maximise economic outcomes, provide cost effective service delivery, and reduce community, environment and public health impacts
- facilitate a cost effective statewide network of waste and resource recovery infrastructure.

Planning for waste and resource recovery infrastructure is inherently linked with transport and land use planning. As our population grows we need to secure more housing, essential community infrastructure, and services and transport. Land use planning tries to balance these competing needs and interests so we achieve an overall community benefit by developing land in a fair, orderly and sustainable way.

As with other essential services and infrastructure, it is important that sufficient land is available in suitable locations with appropriate approvals for the waste and resource recovery facilities that Melbourne is going to need over the next 30 years.

The community, state and local government, planning authorities and private industry all have a role to play in helping to strike the right balance and ensuring their views are considered in the way land is developed.

The Metropolitan Implementation Plan considers regional transport, land use planning and the role of planning schemes in aligning resource recovery, waste and land use planning outcomes and objectives. It also gives further meaning to the concept of waste and resource recovery hubs of 'state importance' in a spatial sense through the land use planning system. The land use planning system can facilitate and encourage the placement of waste and resource recovery facilities in hubs and provide disincentives for potentially conflicting land uses in buffer areas around these hubs. The State Infrastructure Plan identifies 14 hubs of state importance with the metropolitan Melbourne region.

The actions listed in Table 6 will help ensure we have the right resource recovery and waste infrastructure in the right place, at the right time, with the right protections.

Table 6: Actions to achieve Strategic Objective 4

Actions	State Infrastructure Plan - Strategic Direction/s	Responsibility
9. Identify the roles and functions of waste and resource recovery hubs across the metropolitan network		
Implementation • Support developing plans for each metropolitan hub of state importance that will reference the role and function of resource recovery and waste facilities within that hub, identify opportunities for increased aggregation and reprocessing for cost effective recovery and opportunities to implement best practice in the design and operations of the facilities in the hub • Identify and broker opportunities for generators to connect with reprocessors to maximise the benefits of waste and resource recovery hubs • Support Sustainability Victoria to develop a statewide strategy for hubs. In line with this strategy, identify and develop plans for regional hubs *Outcome by 2021* • Options for linking metropolitan hubs into local planning schemes are identified and implemented • Site/precinct plans are developed for at least four hubs of state importance *Outcome by 2026* • Site/precinct plans are developed for the 10 remaining hubs of state importance	• To achieve quantities for reprocessing • To manage waste and material streams	*Lead*: MWRRG, *Support*: local government, landfill and waste operators, SV, DELWP (Planning and Environment), EPA Victoria

Actions	State Infrastructure Plan - Strategic Direction/s	Responsibility
10. Facilitate appropriate land use planning protection of sites of strategic importance for metropolitan Melbourne's waste and resource recovery system		
Implementation • Work with state and local governments and industry to explore how metropolitan planning schemes can support waste and resource recovery hubs and identify and protect their buffer areas • Work with state and local governments to develop and deploy a suite of tools to define, protect and maintain buffer areas around waste and resource recovery facilities and minimise impacts on surrounding communities • Improve how the land use planning system gives effect to waste and resource recovery plans and policy, and increase the knowledge and capacity of land use planners to plan and make decisions in relation to waste and resource recovery infrastructure • Support local government and the waste industry to respond to the land use planning challenges and opportunities associated with waste and resource recovery facilities by providing knowledge and building capacity to protect and enhance waste and resource recovery facilities *Outcome by 2021* • Buffer protection measures are included within the Victorian Planning Provisions • Protection measures for key sites are delivered	• To manage waste and material streams • To facilitate a cost effective statewide network of waste and resource recovery infrastructure	*Lead:* MWRRG *Support:* SV, EPA Victoria, key local governments .DELWP (Planning and Environment)

Actions	State Infrastructure Plan - Strategic Direction/s	Responsibility
11. Facilitate and support aligning waste and resource recovery system needs with transport and land use planning systems		
Implementation • Monitor and respond to statutory and strategic planning applications that impact the metropolitan waste and resource recovery system • Proactively inform and collaborate with local government and state planning agencies to ensure the Metropolitan Implementation Plan is considered in transport and land use planning policy development and decision making • Encourage an integrated planning response by working with all stakeholders to ensure the planning system acknowledges and deals with the effects of waste infrastructure including impacts of new and existing facilities on communities, and the need to reduce the negative impacts of facilities on the environment and community • Work with DELWP to develop land use planning tools and guidelines to assist new multi-unit developments to better plan and provide for resource recovery infrastructure and services • Develop guides for incorporating waste management planning into multi-unit developments *Outcome by 2021* • Responsible authorities report greater awareness and alignment of resource recovery and waste infrastructure planning and land use planning • Multi-unit development planning tools and guidelines are used by 90% of metropolitan councils • Planning schemes are amended to better support recycling from multi-unit developments *Outcome by 2026* • 95% of all new multi-unit developments accommodate resource recovery collections • Responsible authorities report greater awareness and alignment of resource recovery and waste infrastructure planning and land use planning	• To manage waste and material streams • To maximise economic outcomes, provide cost effective service delivery, and reduce community, environment and public health impacts • To facilitate a cost effective statewide network of waste and resource recovery infrastructure	*Lead*: MWRRG *Support*: SV, EPA Victoria, Victorian Planning Authority (VPA), key local governments, DELWP (Environment and Planning)

Actions	State Infrastructure Plan - Strategic Direction/s	Responsibility
12. Ensure metropolitan network of landfills has sufficient capacity to accommodate an emergency or unexpected event (contingency capacity)		
Implementation • Annually assess and survey landfill sites to determine where contingency capacity is available within the metropolitan network • Develop and coordinate a Victorian waste and resource recovery contingency planning group to further investigate the waste management requirements caused by emergency events and the process of decision making regarding waste management *Outcome by 2021* • Sufficient landfill capacity is available if an emergency or unexpected event occurs	• Increase resource recovery • Maximise economic outcomes, provide cost effective service delivery and reduce community, environment and public health impacts	*Lead*: DELWP *Support*: WRRGs, EPA Victoria, SV, Emergency Management Victoria
13. Review the Metropolitan Implementation Plan in 2019 to assess whether new resource recovery infrastructure will be delivered within ten year timeframe		

Implementation
• Finalise terms of review, including indicators for assessing likelihood of recovery infrastructure being commissioned and projected recovery rates being realised
• Undertake a review in 2019, in line with best practice community engagement and statutory requirements. The review will:
  • assess the impact of the metropolitan and regional implementation plans on the resource recovery market
  • assess whether new resource recovery infrastructure will be delivered within 10 year timeframe
  • determine the need for long term landfilling and, if needed, schedule a new landfill
• If required, amend schedule to ensure landfill infrastructure can meet community needs for 10 years and beyond
Outcome by 2021
• If needed, Metropolitan Implementation Plan updated including new landfill/s scheduled (if needed) and detailing additional resource recovery infrastructure required
	• Increase resource recovery	*Lead*: MWRRG
		Support: SV, DELWP

3 MEASURING PERFORMANCE

This section at a glance:

- Progress towards achieving the strategic objectives will be assessed annually and will be publically available.
- The proposed key indicators and targets to monitor progress against the strategic objectives are detailed in Table 7.
- In 2019 MWRRG will review the Metropolitan Implementation Plan to:
  - assess the impact of the metropolitan and regional implementation plans on the resource recovery market
  - assess whether new resource recovery infrastructure will be delivered within 10 year timeframe
  - determine the need for long term landfilling and, if needed, schedule a new landfill. MWRRG will only recommend a new landfill for Melbourne if it is absolutely necessary.

3.1 Measuring performance annually

Progress towards achieving the strategic objectives will be assessed annually and will be made publically available. The proposed key indicators and targets to monitor progress against the strategic objectives are detailed in Table 7. MWRRG acknowledges that no one indicator is perfect or comprehensive. The suite of indicators below seek to provide an overall sign of the effectiveness of the various actions towards achieving the strategic objectives.

3.2 Review of the Metropolitan Implementation Plan in 2019

In 2019, MWRRG will review the Metropolitan Implementation Plan to:

- assess the impact of the metropolitan and regional implementation plans on the resource recovery market
- assess whether new resource recovery infrastructure will be delivered within 10 year timeframe
- determine the need for long term landfilling and, if needed, schedule a new landfill.

MWRRG will only schedule new landfill for Melbourne if it is absolutely necessary.

This review will be underpinned by best practice processes to engage community, business, local governments and other stakeholders. Details about how to get involved, the processes and timeframes governing this review will be publically available. MWRRG will update the Metropolitan Implementation Plan as necessary and in accordance with all statutory expectations.

3.3 Preparing for the Metropolitan Implementation Plan 2026-2036

MWRRG will use deliberative engagement processes for reviewing and developing the Metropolitan Implementation Plan 2026-2036 and will prepare the plan in accordance with all statutory expectations.

Table 7: Proposed key indicators for measuring performance

Strategic objectives	Proposed key indicator	Target	Comment
1. Reduce waste sent to landfill	Less waste sent to landfill (tonnes)	-	Compared to baseline of 2014/15
	More materials recovered (tonnes and %)	-	Materials as described in Table 17
	More municipal residual waste recovered (%)	25% by 2026	Compared to baseline of 2014/15 Amount of municipal residual waste recovered through MWRRG facilitated group procurement
	Increase in the recovery of priority materials (tonnes) from residual waste from the commercial sector	25% by 2026	Compared to baseline 2014/15
	Higher municipal diversion rate	All metropolitan councils have a higher diversion rate by 2026	Compared to 2015 levels As reported by the *Victorian Local Government Annual Survey*
2. Increase organic waste recovered	More of organic waste recovered (tonnes and %)	• 400,000 tonnes processing capacity per annum by 2021 to manage municipal food and garden waste • 600,000 tonnes processing capacity per annum by 2026 to manage municipal and commercial and industrial food and garden waste	Compared to baseline of 2014/15 This is one of categories of materials listed in Table 17
3. Deliver community, economic and environmental benefit	Environmental, public health and/or amenity performance of waste management facilities has improved	-	Examples could include reduction of licensed waste management facilities with environmental breaches
4. Plan for Melbourne's growing population	The Victorian Planning Provisions and other key strategic planning documents or policies are aligned with the Metropolitan Implementation Plan	-	-
	Increase in relevant local planning schemes that recognise waste and resource recovery sites identified in Regional Implementation Plans, and apply appropriate land use planning tools to define and protect buffer separation distances	-	Will include a range of land use protection measures depending on the needs and uses of the site
	Percentage of all new multi-unit developments that accommodate resource recovery collections	95%	-

SECTION 2: INFRASTRUCTURE SCHEDULE

4 INFRASTRUCTURE SCHEDULE INTRODUCTION

This section at a glance:

- The Infrastructure Schedule identifies new and existing waste and resource recovery infrastructure required for the metropolitan region.
- The purpose of scheduling is to holistically plan for the management of waste, and where viable make infrastructure decisions that prioritise resource recovery over landfilling.

The Infrastructure Schedule identifies new and existing waste and resource recovery infrastructure required for the metropolitan region. The purpose of scheduling is to holistically plan for the management of waste, and where viable make infrastructure decisions that prioritise resource recovery over landfilling.

The schedule is the Victorian Government's principal plan for the waste and resource recovery infrastructure that is needed to meet the needs of metropolitan Melbourne.

The Infrastructure Schedule reflects the Metropolitan Implementation Plan's aims of recycling more, sending less waste to landfill, and planning for Melbourne's growth and future sustainability. The goal is to reduce waste to landfill and increase recycling by using new, efficient technologies.

This plan does not schedule additional landfill capacity. Time is required to give the resource recovery industry the opportunity to invest and establish the new technologies required to boost recycling. In 2019, MWRRG will assess whether the new resource recovery infrastructure needed is on track to be delivered within the 10 year timeframe of this Metropolitan Implementation Plan. Additionally, MWRRG will determine the need for long term landfilling, and if needed will schedule new landfill. Stakeholders from the community, governments, businesses and the waste and resource recovery industry will be invited to participate in this review.

MWRRG acknowledges the concern from some community members about the closure of the landfills in the Clayton South precinct and reliance on remaining existing landfills to manage the safe disposal of Melbourne's waste in the medium to long term. The Metropolitan Implementation Plan responds to these concerns by seeking to significantly recycle more materials and send only the absolute minimum to landfill. In particular, this plan seeks to recover more organic waste rather than sending them to landfill where they can cause odour and create greenhouse gases. The new, efficient technologies that this Metropolitan Implementation Plan prioritises will treat, consolidate and recycle materials and will reduce the amount of waste sent to landfill and boost recycling rates. This integrated approach will reduce the impact of existing landfills on community amenity and help to protect the environment and deliver economic benefit to our region.

The schedule informs environmental regulatory decisions, as well as land use planning decisions made within the Victorian Planning Provisions. It also gives guidance to the Victorian Government waste portfolio, industry and local government, as the *Environmental Protection Act 1970* requires that:

- councils perform their waste management functions consistently with this plan
- any person involved in the generation, management or transport of waste must not do anything inconsistent with this plan.

The schedule has two components: a Resource Recovery and Consolidation Infrastructure Schedule, and a Landfill Schedule. The infrastructure analysis included in Section 4 underpins the schedule.

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5 RESOURCE RECOVERY AND CONSOLIDATION INFRASTRUCTURE

This section at a glance:

- Existing resource recovery and consolidation infrastructure, its type, location and the materials managed at the site is presented.
- Future resource recovery and consolidation infrastructure is identified.

5.1 Existing resource recovery and consolidation infrastructure

The purpose of scheduling resource recovery and consolidation infrastructure is to identify gaps and plan for future needs. Planning aims to ensure that the necessary infrastructure is identified, and that suitable sites and zoned areas are available to establish or expand facilities[8]. Table 8 identifies existing infrastructure, its type, location and the materials managed at the site.

Table 8. Existing resource recovery and consolidation infrastructure

Infrastructure type		Facility name	Facility owner/ operator	Address	Suburb	Local Government Area	Major material streams managed
Resource Recovery	**Drop off facilities**	Kew Depot Recycling Drop-off Centre	Boroondara City Council	31-35 Hutchinson Drive	Kew	Boroondara City Council	Cardboard/paper
		Brooklyn Onesteel Transfer Station	Onesteel	750 Old Geelong Road	Brooklyn	Brimbank City Council	Paper/cardboard; Aggregates, Masonry and Soil, Metals, Plastics
		Rayco Waste Management	Rayco	7 Adina Court	Tullamarine	Brimbank City Council	Organics garden
		Seaford Sims Metals Transfer Station	Sims Metals	45 Wells Road	Seaford	Frankston City Council	Metals, E-waste
		Noble Park - Sims Metals Transfer Station	Sims Metals	442 Princess Highway	Dandenong South	Greater Dandenong City Council	Metals, E-waste
		Dandenong Onesteel Transfer Station	Onesteel	21-23 Elliott Road	Dandenong South	Greater Dandenong City Council	Metals
		Broadmeadows Sims Metals Transfer Station	Sims Metals	1904 Hume Highway	Cambellfield	Hume City Council	E-waste
		Coolaroo Onesteel Transfer Station	Onesteel	82A Maffra Street	Coolaroo	Hume City Council	Metals

[8]Guideline: Making, amending and integrating the Statewide Waste and Resource Recovery Infrastructure Plan and Resource Recovery Implementation Plans, DELWP, 2014

Infrastructure type	Facility name	Facility owner/ operator	Address	Suburb	Local Government Area	Major material streams managed
	Dromana Hopper	Mornington Peninsula Shire Council	256 Boundary Road	Dromana	Mornington Peninsula Shire Council	Paper/cardboard, Other (general waste)
	Flinders Hopper	Mornington Peninsula Shire Council	Double Creek Road	Flinders	Mornington Peninsula Shire Council	Paper/cardboard, Other (general waste)
	Sorrento Hopper	Mornington Peninsula Shire Council	81 Normanby Road	Sorrento	Mornington Peninsula Shire Council	Paper/cardboard Other (general waste)
	Nillumbik Recycling & Recovery Centre	Nillumbik City Council	290-304 Yan Yean Road	Plenty	Nilumbik Shire Council	Organics- garden, Paper/cardboard, Other (general waste)
	Delta Group Transfer Station	Delta Group	Bridge Street	Port Melbourne	Port Phillip City Council	Other (general waste)
	Yarra Council Recycling Drop-Off Point[9]	Yarra City Council	168 Roseneath Street	Clifton Hill	Yarra City Council	E-Waste, Metals; Other Hazardous Materials (Household chemicals/paints/ oil)
RRC/TS	Banyule Waste Recovery Centre	Banyule City Council	Corner Waterdale Road and Banksia Street	Bellfield	Banyule City Council	Organics -garden; Other (general waste)
	Bayside Waste Transfer and Recycling Centre	Bayside City Council	144 Talinga Road	Cheltenham	Bayside City Council	Bricks; Soil, Organics - garden, Other (general waste)
	Boroondara Transfer Station	Boroondara City Council	648 Riversdale Road	Camberwell	Boroondara City Council	Organics - garden, Other (general waste)
	Cleanaway - Brooklyn	Cleanaway	Old Geelong Road	Brooklyn	Brimbank City Council	Aggregates, Masonry and Soil, Paper/cardboard, Plastics (flexible); Organics; Other
	Brimbank Resource Recovery Centre	Brimbank City Council	Stadium Drive	Keilor Park	Brimbank City Council	E-waste; Hazardous materials, Other
	Cleanaway – Pakenham[11]	Cleanaway	20 Drovers Way	Pakenham	Cardinia City Council	Other (general waste), Aggregates, Masonry and Soil, Paper/cardboard, Plastics (flexible), Organics, Other

[11]Planning approval in place

Infrastructure type	Facility name	Facility owner/ operator	Address	Suburb	Local Government Area	Major material streams managed
	Cardinia Waste and Recyclers	Atkins Family	Lot 7, Exchange Drive	Pakenham	Cardinia City Council	Metals, Aggregates, Masonry and Soil, Organics - garden, Paper/cardboard; General waste
	SUEZ Hampton Park Resource Recovery Facility	Outlook Environmental (SUEZ Facility)	274 Hallam Road	Hampton Park	Casey City Council	Aggregates, Masonry and Soil, Paper/cardboard, Organics wood/ Ttimber; Plastics, Other
	Darebin Resource Recovery Centre	Darebin City Council	30 Kurnai Avenue	Reservoir	Darebin City Council	Aggregates, Masonry and Soil- only, Metals; E-Waste, Other (general waste)
	Frankston Regional Recycling and Recovery Centre	Frankston City Council	20 Harold Road	Skye	Frankston City Council	Paper/cardboard, E-waste; Soil, Other
	BioGro	BioGro	80-82 Ordish Road	Dandenong South	Greater Dandenong City Council	Organics - garden
	South East Waste Transfer Station	Cleanaway	59A Ordish Road	Dandenong South	Greater Dandenong City Council	Commercial & Industrial waste, Other (general waste)
	Calleja Transfer Station	Calleja Group	30 Baldwin Road	Altona North	Hobsons Bay City Council	
	Campbellfield Recycling and Waste Transfer Station	Hume City Council	1-71 Bolinda Road	Cambellfield	Hume City Council	Organics - garden, Metals, Organics, Timber, Other (general waste)
	Sunbury Landfill Resource Recovery Centre	Hume City Council	515 Riddell Road	Sunbury	Hume City Council	Organics - garden, Other (general waste)
	Cleanaway - Victory Road	Cleanaway	Victory Road	Clarinda	Kingston City Council	Organics- garden, Other (general waste)
	Cleanaway – South East Melbourne Transfer Station[10]	Cleanaway	Cnr Osborne Avenue & Deals Road	Clayton South	Kingston City Council	Aggregates, Masonry and Soil, Paper/cardboard; Plastics (flexible), Organic, Other (general waste)
	Kingston Waste Transfer Station	Rhino Bins	24-30 Fonceca Street	Mordialloc	Kingston City Council	Hazardous waste, Other (general waste)

[10] Planning approvals in place

Infrastructure type	Facility name	Facility owner/ operator	Address	Suburb	Local Government Area	Major material streams managed
	Cleanaway - Carroll Road	Kingston City Council	Carroll Road	Clarinda	Kingston City Council	Aggregates, Masonry and Soil, Paper/cardboard, Plastics (flexible); Organics, Other (general waste)
	Braeside Transfer Station	Kartaway	12-14 Tarnard Drive	Braeside	Kingston City Council	Metals, Glass, Plastics, Soil, Other (general waste)
	Knox Transfer Station	WM Waste Management	251 George Street	Wantirna South	Knox City Council	Organics garden, Other (general waste)
	Eastern Recycling	Maroondah City Council	22 Palmerston Road	Ringwood	Maroondah City Council	Aggregates, Masonry and Soil, Metals; Concrete, Other (general waste)
	Eco Waste Recycling Centre	Eco Waste Recycling	199-201 Colchester Road	Kilsyth	Maroondah City Council	Metals, Other (general waste)
	Citywide Waste Transfer Station	Citywide	437 Dynon Road	West Melbourne	Melbourne City Council	Paper/cardboard, Organics other Other (general waste)
	Melton Recycling Facility	Melton City Council	33-41 Ferris Road	Melton South	Melton City Council	Organics garden; Aggregates, Masonry and Soil, Other (general waste)
	Monash Waste Transfer and Recycling Station	Monash City Council	380 Ferntree Gully Road	Notting Hill	Monash City Council	Organics garden, Aggregates, Masonry and Soil-only concrete, Other (general waste)
	Moonee Valley Transfer Station	Moonee Valley City Council	188 Holmes Road	Moonee Ponds	Moonee Valley City Council	Other (general waste)
	Coburg Transfer Station	Calleja Group	Newlands Road	Coburg North	Moreland City Council	
	East Brunswick Transfer Station	Kartaway	6-32 Kirkdale Street	East Brunswick	Moreland City Council	Metals, Glass, Plastics, Aggregates, Masonry and Soil-only soil, Other (general waste)
	Mornington Resource Recovery Centre	Mornington Peninsula Shire Council	134 Watt Road	Mornington	Mornington Peninsula Shire Council	Organics garden, Plastics, Other (general waste)

Infrastructure type	Facility name	Facility owner/ operator	Address	Suburb	Local Government Area	Major material streams managed
	Tyabb Resource Recovery Centre	Mornington Peninsula Shire Council	21 McKirdys Road	Tyabb	Mornington Peninsula Shire Council	Organics - garden, Plastics, Other (general waste)
	VinsBins	Mornington Peninsula Shire Council	45 Brasser Avenue	Dromana	Mornington Peninsula Shire Council	Organics - garden; Aggregates, Masonry and Soil, Other (general waste)
	Rye Resource Recovery Centre	Mornington Peninsula Shire	280 Truemans Road	Rye	Mornington Peninsula Shire Council	Organics - garden; Plastics; E-waste, Other (general waste);
	Port Phillip Resource Recovery Centre	Port Phillip City Council	Cnr White and Boundary Street	South Melbourne	Port Phillip City Council	Organics - garden, E-waste, Other (general waste)
	Stonnington Waste Transfer Station	Stonnington City Council	32 Weir Street	Malvern	Stonnington City Council	Organics - garden, Other (general waste)
	Whitehorse Recycling and Waste Centre	Whitehorse City Council	638-640 Burwood Highway	Vermont South	Whitehorse City Council	Organics - garden, Other (general waste)
	Wollert Transfer Station	Hanson	45 Bridge Inn Road	Wollert	Whittlesea City Council	Metals, Hazardous materials, Other (general waste)
	Wyndham Transfer Station	Wyndham City Council	470 Wests Road	Werribee	Wyndham City Council	Aggregates, Masonry and Soil – only soil, Organics - garden, Other (general waste)
	Veolia Werribee Transfer Station	Veolia	470 Wests Road	Werribee	Wyndham City Council	E-waste, Aggregates, Masonry and Soil, Organics - garden, Plastics, Glass
	Coldstream Recovery and Waste Transfer Station	WM Waste Management	200 Leonard Rd	Coldstream	Yarra Ranges City Council	Organics - garden, Metals, Aggregates, Masonry and Soil – only bricks, Paper/ cardboard, Other (general waste)

Infrastructure type	Facility name	Facility owner/ operator	Address	Suburb	Local Government Area	Major material streams managed
	Cleanaway - Montrose	Cleanaway	67-71 Canterbury Road	Montrose	Yarra Ranges City Council	Aggregates, Masonry and Soil, Paper/cardboard, Plastics-(flexible), Organics, Other (general waste)
	Cleanaway - Lysterfield	Yarra Ranges City Council	840 Wellington Road	Lysterfield	Yarra Ranges City Council	Aggregates, Masonry and Soil, Paper/cardboard, Plastics (flexible), Organics, Other (general waste)
	Wesburn Recovery and Waste Transfer Station	WM Waste Management	689 Old Warburton Road	Wesburn	Yarra Ranges City Council	Organics garden, Other (general waste)
Material recovery facilities	Visy Heidelberg	Visy	Cnr Banksia & Waterdale Road	Heidelberg	Banyule City Council	Paper/cardboard, Plastics, Glass, Metals
	Sunshine Groupe	Sunshine Groupe	125 Bunting Road	Brooklyn	Brimbank City Council	Aggregates, Masonry and Soil
	Polytrade Recycling - Dandenong	Polytrade	120-134 Thomas Murrell Crescent	Dandenong South	Greater Dandenong City Council	Paper/cardboard, Plastics; Glass, Metals
	Cleanaway -Dandenong	Cleanaway	88-90 Ordish Road	Dandenong South	Greater Dandenong City Council	Paper/cardboard
	Visy Springvale	Visy	708-710 Princess Highway	Springvale	Greater Dandenong City Council	Paper/cardboard, Plastics, Glass, Metals
	Mobius Materials Recovery	Mobius Materials Recovery	164-168 Williams Road	Dandenong South	Greater Dandenong City Council	Soil; Hazardous materials, Aggregates, Masonry and Soil
	Cleanaway – Altona	Cleanaway	72-80 Harcourt Road	Altona	Hobsons Bay	Paper/cardboard
	Orora Recycling	Orora Recycling	72-80 Harcourt Road	Altona	Hobsons Bay City Council	Paper/cardboard, Glass
	Polytrade Recycling - Campbellfield	Polytrade	202-204 Northbourne Road	Campbellfield	Hume City Council	Paper/cardboard, Plastics, Glass, Steel
	SKM Recycling Coolaroo	SKM Recycling	94 Maffra Street	Coolaroo	Hume City Council	Paper/cardboard. Plastics, Glass, Metals
	Outlook E-waste Processing Facility	Outlook Environmental	5-7 Hickson Road	Officer	Cardinia	Metals, E-waste

Infrastructure type		Facility name	Facility owner/ operator	Address	Suburb	Local Government Area	Major material streams managed
		Polytrade Recycling - Coburg	Polytrade	172 Newlands Road	North Coburg	Moreland City Council	Paper/cardboard. Plastics, Glass, Metals
Reprocessor	**Paper and cardboard**	Huhtamaki	Huhtamaki	77 Raglan Street	Preston	Darebin City Council	Paper/cardboard
		Insulfluf	Insulfluf	13 Union Road	Dandenong South	Greater Dandenong City Council	Paper/cardboard
		Visy Coolaroo	Visy	13 Reo Crescent	Coolaroo	Hume City Council	Paper/cardboard
		Enviroflex	Enviroflex	1 Forbes Close	Knoxfield	Knox City Council	Paper/cardboard,
		Visy Laverton	Visy	46-48 Dohertys Road	Laverton North	Wyndham City Council	Cardboard/Paper, Glass
		Encore Tissues	Encore Tissues	37 Gilbertson Road	Laverton North	Wyndham City Council	Paper/cardboard,
	Garden waste	The Green Centre	The Green Centre	1 Stadium Drive	Keilor Park	Brimbank City Council	Organics - garden, Aggregates, Masonry and Soil
		Veolia - NRS	Veolia	15 Berends Drive	Dandenong South	Greater Dandenong City Council	Organics - food, Organics - garden
		Veolia - Bulla	Veolia	580 Sunbury Road	Bulla	Hume City Council	Organics food, Organics garden
		Enviromix	Enviromix	2 Grange Road	Dingley Village	Kingston City Council	Organics - garden
		SUEZ Epping Organic Resource Recovery Facility	SUEZ	480 Cooper Street	Epping	Whittlesea City Council	Organics - garden, Organics
		Spotswood Holdings	Spotswood Holdings	6 King Street	Yarra Glen	Yarra Ranges City Council	Organics - wood/ timber
	Wood/timber	Bark King Group	Bark King	54 Fussell Road	Montrose	Yarra Ranges City Council	Organics - garden
	Textiles	TIC Group	TIC Group	214 Blackshaws Road	Altona North	Hobsons Bay City Council	Mattresses
		Pacific NonWovens	Pacific NonWovens	50 Bakers Road	Coburg North	Moreland City Council	Textiles
	Glass	Potters Industries	Potters Industries	100-102 Boundary Road	Laverton North	Brimbank City Council	Glass
		Owens Illinois	Owens Illinois	Booker Street	Spotswood	Hobsons Bay City Council	Glass
	Plastics	Unipod	Unipod	40 Buys Court	Derrimut	Brimbank City Council	EPS

Infrastructure type	Facility name	Facility owner/ operator	Address	Suburb	Local Government Area	Major material streams managed
	National Polystyrene Systems	National Polystyrene Systems	329 St Albans Road	Sunshine	Brimbank City Council	EPS
	Styro Polymers	Styro Polymers	8-10 Hawthorn Avenue	Sunshine	Brimbank City Council	Plastics - rigid
	Carrington Plastics	Carrington Plastics	2 Vimy Street	Reservoir	Darebin City Council	Plastics - flexible
	EQ Plastics	EQ Plastics	16 Egan Road	Dandenong South	Greater Dandenong City Council	Plastics - rigid, Plastics - flexible
	Cryogrind	Cryogrind	42 Tatterson Road	Dandenong South	Greater Dandenong City Council	Plastics - flexible
	Polyfoam	Polyfoam	24-36 Dandenong Street	Dandenong South	Greater Dandenong City Council	EPS
	Polytrade Recycling	Polytrade	202 Northbourne Road	Campbellfield	Hume City Council	Plastics - rigid, Plastics - flexible
	MAP Precision Plastics	MAP Precision Plastics	33 Scammel Street	Campbellfield	Hume City Council	Plastics rigid, Plastics - flexible
	Global Industrial Group	Global Industrial Group	49 Jesica Road	Campbellfield	Hume City Council	Plastics rigid, Plastics - flexible
	Complete Pod Solutions	Complete Pod Solutions	17/21 Freight Drive	Somerton	Hume City Council	EPS
	Close the Loop	Close the Loop	208 Hume Highway	Somerton	Hume City Council	Plastics - rigid, Plastics - flexible
	Megara	Megara	908-920 Mountain Highway	Bayswater	Knox City Council	Plastics - rigid
	RMAX Rigid Cellular Plastics	RMAX Rigid Cellular Plastics	2-4 Mephan Street	Maribyrnong	Maribyrnong City Council	EPS
	Foamex Group	Foamex Group	31-33 Gatwick Road	Bayswater	Maroondah City Council	EPS
	PCP Global Recycling	PCP Global Recycling	21 Little Boundary Road	Laverton	Wyndham City Council	Plastics - rigid, Plastics - flexible
	Repeat Plastics Australia	Repeat Plastics Australia	21 East Court	Lilydale	Yarra Ranges City Council	Plastics - rigid, Plastics - flexible
Metals	Sims Metals	Sims	44-60 McDonald Road	Brooklyn	Brimbank City Council	Metals
	Outlook	Outlook Environmental	5-7 Hickson Road	Officer	Cardinia	E-waste
	PGM Refiners	PGM Refiners	7-19 Mills Road	Dandenong	Greater Dandenong City Council	E-waste
	CMA Ecocyle	CMA Ecocyle	5-11 Reo Crescent	Campbellfield	Hume City Council	Hazardous waste
	MRI – E-cycle Solutions	MRI	20-24 Dennis Street	Campbellfield	Hume City Council	E-Waste; Other

Infrastructure type		Facility name	Facility owner/ operator	Address	Suburb	Local Government Area	Major material streams managed
		OneSteel - Non Ferrous	OneSteel	70 Cliffords Road	Somerton	Hume City Council	Metals
		TES-AMM	TES-AMM	14 Graham Road	Clayton South	Kingston City Council	E-waste
		Sims E-Waste[12]	Sims	195 Forster Road	Mount Waverley	Monash City Council	E-waste; Metals
		Norstar Steel Recyclers	Norstar	191-205 Dohertys Road	Laverton North	Wyndham City Council	Metals
		OneSteel - Ferrous	OneSteel	62-66 Fitzgerald Road	Laverton	Wyndham City Council	Metals
	Aggregates, masonry and soil	Brooklyn Recycling Plant	City Circle	Jones Road	Brooklyn	Brimbank City Council	Aggregates, Masonry and Soil, Glass
		Delta Group	Delta Group	473 Sommerville Road	Brooklyn	Brimbank City Council	Aggregates, Masonry and Soil, Glass
		Sunshine Groupe[13]	Sunshine Groupe	125 Bunting Road	Brooklyn	Brimbank City Council	Aggregates, Masonry and Soil,
		SUEZ ResourceCo - Hallam	SUEZ ResourceCo	274 Hallam Road	Hampton Park	Casey City Council	Aggregates, Masonry and Soil,
		Dandenong Recycling Plant	City Circle	128-148 Ordish Road	Dandenong South	Greater Dandenong City Council	Aggregates, Masonry and Soil,
		Waste Converters Recycling	Waste Converters Recycling	185 Dandenong Hastings Road	Dandenong South	Greater Dandenong City Council	Concrete, Organics - garden, Other organics, Wood/Timber, Bricks whole/brick rubber
		Altona North Recycling (Masalovski Group)	Masalovski Group	55 McArthurs Road	Altona North	Hobsons Bay City Council	Aggregates, Masonry and Soil, Organics - garden, Other Organics; Organics wood/ timber
		Urban Salvage	Urban Salvage	190A Hall Street	Spotswood	Hobsons Bay City Council	Organics wood
		Alex Fraser - Clarinda	Alex Fraser	275-315 Kingston Road	Clarinda	Kingston City Council	Aggregates, Masonry and Soil, Glass
		Apex Waste Control	Apex Waste Control	4 Sara Grove	Tottenham	Maribyrnong City Council	Aggregates, Masonry and Soil, Organics - garden
		Shiver Me Timbers	Shiver Me Timbers	50 Emu Road	Maidstone	Maribyrnong City Council	Organics wood/ timber

[12] Sims E-waste is required to obtain further planning approvals for this operation
[13] Includes colocated light MRF

Infrastructure type		Facility name	Facility owner/ operator	Address	Suburb	Local Government Area	Major material streams managed
		Barro Group	Barro Group	191 Drummond Street	Carlton	Melbourne City Council	Aggregates, Masonry and Soil
		National Recycling Centre (DATS)	National Recycling Centre (DATS)	372-374 Dynon Road	West Melbourne	Melbourne City Council	Metals, Aggregates, Masonry and Soil, Glass, Plastics, Paper/cardboard; Organics wood/ timber; E-waste
		Paddy's Bricks	Paddy's Bricks	240 Kensington Road	West Melbourne	Melbourne City Council	Aggregates, Masonry and Soil
		City Circle - Melton	City Circle	Treeleaf Lane	Melton	Melton City Council	Aggregates, Masonry and Soil,
		Eco Group	Eco Group	60 Garden Road	Clayton	Monash City Council	Aggregates, Masonry and Soil, Wood/timber, Other
		Konstruct Recycling	Konstruct Recycling	63-67 Gardens Road	Clayton	Monash City Council	Aggregates, Masonry and Soil, Glass; Organics wood/timber, Hazardous waste; General waste, Paper/cardboard, Other
		Budget Demolition and Recyclers	Budget Demolition and Recyclers	7 Lens Street	Bittern	Mornington Peninsula Shire Council	Aggregates, Masonry and Soil, Hazardous waste, Glass, Metals
		Alex Fraser - Epping	Alex Fraser	445-475 Cooper Street	Epping	Whittlesea City Council	Aggregates, Masonry and Soil, Glass
		SUEZ ResourceCo – Epping[14]	SUEZ ResourceCo	480 Cooper Street	Epping	Whittlesea City Council	Aggregates, Masonry and Soil
		Alex Fraser - Laverton	Alex Fraser	9-19 Alex Fraser Drive	Laverton North	Wyndham City Council	Aggregates, Masonry and Soil, Glass
		Beaver Bricks	Beaver Bricks	199 Liverpool Road	Kilsyth	Yarra Ranges City Council	Aggregates, Masonry and Soil - only bricks
	Rubber/tyres	Tyre Crumb	Tyre Crumb	160 Camp Road	Broadmeadows	Hume City Council	Rubber including tyres
	Rubber/tyres cont.	Tyre Cycle	Tyre Cycle	30-56 Encore Avenue	Somerton	Hume City Council	Rubber including tyres

[14] New facility

Infrastructure type		Facility name	Facility owner/ operator	Address	Suburb	Local Government Area	Major material streams managed
Energy from Waste	**Combustion**	Visy Energy from Waste*	Visy	13 Reo Crescent	Coolaroo	Hume City Council	Residual waste
	Anaerobic Digester	Yarra Valley Water Waste to Energy[15]	Yarra Valley Water	525 Craigieburn Road East	Wollert	Whittlesea City Council	Organics food, organics other, Biogas

*Co-located with Visy paper reprocessing plant in Coolaroo

Note: This schedule is a list of existing facilities; it does not reflect whether appropriate operational practices are maintained or whether works and planning approvals are in place. If appropriate approvals are not in place, the onus is on the site owner/operator to obtain them.

5.2 Future resource recovery and consolidation infrastructure needs

The metropolitan resource recovery network will need to expand over the next 10 years to keep pace with projected growth in waste generation.

As landfills close in the south east of Melbourne, an increase in resource recovery capacity will play a central role in reducing reliance on existing landfills, and in reducing the need to schedule new landfill(s). In the face of this change we need to seek out new solutions that can realise the Victorian Government's goal of reduced reliance on landfills.

The future resource recovery infrastructure in this schedule (Table 9) will help reduce the need for new landfills. Scheduling for increased organics recovery, landfill pre-sorting, and residual waste processing is a significant step towards seeing waste materials as a resource, and managing them as such.

The Infrastructure Schedule below has been informed by the State Infrastructure Plan, the Victorian Waste and Resource Recovery Projection Model, the MWRRG 2015 Market Assessment, feedback on the consultation draft of the Metropolitan Implementation Plan and MWRRG facilitated group procurements, specialist knowledge and experience. See Appendix B for more information.

Infrastructure is expected to be located within appropriately zoned land, with appropriate buffer distances from sensitive land uses, and with adequate transport connections. MWRRG will work with relevant local governments, communities and those looking to invest in new infrastructure to ensure infrastructure is sited appropriately and that local planning schemes support and acknowledge the role this infrastructure plays in the waste and resource recovery network.

Some future infrastructure will be located in hubs, but not all will be. Chapter 8 provides further guidance on the role of hubs. The siting and location of waste and resource recovery infrastructure is led by industry investors and involves complex decisions based on a number of environmental, planning, market and community considerations.

The Infrastructure Schedule does not specify the type of technology that could be used to meet the infrastructure category in Table 9.

In 2019, MWRRG will assess whether the new resource recovery infrastructure that is needed will be delivered within the 10 year timeframe. This review will also determine the need for long term landfilling and if needed, MWRRG will schedule a new landfill.

[15] New facility in construction

Table 9. Future resource recovery Infrastructure Schedule

Infrastructure	Category of proposed infrastructure	General location	Material streams managed	Timeframe (likely commencement date/need date)	Reason for need	Other requirements
RRC/TS	Proposed new infrastructure at existing and/or new sites in broad metropolitan region	Central	MSW residual, hardwaste, organics, MSW & C&I drop off, priority materials	[16]2016-2017	Indicative capacity need by year 2031-2040: 22,000-65,000 tpa Increase resource recovery	
RRC/TS		Eastern			Indicative capacity need by year 2031-2040: 96,000-121,000 tpa Increase resource recovery	
RRC/TS		Western			While there is sufficient capacity the RRC/TS network in the Western subregion, there is a need to increase resource recovery achieved	
RRC/TS		Northern			Indicative capacity need by year 2031-2040: 17,000-43,000 tpa Increase resource recovery	
RRC/TS		Southern			Indicative capacity need 2031-2040: 115,000-168,000 tpa Initial priority to focus on closure of landfills in south east	
Residual sorting and treatment	Technology type to be identified through facilitated procurement for MSW residual treatment [17]	Metropolitan region	MSW and C&I residual waste	2026	Increase MSW and C&I recovery rates Infrastructure capacity to sort and treat approximately 670,000 tonnes of residual minicipal waste (to recover and divert from landfill 300-400,000 tonnes of recoverable materials)	Facilitated procurement process to be undertaken by 2021 Initial priority will be to focus on providing infrastructure capacity in in the south east of Melbourne

[16] Indicative commencement dates for proposals across one or more sub-regions
[17]2015 MWRRG market assessment process indicated a range of technology types that are likely to be put forward

Infrastructure	Category of proposed infrastructure	General location	Material streams managed	Timeframe (likely commencement date/need date)	Reason for need	Other requirements
Reprocessor - paper/ cardboard[a]	Formal proposals yet to be identified	Metropolitan region	Paper/ cardboard	2016	Indicative current shortfall in local reprocessing capacity: 525,000 tpa	
Reprocessor - plastics[b]	Formal proposals yet to be identified	Metropolitan region	Plastics	2016	Indicative current shortfall in local reprocessing capacity: 127,000 tpa	
Reprocessor - glass	Formal proposals yet to be identified	Metropolitan region	Glass	2016	Shortage of reprocessing capability Improved sorting technology is needed to increase recovery	Expansion of markets for recovered glass would benefit recovery
Reprocessor - rubber/tyres[c]	Formal proposals yet to be identified	Metropolitan region	Rubber/tyres	2016	Tonnage unspecified [d]	
Reprocessor - metals	Formal proposals yet to be identified	Metropolitan region	Metals	2025	Indicative capacity need by 2026: 138,000 tpa	Potential opportunity for market to respond
Reprocessor -organics, garden	New infrastructure at new site	North West- Wyndham	Municipal garden organics	Date - TBA	Identified need and contractual requirement 35,000 tpa	
	New/upgraded infrastructure	South East – Greater Dandenong	Municipal garden organics, some food organics	2017	Identified need and contractual requirement 24,000 tpa	
	New infrastructure at new site	South East	Municipal garden organics, some food organics	2017	Identified need and contractual requirement 80,000 tpa[18]	
	New infrastructure at new site	South East – Greater Dandenong	Municipal garden organics, some food organics	2017	Identified need and contractual requirement 100,000 tpa	
	New infrastructure at new site	East – location to be determined	Municipal garden organics, some food organics	Tender released end of 2015	80,000 projected tpa	

[18] This organics material to be processed outside the region with consolidation and transfer occurring in the metropolitan region

Infrastructure	Category of proposed infrastructure	General location	Material streams managed	Timeframe (likely commencement date/need date)	Reason for need	Other requirements
Reprocessor - organics	Options to be identified	Regional – location(s) to be determined	Municipal garden and food organics	Initial planning to commence 2016	200,000 projected tpa	
Reprocessor - organics, food	Options to be identified	Metrowide	Commercial food organics	Initial planning to commence 2016	To be determined	

The 2015 market assessment process indicated a range of technology types that are likely to be put forward in a procurement process, see Appendix B for further information on the market assessment process.

Notes

a The shortfall in local reprocessing for paper/cardboard is currently managed through export markets. This is expected to continue into the future.

b The shortfall in local reprocessing for plastics is currently managed through export markets. This is expected to continue into the future.

c Assumes all tyres recovered will be locally reprocessed

d Required capacity unspecified to preserve commercial in confidence

6 PART B: LANDFILLS

This section at a glance:

- The Metropolitan Implementation Plan seeks to increase the supply of viable resource recovery infrastructure to reduce pressure on existing landfills, and to reduce the need for new landfills.
- Table 11 shows the landfill sequence of filling existing landfills across a 30 year period.
- The metropolitan Melbourne region will not have sufficient landfilling capacity if any of the significant landfills, listed below, do not operate in accordance with this sequence. Significant landfills are those in a designated hub of state importance, and are:
  - SUEZ Hallam and SUEZ Lyndhurst
  - Cleanaway MRL Ravenhall
  - Hanson Landfill Wollert
  - Werribee Landfill.
- Even after landfills stop accepting waste and are closed, the environmental and human health risks, such as landfill gases and leachate, must still be managed. EPA Victoria regulates the rehabilitation of closed landfill sites.
- The closure of many landfills in the south east is an opportunity to make a step change in the way we think about and manage waste in the metropolitan Melbourne region. By prioritising resource recovery and establishing new and expanded infrastructure to recycle more, particularly organic waste, we are working to avoid scheduling additional landfills.
- This plan also identifies ways in which the impacts of existing landfills on communities can be limited, particularly from amenity issues relating to the disposing of organics to landfill.

The purpose of landfill scheduling is to:

- ensure metropolitan Melbourne has an adequate amount of landfill capacity to safely manage waste that is not recovered
- minimise the development and use of landfills for the management of waste in Victoria
- propose the sequence of filling of available sites for at least 10 years
- provide estimates on intended or likely closures dates
- report on the rehabilitation status of closed landfills
- ensure future landfill capacity needs are planned for to enable appropriate buffers to be known and defined.[19]

A proposed landfill must be listed on the landfill schedule before EPA Victoria can consider any works approval requests.

6.1 Existing landfills

The landfills listed in this schedule are existing landfills that are operating and accepting waste for disposal within metropolitan Melbourne (Table 10).

The schedule is required to cover at least a 10 year period. To provide greater transparency and certainty for land use planning decisions, this schedule extends to 30 years.

The likely closure date listed for existing landfills is an estimate of how long it would take to fill the maximum possible airspace available at each site. Estimate calculations are informed by:

- the information provided by landfill operators to MWRRG on available airspace
- MWRRG modelling and data projections for when each site is likely to be filled
- EPA Victoria license conditions and planning permits.

Providing the likely closure date is a statutory requirement of the schedule. The likely closure date helps inform long term planning by stating what landfill capacity is available within the existing network to meet Melbourne's needs. The actual timeframes and closure dates will depend on business decisions made by owners and operators, and whether the appropriate approvals are granted.

Site maps for scheduled landfills can be found at Appendix C. These maps identify landfill sites for the purpose of this Metropolitan Implementation Plan and are not necessarily EPA Victoria works approved and/or licensed boundaries.

[19]Guideline: Making, amending and integrating the Statewide Waste and Resource Recovery Infrastructure Plan and Resource Recovery Implementation Plans, DELWP, 2014

Table 10. Existing landfills

Site name	Location (Local Government Area)	Owner (and operator if different)	EPA Victoria Licence Number	Licenced waste types	Likely closure date*
Cleanaway-Heatherton Sands	101-157 Old Dandenong Road cnr Henry Street Heatherton (Kingston)	Cleanaway	14536	Solid inert waste Pneumatic automotive tyres shredded into pieces < 250mm in all dimensions	2014
Cleanaway-Clarinda Landfill	19-71 Carroll Road Clarinda (Kingston)	Cleanaway	12412	Solid inert waste Pneumatic automotive tyres shredded into pieces < 250mm in all dimensions	2015
Clayton Regional Landfill	654-718 Clayton Road Clayton South (Kingston)	Clayton Regional Joint Venture	11719/ ES 20872	Solid inert waste Putrescible waste Pneumatic automotive tyres shredded into pieces < 250mm in all dimensions	2016
Cleanaway-Deals Rd	Deals Road Clayton South (Kingston)	Cleanaway	12512	Solid inert waste Putrescible waste Waste acid sulphate soils	2017
Cleanaway-Victory Rd	3 Victory Road Clayton South (Kingston)	Cleanaway	12339	Solid inert waste Tyres shredded into pieces < 250mm	2017
Cleanaway-Fraser Rd	Fraser Road Clayton South (Kingston)	Cleanaway	9089	Solid inert waste Putrescible waste Tyres shredded into pieces < 250mm	2017
Rye Landfill	280 Truemans Road Fingal (Mornington Peninsula)	Mornington Peninsula Shire Council	67884	Solid Inert waste Putrescible waste Tyres shredded into pieces < 250mm Asbestos waste of domestic origin	2018
Western Land Reclamation	124 Jones Road Brooklyn (Brimbank)	Sunshine Group	11972	Solid inert waste Putrescible waste Pneumatic automotive tyres shredded into pieces < 250 mm in all dimensions Waste acid sulphate soils Asbestos waste of domestic origin Asbestos (All forms) Contaminated soil (Category C)	2020
Altona North Landfill	55 McArthurs Road Altona North (Hobsons Bay)	Altona North Landfill P/L	11940	Solid inert waste Tyres shredded into pieces < 250mm Waste acid sulfate soils	2020
BTQ Group-Sunbury	500 Sunbury Road Bulla (Hume)	BTQ Group P/L	11758	Solid inert waste Tyres shredded into pieces < 250mm Asbestos waste of domestic origin Asbestos all forms	2023
SBI-Cranbourne	950 Ballarto Road Cranbourne (Casey)	SBI	-	Solid inert waste	2025
Glen Landfill	75 Quarry Road Langwarrin (Frankston)	Glen Landfill P/L	11818	Solid inert waste Tyres shredded into pieces < 250mm	2025
Devil Bend Rockleigh	435 Balnarring Road Tuerong (Mornington Peninsula)	Grosvenor Lodge P/L	45248	Solid inert waste Tyres shredded into pieces < 250mm Asbestos waste of domestic origin Asbestos (all forms) Ceramic based fibres similar to asbestos	2025
Riddell Rd Sunbury Landfill	515 Riddell Road Sunbury (Hume)	Hume City Council	12450	Solid inert waste Putrescible waste Tyres shredded into pieces < 250mm	2030

Site name	Location (Local Government Area)	Owner (and operator if different)	EPA Victoria Licence Number	Licenced waste types	Likely closure date*
Barro Kealba	Lot 1 McIntyre Road Kealba (Brimbank)	Barro Group	80195	Solid inert waste Tyres shredded into pieces < 250 mm	2030
SUEZ-Hallam	274 Hallam Road Hampton Park (Casey)	SUEZ	74643	Solid inert waste Putrescible waste Pneumatic automotive tyres shredded into pieces < 250mm in all dimensions	2040
Cleanaway-MRL Ravenhall	1154-1198 Christies Road Ravenhall (Melton)	Cleanaway	12160	Solid inert waste Putrescible waste Tyres shredded into pieces < 250mm Contaminated soil (Category C)	Potential to operate beyond 2046
Werribee Landfill	420 Wests Road Werribee (Wyndham)	Wyndham City Council	12483	Solid inert waste Putrescible waste Tyres shredded into pieces < 250 mm	Potential to operate beyond 2046
SUEZ-Lyndhurst	890 Taylors Road Dandenong South (Greater Dandenong)	SUEZ	74643	Solid inert waste Putrescible waste Tyres shredded into pieces < 250mm Potential acid sulphate soils Contaminated soil (Category C) Various Prescribed waste: Cat B & Cat C	Potential to operate beyond 2046
Hanson–Wollert Landfill	45 Bridge Inn Road Wollert (Whittlesea)	Hanson Construction Materials P/L	12309	Solid inert waste Putrescible waste Asbestos waste of domestic origin Asbestos all forms Tyres shredded into pieces < 250mm Contaminated soil (Category C)	Potential to operate beyond 2046
Hi Quality-Bulla	600 Sunbury Road Bulla (Hume)	Hi Quality Quarry Products P/L	45279	Inert sludges/slurries Materials with PCBs (> 2 & < 50 mg/kg) Contaminated soil (Category C) Asbestos (all forms) Ceramic-based fibres similar to asbestos	Potential to operate beyond 2046

Notes to the schedule:

The BPEM provides for the classification of landfills according to the waste types they accept. EPA regulates the types of waste accepted at landfills through a licence. Only waste that are listed in a licence may be accepted at the landfill. A landfill is scheduled only for the waste listed in its licence. The information on waste types is accurate as at June 2016. A detailed description of waste accepted at each landfill can be found in the EPA licence.

Likely closure dates are estimated based on consideration of modelled tonnage projections and land available under current EPA Victoria works approval, planning and permit requirements and potential airspace that may eventuate at quarry based landfill sites. Final timeframes for landfill closures will depend on a range of business decisions made by owners and operators including the rate of fill and whether sites gain the appropriate approvals for additional available airspace.

Landfills that have used all available airspace for waste disposal will continue to receive clean fill and soils for the purposes of final contouring, capping, revegetation and rehabilitation. Closed landfills will move from this table to the closed landfill table when EPA Victoria issues a Post Closure Pollution Abatement Notice (PAN). Closed landfills may also need to undertake construction works for gas extraction and leachate management. This activity on the site is managed by EPA Victoria through Post Closure PAN's. Resource recovery activities may occur on landfill sites after a site ceases accepting waste for disposal providing the necessary planning approvals are in place.

Further details on rehabilitation of landfill sites, progressive rehabilitation of landfill cells and the management and monitoring of closed landfills can be found in Section 2 and the Best Practice Environmental Management Siting, Design, Operation and Rehabilitation of Landfills (Landfill BPEM). The Landfill BPEM notes in Section 8.1 'Rehabilitation requires a site aftercare management plan to be implemented for at least 30 years after the site stopped receiving waste'.

6.2 Sequencing fill of available airspace

This section sets out the location and sequence for the filling and operation of landfill sites over a 30 year period.

A 30 year period is provided to clearly show the sequencing of closures for landfills across Melbourne throughout this time and inform and align with other strategic planning strategies for Melbourne including Plan Melbourne, and the State Infrastructure Plan.

The metropolitan Melbourne region will not have sufficient landfilling capacity if any of the significant landfills, listed in Table 11, do not operate in accordance with this sequence. Significant landfills are those in a designated hub of state importance, and are:

- SUEZ Hallam and SUEZ Lyndhurst
- Cleanaway MRL Ravenhall
- Hanson Landfill Wollert
- Werribee Landfill.

If any of the above significant landfills sequenced in Table 11 ceases to operate prior to the likely closure date, new landfill capacity and/or significant resource recovery operations with an annual processing capacity similar to these existing significant landfills will need to be scheduled to meet Melbourne's needs. This additional capacity would be above and beyond the new required resource recovery infrastructure scheduled included in Table 9.

Werribee Landfill takes waste from Barwon South West Region; Riddle Road Landfill Sunbury currently takes waste from Loddon Mallee Region; and MRL Ravenhall is likely to take waste from Loddon Mallee Region. If for any reason landfills do not operate for the period they are sequenced other regional waste and resource recovery groups will need to plan alternative disposal options for regional waste flows into the Metropolitan region.

Landfills estimated for closure between 2016 and 2017 will continue to receive clean fill and soils for the purposes of final contouring, capping, revegetation and rehabilitation after ceasing accepting waste. This activity on the site is managed by EPA Victoria through Post Closure pollution abatement notices (PANs). Resource recovery activities may occur on a landfill site after a site ceases accepting waste for disposal providing the necessary planning approvals are in place.

This chapter should be read in conjunction with the landfill analysis outlined in Section 4.

Table 11. Metropolitan landfill sequence of fill*

Landfill / Year 2016-2046	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	Likely Closure Date
Cleanaway - Heatherton Sands Heatherton (14536)**																																2014
Cleanaway - Clarinda Landfill (12412)**																																2015
Clayton Regional Landfill - Clayton South (11719/ES 20872)**																																2016
Cleanaway - Deals Road Clayton South (12512)																																2017
Cleanaway - Victory Road Clayton South (12339)																																2017
Cleanaway - Fraser Road Clayton South(9089)																																2017
Rye landfill (67884)																																2018
Western Land Reclamation - Brooklyn (11972)																																2020
Altona North Landfill (11940)																																2020
BTQ Group - Sunbury (11758)																																2023
SBI - Cranbourne																																2025
Glen Landfill Langwarrin (11818)																																2025
Devil Bend Landfill - Tuerong (45248)																																2025
Riddell Rd Landfill Sunbury (12450)																																2030
Barro - Kealba (80195)																																2030
SUEZ - Hallam (74643)																																2040
Cleanaway - MRL Ravenhall (12160)[1]																																Potential to operate beyond 2046
Werribee Landfill (12483)[1]																																Potential to operate beyond 2046
SUEZ - Lyndhurst (74643)[1]																																Potential to operate beyond 2046
Hanson Landfill - Wollert (12309)[1]																																Potential to operate beyond 2046
Hi Quality – Bulla (45279)[1]																																Potential to operate beyond 2046

- Land use Planning Approved
- Works Approved and Planning Approved
- Intended /Likely Closure
- Airspace needing works and planning approvals

Footnote

*Sequence of fill is to be read in conjunction with:

- the landfill schedule set out in Table 10 which identifies the materials for which the landfills are scheduled and licenced and the Hub assessments (Table 15),
- existing resource recovery and reprocessing infrastructure (Section 2),
- future Resource Recovery Infrastructure requirements (Section 2).

The" likely closure date" in Table 11 is the date the site is likely to cease accepting waste at the site.

Landfills that have used all available airspace for waste disposal will continue to receive clean fill and soils for the purposes of final contouring, capping, revegetation and rehabilitation. Closed landfills will move from this table to the Closed Landfill Table (Table 12) when EPA Victoria issues a PC PAN. Further details on rehabilitation of landfill sites, progressive rehabilitation of landfill cells and the management and monitoring of closed landfills can be found in Section 2 and the Landfill BPEM. The Landfill BPEM notes in section 8.1 'Rehabilitation requires a site aftercare management plan to be implemented for at least 30 years after the site stopped receiving waste'.

** These landfills have ceased accepting new waste. EPA Victoria has not issued PC PANs to these sites. When EPA Victoria issues the PC PAN, these sites will move to the Closed Landfills table (Table 12).

[1] Landfills have potential to operate beyond 2046. It is acknowledged that due to their size and potential long term capacity, waste and/or resource recovery activities may continue at all sites beyond the current landfill schedule. In addition it is expected that, during this 30 year period and beyond, there will be changes in the need and ability of these sites to undertake resource recovery and disposal activities.

6.3 Potential new or expanded landfills

An objective of the Metropolitan Implementation Plan is to increase the supply of viable resource recovery infrastructure to reduce pressure on existing landfills, and to reduce the need for new landfills. This aligns with the:

- statutory requirement for the Metropolitan Implementation Plan to minimise the development of landfills
- State Infrastructure Plan strategic direction of maximising the diversion of recoverable materials from landfill.

As landfills in the south east close, increased infrastructure capacity will be needed to manage this shortfall. MWRRG's analysis indicates that the market has the appetite to deliver a resource recovery solution for Melbourne. This is a significant opportunity to achieve a step change in how we manage waste.

MWRRG's strategy for managing landfill closures is to boost resource recovery infrastructure. No new landfills are scheduled in this Metropolitan Implementation Plan.

The Action Plan (Section 1) sets out the pathway for delivering this boost in resource recovery infrastructure. The Victorian Government will need to test and confirm the market's readiness to invest in new resource recovery facilities through a metropolitan facilitated group procurement to accept, recover and, if needed, landfill metropolitan municipal residual waste.

However, it is critical that this infrastructure boost is established within the next 10 years, and prior to the likely closure of the SUEZ Hallam landfill in 2040.

MWRRG will undertake a review of this Metropolitan Implementation Plan (including the Landfill Schedule) in 2019, to identify and confirm that there is a strong pipeline of infrastructure projects that can achieve the resource recovery capacity boost indicated in the schedule for future resource recovery (Table 9), and the actions listed in Section 1. If that review indicates the required infrastructure is not likely to be in place within 10 years, MWRRG will commence the process of scheduling new landfill/s and identifying work required to continue to build resource recovery capacity.

6.4 Closed landfills

Even after landfills stop accepting waste and are closed, the environmental and human health risks, such as landfill gases and leachate, must still be managed. These risks can remain active for many years after closure. EPA Victoria regulates the rehabilitation of closed landfill sites. There are a number of policies, guidelines and tools used to achieve this, including the Landfill BPEM and post-closure Pollution Abatement Notices.

EPA Victoria requires operating landfills to be progressively rehabilitated in accordance with the Landfill BPEM. Progressive rehabilitation of a landfill involves the closure and rehabilitation of each cell once filling has been completed, while other cells on the site can still be active and accept waste.

Buffer distances required during the operation of a landfill remain during the post-closure period to ensure any development of the landfill site and any proposed use or development in the buffer area addresses these risks. A 500 metre buffer for former putrescible landfills and a 200 metre buffer for former solid inert landfill apply during the 30 year post-closure period.

MWRRG expects the operators of all closed landfills to meet their EPA Victoria obligations and to communicate effectively with adjoining communities on the progress of rehabilitation and possible future uses of the site.

Table 12 details the 48 sites identified as closed landfills. They are all managed and regulated under EPA Victoria statutory tools. The date EPA Victoria started to manage them as 'closed landfills' is listed in Table 12. These closed landfills do not accept waste but may continue to receive clean fill and soils to undertake capping and rehabilitation work after these dates, as permitted by EPA Victoria. The information on the status of closed landfills was current as at December 2015.

Table 12. Closed landfills

Address	Local Government Area	Duty holder	EPA Victoria Statutory rehabilitation tool	Date EPA Victoria began managing the landfill as a Closed Landfill
Fritzch Holzer Park Rose Street, Hawthorn, 3122	Boroondara City Council	Boroondara City Council	PAN	1995
594 Geelong Rd (Cnr McDonald Rd), Brooklyn, 3012	Brimbank City Council	Andrew James Hewson; and Andrew Henry Hewson Trading as Andy's Autos	PC PAN	2002
Bunting Road Brooklyn, 3012	Brimbank City Council	Andrew James Hewson; and Andrew Henry Hewson Trading as Andy's Autos	PC PAN	2000
Carrington Drive Reserve and Sunshine Energy Park Hulett St, Sunshine, 3020	Brimbank City Council	Brimbank City Council	PC PAN	2013
Green Gully Road, Keilor Downs, 3038	Brimbank City Council	Brimbank City Council	PC PAN	2001
Cnr Annandale Road & Arundel Road, Keilor,3036	Brimbank City Council	Calleja Properties Pty Ltd	Licence	2006
44-60 McDonald Road, Brooklyn, 3012	Brimbank City Council	SIMS Group Australia Holdings Ltd	PC PAN	2011
(Old Geelong Road) Western Side of Jones Road, Brooklyn, 3012	Brimbank City Council	Cleanaway	Licence	2013
52-60 Market Rd, Brooklyn, 3012	Brimbank City Council	Cleanaway	PC PAN	2013
Five Mile Road, Nar Nar Goon, 3812	Cardinia Shire Council	Cardinia Shire Council	PC PAN	2001
Stevenson's Road, Cranbourne,	Casey City Council	Casey City Council	PC PAN	2012
Quarry Road, Narre Warren North, 3804	Casey City Council	Casey City Council	PC PAN	1997
All Nations Park, Cnr Clifton St & Wales St, Northcote, 3070	Darebin City Council	Darebin City Council	PC PAN	2003
Lot 87, Newlands Road, Reservoir, 3058	Darebin City Council	University Meat Supply Pty Ltd	PC PAN	1999
McClellend Drive, Frankston, 3199	Frankston City Council	Frankston City Council	PC PAN	2001
Clarke Road Springvale South, 3172	Greater Dandenong City Council	Glynlee Pty Ltd	PC PAN	2010
Former Spring Valley Landfill, East side of Clarke Road, Springvale South, 3175	Greater Dandenong City Council	Greater Dandenong City Council	PC PAN	2004
185 Dandenong-Hastings Road, Dandenong South, 3175	Greater Dandenong City Council	Lyndcadle Pty Ltd	PC PAN	2012
Queen Street, Altona, 3018	Hobsons Bay City Council	Hobsons Bay City Council	PC PAN	1999

Address	Local Government Area	Duty holder	EPA Victoria Statutory rehabilitation tool	Date EPA Victoria began managing the landfill as a Closed Landfill
Kyle Road, Altona North, 3025	Hobsons Bay City Council	Kyle Road Developments Pty Ltd	PC PAN	2008
Cnr Bolinda Road & Sydney Road, Campbellfield, 3061	Hume City Council	Hume City Council	Licence	2013
Mahoney's Road, Campbellfield, 3061	Hume City Council	Hume City Council	PC PAN	1991
Craigieburn Road, Craigieburn, 3064	Hume City Council	Hume City Council	PC PAN	1996
206-300 Western Avenue, Melbourne Airport, 3043	Hume City Council	(Transpacific Waste Management Pty Ltd) now Cleanaway	PC PAN	2009
Ryans Road, Clayton South, 3169	Kingston City Council	Brambles Australia Ltd	PC PAN	2002
Cnr Clayton Rd & Ryans Rd, Clayton South, 3169	Kingston City Council	Brambles Australia Ltd	PC PAN	2003
370-418 Old Dandenong Road, Dingley Village, 3172	Kingston City Council	Ernest Smith Contractors Pty Ltd (Trading as DinSan Nurseries)	PC PAN Pending	2013
Heatherton Park, 623-633 Heatherton Rd, Clayton South, 3169	Kingston City Council	Kingston City Council	PC PAN Pending	2014
167-189 Spring Road, Dingley Village, 3172	Kingston City Council	Kingston City Council	PC PAN Pending	2013
Scotch Parade/Argyle Avenue, Chelsea, 3196	Kingston City Council	Kingston City Council	PC PAN	2002
Lot 8 Elder Street, Clayton South	Kingston City Council	Whelan Cartaway PTY	PC PAN	2002
Cathies Lane, 1180 High Street Road, Wantirna South, 3152	Knox City Council	Knox City Council	Licence	2013
Llewellyn Park, 14 Coppelia Street, Wantirna South, 3152	Knox City Council	Knox City Council	PC PAN	2003
Former James Hardie Landfill, Hardie Road, Brooklyn, 3025	Maribyrnong City Council	Cawley Road Pty Ltd	PC PAN	2001
Quarry Park Farnsworth Avenue, Footscray, 3011	Maribyrnong City Council	Maribyrnong City Council	MRA PAN	1993
2-26 Ferris Road, Melton, 3337	Melton City Council	Harness Racing Victoria	MRA PAN	2013
Reg Harris Reserve, Ferntree Gully Road, Oakleigh East, 3166	Monash City Council	Monash City Council	MRA PAN	2014
2 Lens St, Crib Point, 3919	Mornington Peninsula Shire Council	Mornington Peninsula Shire Council	PC PAN	2003
450 A Moorooduc Hwy, Mt Eliza, 3930	Mornington Peninsula Shire Council	Mornington Peninsula Shire Council	PC PAN	2003
113–119 Trueman's Rd, Rosebud, 3969	Mornington Peninsula Shire Council	Mornington Peninsula Shire Council	PC PAN	2003

Address	Local Government Area	Duty holder	EPA Victoria Statutory rehabilitation tool	Date EPA Victoria began managing the landfill as a Closed Landfill
15 McKirdy's Road, Tyabb, 3913	Mornington Peninsula Shire Council	Mornington Peninsula Shire Council	PAN	2003
Nillumbik Shire Council, Depot, Yan Yean Road, Yarrambat, 3091	Nillumbik Shire Council	Nillumbik Shire Council	Licence	2013
105 Graham Road, Kangaroo Ground, 3097	Nillumbik Shire Council	Nillumbik Shire Council	PC PAN	2007
Phileo Federation St, Box Hill	Whitehorse City Council	Whitehorse City Council	PC PAN	2000
Cooper Street, No. 1500 Cooper Street, Epping, 3076	Whittlesea City Council	Whittlesea City Council	PC PAN	1992
500 Cooper Street, Epping, 3076	Whittlesea City Council	Whittlesea City Council	PC PAN	2007
Mount Riddel Road, Healesville, 3777	Yarra Ranges City Council	Yarra Ranges City Council	Licence	2013
Cnr Ingram Road & Leonard Road, Coldstream, 3770	Yarra Ranges City Council	Yarra Ranges City Council	Licence	2012

Note
Details on the statutory tools listed in this table can be found at www.epa.vic.gov.au

6.4.1 Replacing and rehabilitating landfill sites

Local communities, local government, other planning authorities and landfill site owners all have an important role to play in considering the future use of closed and rehabilitated landfill sites. The closure of landfills are welcomed by some communities who may look forward to the site eventually being used for such things as a public open space. Other communities may support local government and business efforts to retain some type of resource recovery operations on the site that contribute productively and appropriately to the local area.

Former, rehabilitated landfill sites cannot support a full range of uses. Planning authorities and landfill owners should work together and in consultation with the local community to clearly articulate the plans for rehabilitation and potential reuse of closed landfill sites, and post rehabilitation land use options. Developing a site master plan for closed and rehabilitating landfill sites is one way to inform the future use and development of closed and closing landfills, and any other land that is located within a landfill site's buffer separation distances.

The Local Planning Policy Framework of planning schemes could give effect to site master plans to guide the zoning and overlays applied to the land, as well as decision making on planning permit applications on closed landfill sites and land in their buffer separation distances. The use and development of closed landfills and rehabilitated sites can then be considered on their merits appropriate to an assessment of risk, site conditions and any special conditions for development and use of the land.

6.4.2 Kingston Closed Landfill Precinct strategy

The Kingston Closed Landfill Precinct forms part of the Clayton South Hub[20] identified as a 'hub of state importance' in the State Infrastructure Plan (these hubs are discussed in Section 3. The Kingston Closed Landfill Precinct is a significant area of land that is occupied by closed and closing landfills and is undergoing rehabilitation. The core of this precinct is the land located to the north of Kingston and Heatherton Roads, however there are also substantial closed landfill sites within the Clayton South Hub to the south east and north west. As the use and development of closed landfills and surrounding land is constrained, the future use and development of this precinct needs to be managed.

By the end of 2017, both council and privately owned and managed landfills within this precinct will cease accepting new waste and all landfill sites will have commenced rehabilitation. Details of these sites are set out in Table 13 below.

There are a number of policies and planning tools influencing these sites including the Landfill BPEM, Environmental Audit Overlay and Environmental Significance Overlay. These help inform future developments to ensure risks are identified, considered and managed. These tools specify that buffer distances must be maintained between a landfill site and sensitive land uses; and risks assessments must be prepared to inform possible future uses.

Opportunities to manage the future use and development of land within the Kingston Closed Landfill Precinct include undertaking a strategic planning approach that includes preparing precinct master plans and master plans for individual sites. MWRRG supports this approach. There is also the opportunity to extend the use of planning scheme overlays (currently applied to the core of the precinct to the

[20]Part of the land identified in the Clayton South Hub that is outside the urban growth boundary and within the South East Green Wedge has now been rezoned to Green Wedge A through Amendment C143

north of Kingston and Heatherton Roads) to the broader closed landfill precinct.

A precinct master plan could be prepared by the relevant planning authority to inform the future use and development of the closed and closing landfills, as well as other land located within their buffer separation distances. In consultation with community and industry, this master plan could identify the types of uses and nature of development that may be suitable within the precinct. This needs to consider relevant EPA Victoria policies and guidelines and associated restrictions on the use and development of closed landfills land within their associated buffer separation distances. The Local Planning Policy Framework of the Kingston Planning Scheme could give effect to a precinct master plan to guide the zoning and overlays applied to the land and decision making on planning permit applications.

At a site level, master plans could be developed to provide the long term plan for the use and development of individual landfill sites. The requirement for a master plan to be prepared by a site owner could be facilitated through the application of an appropriate planning scheme overlay, such as a Development Plan Overlay or an Incorporated Plan Overlay.

MWRRG's Local Buffer Support Program is developing a suite of measures to define, protect and maintain buffer areas around waste and resource recovery facilities. These buffer protection measures may further inform land use planning approaches within this closed landfill precinct.

Table 13 Landfills closing or closed in the Kingston Closed Landfill Precinct

Site	Waste Stream & Closure Date	Buffer	Status/After use
Cleanaway – Deals Road (12512)	Putrescible and solid inert Closed 2010. Final contouring 2017	500	EPA Victoria confirmation of landfill closure. Post closure Pollution Abatement Notice (PAN) is being prepared. EPA Victoria Application to reopen in 2015-16 for solid inert to reach final contours. New contour plans are being issued and closure works commenced. Cleanaway estimates rehabilitation commencing 2017.
Cleanaway – Henry Street (Heatherton Sands) (14536)	Inert waste only. Closed 2014.	250	This is a solid inert landfill that has closed. The site has commenced rehabilitation .
Clarinda Landfill Carroll Road (12412)	Inert waste only To close 2015	250	Site being progressively rehabilitated. The last remaining cell closed in 2015.
Victory Road (12339)	Inert waste only. To close 2017	250	The landfill operates in a former quarry site ('area filling' method). Cleanaway estimates a 2017 closure and hand back to City of Kingston in 2018 who own the site. The site is to form part of the 'chain of parks' and as sections of the land are filled and remediated they are planned to be opened to the public as parkland. The first section opened in 2015 was on the Clayton Road and Leslie Road frontages.
Fraser Road (9089)	Putrescible and solid inert To close 2017	500	This site is estimated to cease accepting new waste in 2017. The site will be home to significant transfer and resource recovery facilities.
Clayton Regional Landfill (ES 20872)	Putrescible and solid inert waste Closed 2015	500	The landfill operated in a former quarry site ('area filling' method) surrounded by industrial and residential land. The Clayton Regional Landfill Joint Venture closed the landfill in 2015 and commenced post closure operations, and has closed the transfer station and resource recovery activity in early 2016.
Ernest Smith Contractors (ES 146)	Inert waste only Closed 2012	250	Site has closed. EPA Victoria has confirmed closure and post closure PAN is being issued.

Footnote
The closure of the landfills above represents a significant opportunity to make a step change in the way we think about and manage waste in the metropolitan Melbourne region. By prioritising resource recovery and establishing new and expanded infrastructure to recycle more, particularly organic waste, we are planning to avoid scheduling additional landfills.

SECTION 3: LAND USE PLANNING, SITING AND TRANSPORT

7 INTEGRATED PLANNING AND DECISION MAKING

This section at a glance:

- Land use planning, transport planning and waste and resource recovery infrastructure planning need to be carried out in an integrated way.
- MWRRG will inform and collaborate with local government and planning authorities to ensure the Metropolitan Implementation Plan objectives and Infrastructure Schedule are understood and considered in land use planning policy development and decision making.
- MWRRG will use its facilitated collective procurements with local government and infrastructure providers to encourage best practice operations, community engagement and that a culture of continuous improvement guides the development of the waste and resource recovery network.
- Identifying specific sites for locating future waste and resource recovery infrastructure is guided by a number of environmental and land use planning requirements.
- Land use planning decision makers need to assess the transport network impacts in considering any expansion or new waste and resource recovery operations.

MWRRG has a legislative role to plan for the future needs of waste and resource recovery infrastructure. Ensuring Melbourne has the right infrastructure, in the right locations, that are permitted to operate to meet growing community needs, is a key challenge. The Metropolitan Implementation Plan's four key strategic objectives discussed in Section 1 seek to address this challenge.

Land use planning, transport planning and waste and resource recovery infrastructure planning need to be carried out in an integrated way.

The Victorian Waste and Resource Recovery Infrastructure Planning Framework provides the direction for achieving this through the State Infrastructure Plan and the metropolitan and regional implementation plans.

In developing the Metropolitan Implementation Plan MWRRG has considered relevant land use and transport planning legislation, policy and strategies and impacts on the transport network.

7.1 Steps required to align the Infrastructure Schedule with local planning schemes

The *Planning and Environment Act 1987* establishes a framework for planning the use, development and protection of land in Victoria in the present and long term interests of all Victorians.

Victoria's land use planning system is underpinned by the Plan Melbourne 2014 strategy and the regional growth plans. Plan Melbourne 2014 has a key role in addressing how the land use planning and transport system will respond to a growing and aging population, a changing economy and climate, the demands of providing infrastructure across a greater area to more people and meeting demands for diverse housing. There is a current Plan Melbourne refresh underway that is not intended to comprehensively revise Plan Melbourne 2014. Plan Melbourne includes a vision for Melbourne based on key transport, housing and environment elements that includes a specific direction to plan for better waste management and resource recovery.

Under Victoria's planning system local councils and the Victorian Government develop planning schemes to control the use and development of land. Planning schemes contain the State Planning Policy Framework (SPPF). These are policies concerned with issues important to the state and are statements that guide how land use planning decisions will be made. The SPPF at Clause 19.03-5 includes a specific waste and resource recovery policy. Its objective is to avoid, minimise and generate less waste to reduce environmental impacts of waste. The purpose of state policy is to inform planning decision making.

The SPPF provides the mechanism for alignment between the Metropolitan Implementation Plan and planning schemes. State agencies, councils, owners and developers of land are obliged to consider the Metropolitan Implementation Plan in their decision making including planning permit decisions, planning scheme amendments, strategic planning and growth area planning.

Where the schedule identifies potential future infrastructure in the metropolitan region, it is noted that all future infrastructure will need to obtain the necessary planning permits and other approvals, the obligation for which lies with the infrastructure proponent. MWRRG considers that the granting of a planning permit represents alignment with the local planning scheme, and where necessary will aid both the infrastructure proponent and local government in the consideration of infrastructure proposals.

MWRRG will inform and collaborate with local government and planning authorities to ensure the Metropolitan Implementation Plan objectives and Infrastructure Schedule are understood and considered in land use planning policy development and decision making. MWRRG has consulted with all local governments within its jurisdictions in the drafting of this plan, see Appendix B for detail on consultation processes.

Specifically MWRRG will:

- work with local governments and state authorities to ensure they consider the Infrastructure Schedule in their strategic planning and can use a range of planning tools to align the schedule with the planning scheme
- work with infrastructure proponents, local governments and communities to ensure future infrastructure developments are in line with the Infrastructure Schedule, best practice community engagement is demonstrated and the proposed site is appropriately zoned and protected
- work with local governments, planning authorities, Sustainability Victoria, EPA Victoria and communities to implement buffer protection measures around infrastructure sites considered to be important hubs.

7.2 Amenity impacts and best practice

Waste and resource recovery infrastructure and activities can affect the liveability of local communities through impacts from odour, dust, noise, litter, gas emissions and the release of pollutants into surface and groundwater. These impacts can, and should, be minimised and managed by ensuring infrastructure and activities are managed according to all regulatory requirements and to best practice standards.

The Metropolitan Implementation Plan will ensure a collaborative approach between governments, industry and community to promote best practice. MWRRG will use its facilitated collective procurements with local government and infrastructure providers to encourage best practice operations, community engagement and that a culture of continuous improvement guides the development of the waste and resource recovery network.

MWRRG will recommend the use of EPA Victoria's guidance on best practice operations-*Demonstrating Best Practice* (Publication 1517 Feb 2013) as a reference. This guideline focuses on the implementation of 'best practicable' measures to manage emissions and discharges to air, land, surface water or groundwater. The guidelines purpose is to assist in the understanding and meeting of State Environment Protection Policies (SEPP's) best practice requirements. The guideline uses the SEPP (Air Quality Management) definition of best practice to mean: *"the best combination of eco-efficient techniques, methods, processes or technology used in an industry sector or activity that demonstrably minimises the environmental impacts of a generator of emissions in an industry sector or activity"*.

Case study: Brimbank Amendment C177 Brooklyn Industrial and Commercial Precinct: Addressing amenity impacts and promoting best practice

The Brooklyn Industrial and Commercial Precinct is an area bound by Sunshine Road, Geelong Road, the Western Ring Road and the rear of industrial properties on Somerville Road. Traditionally this area has been used for heavy industrial and resource recovery uses and is mainly zoned Industrial 1. These activities have generated significant dust and odour impacts, particularly on the residential area to the south. EPA Victoria's air quality monitoring over a number of years has shown a significant number of exceedances of the accepted state standard for particle pollution and there have been odour complaints reported.

The City of Brimbank through the Brooklyn Evolution (2012) Initiative, articulates a vision and long term plan for the precinct including upgrading the infrastructure and enhancing the image of precinct to improve its attractiveness to new businesses.

To achieve this, the City of Brimbank prepared Amendment C177 to the Brimbank Planning Scheme. This amendment introduces a policy direction for the Brooklyn Industrial and Commercial Precinct into its Municipal Strategic Statement (MSS), applies a Design and Development Overlay to the Precinct, and rezones land along part of Geelong Road to Commercial 2 Zone.

The policy direction seeks to support the City of Brimbank's vision for the precinct to develop as a high quality business and industrial hub, strengthening and consolidating Brooklyn's role as a location for transport, logistics and distribution, manufacturing, wholesale industries and resource recovery and recycling industries. This includes improving the Geelong Road interface by encouraging office, showroom and large format retailing. The policy also aims to reduce amenity impacts and includes a specific strategy to promote best practice resource recovery. Amenity impacts will be reduced by promoting best practice for site operations including sealing of sites, provision of dust management plans, enclosing storage areas, and developing guidelines to improve the amenity and appearance of the precinct. To date the council and EPA Victoria have pursued a range of improvements to the area including sealing roads, tree planting, and working with site operators to improve operations.

7.3 Siting future infrastructure

The State Infrastructure Plan summarises the land use planning challenge as *"making suitably zoned land available for waste and resource recovery activities for the lifetime of industry investment"*. This requires planning to ensure there is well located land available with appropriate buffers and other mechanisms in place to protect sites from encroachment by incompatible land uses and the amenity of the surrounding community.

This Metropolitan Implementation Plan identifies the type and general location of waste and resource recovery infrastructure likely to be required in the future to meet our recycling and waste management needs.

Identifying specific sites for locating future waste and resource recovery infrastructure is guided by a number of environmental and land use planning requirements. At the highest level, these requirements seek to protect the environment and communities from potential adverse impacts, such as dust, noise, traffic, odours, landfill gas migration and leachates. Figure 3 and Figure 4 demonstrate the high level logic and application of these considerations. MWRRG will apply this logic in conjunction with best practice community engagement to its procurement, strategic planning and to implementing the Infrastructure Schedule.

Applying this approach will help to protect communities and the environment from potential adverse impacts and give the operators of future waste and resource recovery infrastructure confidence to operate their facilities over the long term. Siting of waste and resource recovery infrastructure in close proximity to end markets can provide employment opportunities and offer opportunities for the co-location of alternative resource recovery facilities with other sectors (e.g. co-locating organics treatment facilities on water treatment sites). This approach is consistent with the *Victorian Organics Resource Recovery Strategy*.

Figure 3. Logic for considering potential new resource recovery infrastructure sites

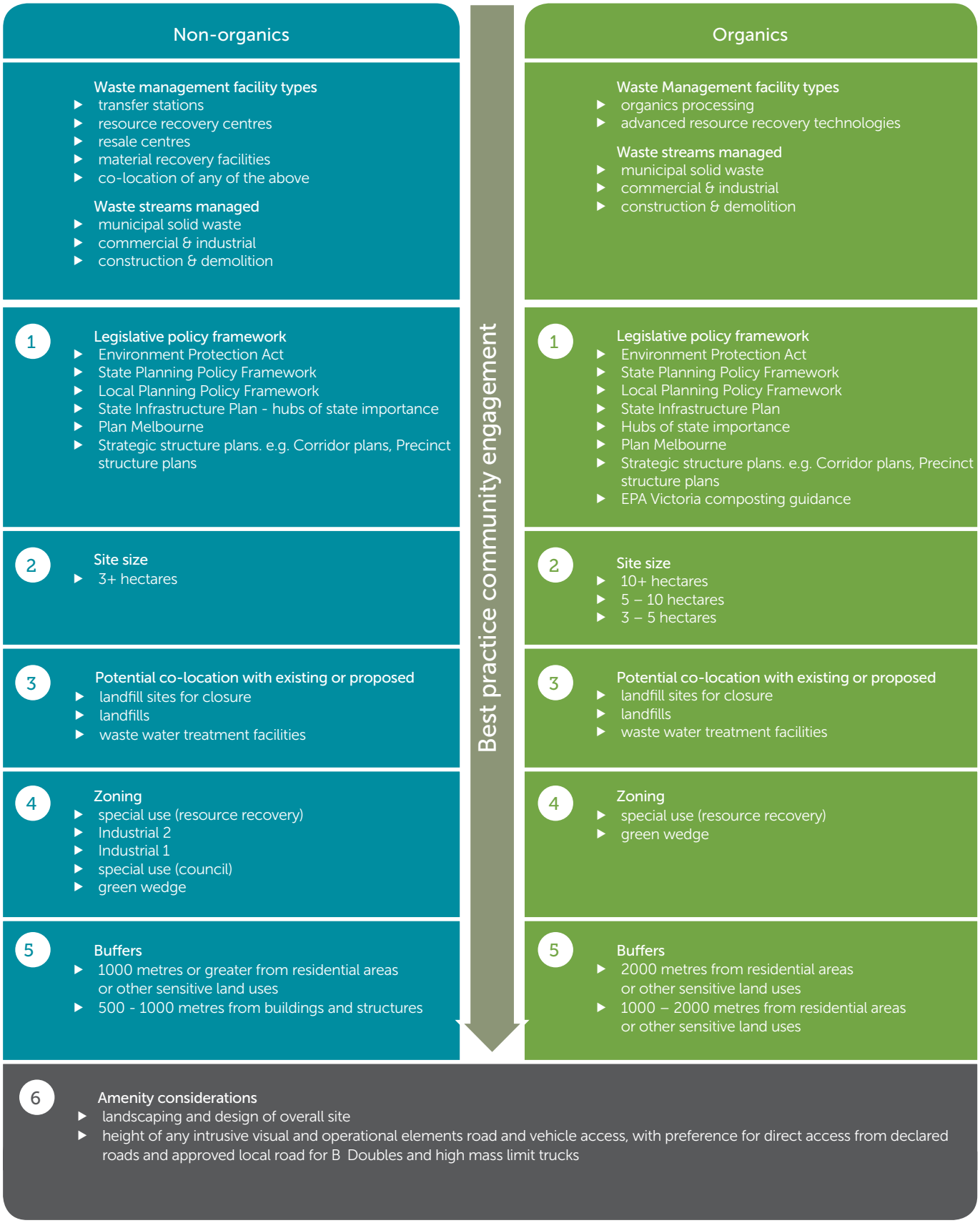
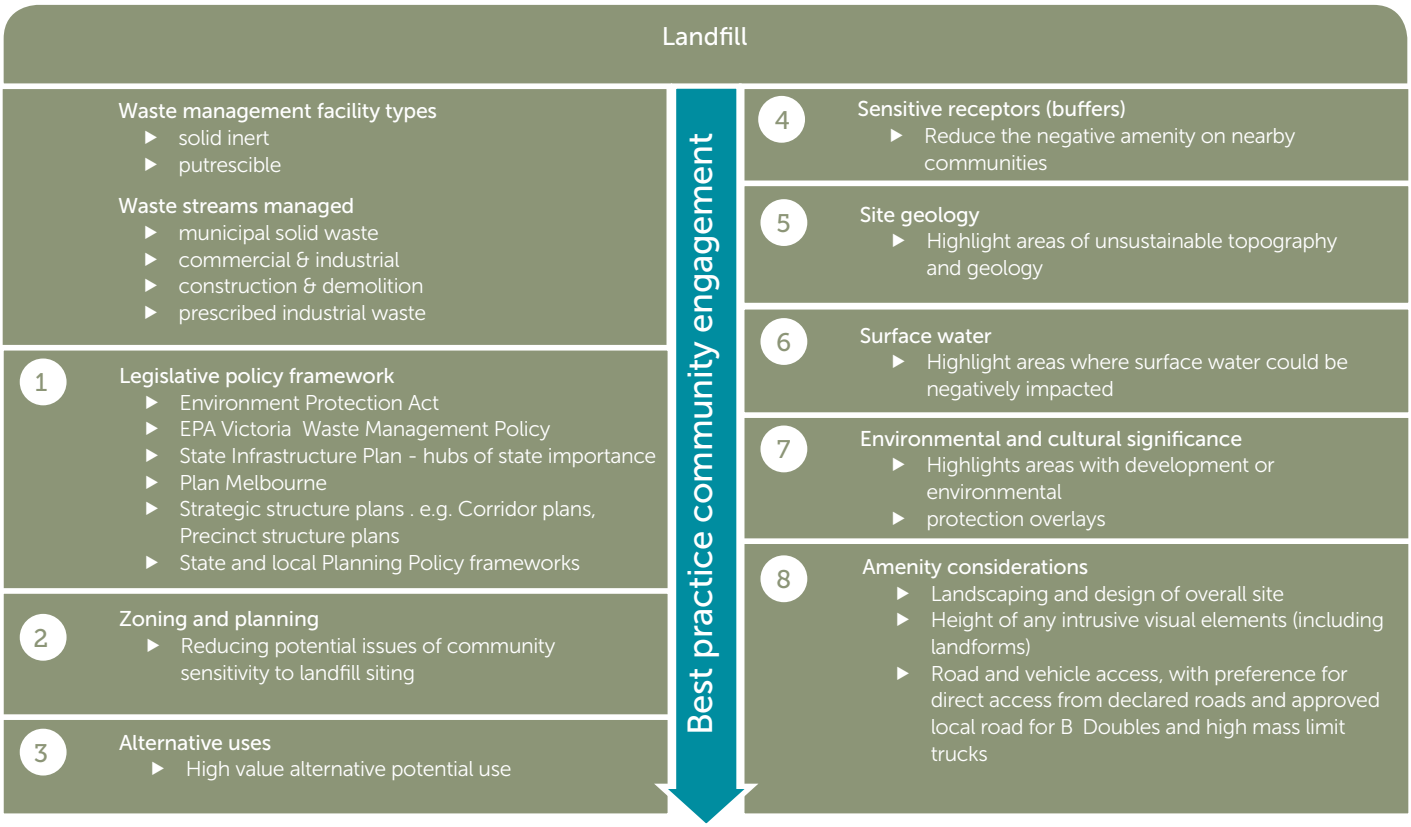


Figure 4. Logic for considering potential new landfill sites



7.4 Transport planning

Land use and transport planning associated with the waste and recovery system are interdependent and an understanding of these interdependencies is important. Facilities can be constrained by inadequate access to the road network and congestion.

The *Transport Integration Act 2010* (TI Act) seeks to ensure integrated decision making and ensure that the transport system facilitates economic prosperity by enabling efficient and effective access for persons and goods to places of employment, markets and services. The transport system should also provide for the effective integration of transport and land use decision making and facilitate access to social and economic opportunities.

The TI Act seeks to also ensure that transport decisions are made having regard to the current and future impact on land use. Transport infrastructure and services need to be provided in a timely manner to support changing land use and associated transport demand. The transport system should also improve the amenity of communities and minimise impacts of the transport system on adjacent land uses.

This is particularly relevant to the waste sector and supporting the metropolitan resource recovery, transfer and disposal network outlined in this Metropolitan Implementation Plan. MWRRG has actively considered the impacts of the waste and resource recovery system on the transport network. Future considerations for hubs of state importance has also actively considered transport system needs.

The State Infrastructure Plan analyses the contribution to congestion made by municipal kerbside collections up until their first destination point (e.g. transfer station, landfill, Material Recovery Facility). The cost to the Victorian economy of increased congestion resulting from this movement was calculated to be around $2.5 million annually. It should be noted that this analysis focused only on the first destination for the waste collected and excluded C&I or C&D sectors which account for more than 75% of the approximately 10.433 million tonnes of waste managed in the metropolitan region. The State Infrastructure Plan provides further detail on the economic and transport impacts in Section 3.

The Metropolitan Implementation Plan seeks to prioritise resource recovery activities and establish new and expanded recycling infrastructure rather than relying on landfilling. New landfills to replace those progressively closing in the south east over the next 3-20 years are not scheduled in this plan and MWRRG has assessed the impact of this scenario on the transport network.

The movement of waste and resources from the point where it is generated to facilities that manage the waste, can have impacts at the local community level. Many truck movements can cause localised congestion, as well as noise and odour issues. Facilities with good access to the freight network may have a greater chance of minimising local transport impacts and costs.

Our research and analysis has highlighted that transporting waste can have significant impacts on the local road network, local amenity and congestion. Land use planning decision makers need to assess the

transport network impacts in considering any expansion or new waste and resource recovery operations. Decision makers need to consider how sites can be accessed via roads that are part of the principal freight network and reduce the need to impact local streets and residential neighbourhoods.

MWRRG explored and compared congestion costs of waste and resource recovery and found compared to all other vehicles on the road in Victoria, municipal collections constitute less than 0.2% of the overall congestion costs in Victoria. It is unlikely that any increase in waste transported across Melbourne for waste and resource recovery will adversely impact the principal freight and transport network as this waste is a relatively small component of the metropolitan freight task.

8 WASTE AND RESOURCE RECOVERY HUBS

This section at a glance:

- The State Infrastructure Plan has identified existing waste and resource recovery hubs – a facility or group of facilities that manage or recover waste or materials.
- There are 14 hubs of state importance within metropolitan Melbourne.
- MWRRG supports working with local government, industry and communities using a range of planning and non-planning tools to ensure hubs are planned and developed in an integrated way.

8.1 Waste and resource recovery hubs

The State Infrastructure Plan has identified existing waste and resource recovery hubs. The State Infrastructure Plan defines a waste and resource recovery hub as a facility or group of facilities that manage or recover waste or materials. It defines an ideal hub as:

- having appropriate buffers to support the waste and resource activities occurring at the site
- having well established feeding spokes and good access to transport networks
- being co-located or in close proximity to complementary activities that provide feedstocks or markets for the products and services made from the activities, or that share and utilise the same buffers
- being viable, minimising community, environmental and public health impacts and contributing to the local and state economy.

In addition MWRRG considers that hubs can also provide opportunities to promote industrial ecology, consolidation of material streams and to achieve economies of scale and best practice waste and resource recovery operations. Industrial ecology is an important element to implement a circular economy for metropolitan Melbourne.

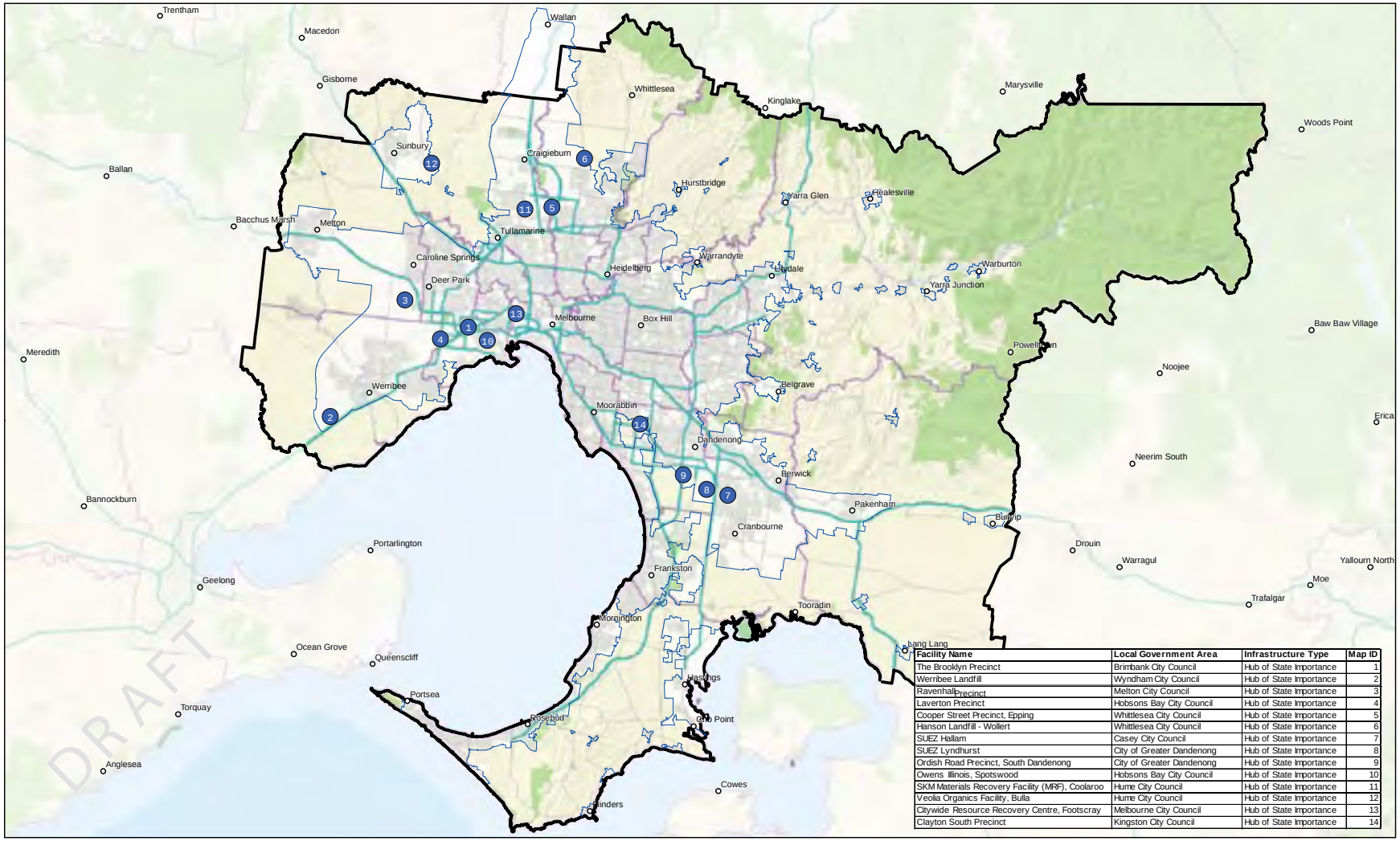
The State Infrastructure Plan notes that future planning for waste and resource recovery will:

- optimise the location of hubs so that impacts on community and the environment are minimised, and contributions to local and state economies are maximised
- encourage the co-location of compatible activities that can support and enhance the ability to increase recovery and improve management of waste.

The State Infrastructure Plan identified 14 hubs of state importance within metropolitan Melbourne (Figure 5).

The State Infrastructure Plan also establishes criteria for local, metropolitan and state hubs detailed in Table 14.

Figure 5. Map of metropolitan hubs of state importance



Facility Name	Local Government Area	Infrastructure Type	Map ID
The Brooklyn Precinct	Brimbank City Council	Hub of State Importance	1
Werribee Landfill	Wyndham City Council	Hub of State Importance	2
Ravenhall Precinct	Melton City Council	Hub of State Importance	3
Laverton Precinct	Hobsons Bay City Council	Hub of State Importance	4
Cooper Street Precinct, Epping	Whittlesea City Council	Hub of State Importance	5
Hanson Landfill - Wollert	Whittlesea City Council	Hub of State Importance	6
SUEZ Hallam	Casey City Council	Hub of State Importance	7
SUEZ Lyndhurst	City of Greater Dandenong	Hub of State Importance	8
Ordish Road Precinct, South Dandenong	City of Greater Dandenong	Hub of State Importance	9
Owens Illinois, Spotswood	Hobsons Bay City Council	Hub of State Importance	10
SKM Materials Recovery Facility (MRF), Coolaroo	Hume City Council	Hub of State Importance	11
Veolia Organics Facility, Bulla	Hume City Council	Hub of State Importance	12
Citywide Resource Recovery Centre, Footscray	Melbourne City Council	Hub of State Importance	13
Clayton South Precinct	Kingston City Council	Hub of State Importance	14

Paper Size A3

0 2.5 5 10 15 20

Kilometres

LEGEND

Hub of State Importance

Study Area Boundary

Principal Freight Network

Urban Growth Boundary (UGB)

Major Roads

Major Watercourses

LGA Boundaries

Major Water Areas

Residential Areas

Parks and Reserves

Table 14. State Infrastructure Plan waste and resource recovery hubs criteria

Local hubs	Are the first point of consolidation and local recovery for the community. They are likely to include transfer stations, resource recovery centres and resale shops. Due to the increasing cost of operating, managing and rehabilitating best practice landfills, over time local hubs are unlikely to include landfills. They will probably include the ability to pre-sort and consolidate local residual waste streams prior to transport for recovery or landfill.
Regional hubs	Service both their local area and their region. They receive material streams from surrounding local hubs and their local area. They most likely include a higher order of infrastructure and include one or more facilities undertaking sorting and/or recovery and possibly reprocessing. Regional landfill hubs undertake pre-sorting and some recovery before best practice residual waste management.
State hubs	Provide a service to the local area, region and state. They receive consolidated material streams from both local and regional hubs and undertake higher order recovery, reprocessing or management. They can be one facility or a number of facilities that support each other.

Sustainability Victoria is developing a strategy to further define and guide the use of hubs. MWRRG will support its development and implementation. In line with this strategy, MWRRG will identify and help plan regional hubs across the metropolitan region.

8.1.1 Delivering community benefits through planning and managing hubs

MWRRG acknowledges the challenges of managing the use and development of land in and around hubs for local government, industry and local communities. MWRRG considers that a best practice approach to the design and operation of facilities in a hub can strengthen security of tenure, promote consolidation of material streams, and attract investment while minimising impacts on local communities, public health and the environment. MWRRG supports working with EPA Victoria, local government and industry to promote and ensure best practice operations across the waste and resource recovery sector for both existing operations and new infrastructure.

MWRRG also supports working with local government, industry and communities using a range of planning and non-planning tools to ensure hubs are planned and developed in an integrated way. This includes:

- developing plans for hubs of state importance that set out objectives and strategies to manage development and change over time and that reference the importance of resource recovery and waste facilities in an area
- developing a shared vision for a hub to support ongoing community and stakeholder engagement. This vision could outline a hub's ongoing role and function, measures to support improved operations, and guide land use planning decision making around future growth and redevelopment
- supporting investment facilitation to focus investment around hubs as well as exploring the opportunities to link local government procurement contracts with locational considerations
- supporting best practice by working with local government and industry when new development is planned and considering planning permits, and working with industry to improve their practices independently from statutory processes.

8.1.2 Metropolitan resource recovery and waste hubs of state importance

The State Infrastructure Plan identifies 14 hubs of state importance within the metropolitan Melbourne region. Table 15 describes these hubs considering:

- the State Infrastructure Plan's description of metropolitan hubs
- land use planning and transport constraints and opportunities
- waste and resource recovery needs and opportunities of the metropolitan region
- the role of co-location with existing facilities, including waste water treatment facilities
- feedback from community consultation
- principles of environment protection.

It is primarily the responsibility of local government and planning authorities in consultation with their communities and industries to determine future uses and developments within hubs informed by the Metropolitan Implementation Plan.

In addition, there are a few important regional hubs outside of the Metropolitan region that receive significant tonnages of materials. These are listed in Table 16.

Table 15. Metropolitan Melbourne hubs of state importance

Map ID (Fig 5)	Waste and resource recovery hub	Description of hub location	Strategic assessment for metropolitan Melbourne
1	The Brooklyn precinct	**Location**: Generally bounded by Sunshine Road, Geelong Road, the Western Ring Road and the rear of industrial properties on Somerville Road. The precinct straddles four local councils: Maribyrnong, Hobsons Bay Wyndham and Brimbank **Landfill**: Operating and closed MSW and Solid inert **Resource recovery:** Concrete, organics, metal **Buffers**: The Landfill BPEM applies a 200 metre (solid inert) 500 metre (putrescible) landfill buffer to sensitive uses from operating and closed cells within this hub. Some resource recovery operations also require separation distances	**Description & current role** Brooklyn is an older industrial area with a range of waste disposal and recovery operations as well as significant home to food processors and other general industries. The precinct provides strategically located land for a range of major industrial developments. It is linked to the adjoining principal freight network and transport gateway for Melbourne. **Challenges** MWRRG acknowledge the feedback from Brimbank City Council and its community that the waste and resource recovery sector in the precinct has contributed to poor amenity outcomes and historically posed a number of challenges to meeting improved amenity aspirations (such as impacts of truck movements, stockpiling materials, dust and odour). MWRRG supports the need for waste and resource recovery facilities to continuously improve and operate to best practice standards and act to be exemplar operations within the precinct. MWRRG supports Brimbank City Council's aspirations for improved amenity, appearance and operation of industry and supported council's planning scheme amendment (C177) that developed local policies to promote investment, best practice and improved amenity outcomes. **Future considerations** MWRRG supports the action in the Brooklyn Evolution Strategy prepared by Brimbank City Council and its recommendations to work with MWRRG to identify opportunities to promote best practice waste management and resource recovery. Brimbank City Council recognises the economic importance of the Brooklyn industrial precinct to Melbourne's west. It has acknowledged the important role of waste and resource recovery within the context of the broader role the precinct plays across other industrial sectors. Council continues to works proactively with businesses to improve the operation and appearance of the precinct so that it can support further growth and development. Council has been working with businesses and residents to address infrastructure and environmental concerns particularly protection of areas of ecological importance associated with the Brooklyn industrial precinct through Council's Brooklyn Evolution program. MWRRG will continue to work with Brimbank, Maribyrnong, Hobson's Bay, Wyndham Council and industry, to support planning approaches that outline the ongoing waste and resource recovery role and best practice management of waste and resource recovery facilities within the Brooklyn precinct.

Map ID (Fig 5)	Waste and resource recovery hub	Description of hub location	Strategic assessment for metropolitan Melbourne
2	Werribee Landfill	**Location**: Wyndham refuse disposal facility site bounded by Wests Road and the Melbourne Geelong rail line **Landfill**: Putrescible and solid inert waste disposal **Resource Recovery:** Organics, commercial and domestic transfer station **Buffers**: The Landfill BPEM applies a 500 metre landfill buffer to sensitive uses from operating and closed landfill	**Description & current role** The Werribee hub is a significant putrescible landfill and resource recovery site for Melbourne. It has good transport connections due to its location adjoining the Princes Highway and access to the proposed outer metropolitan ring road. The entire site has planning approval to operate as a landfill and resource recovery facility. Wyndham advises that the site has a current works approval for 3 to 5 years of landfill capacity. Wyndham City Council has indicated that existing transfer station activities for general and organic waste are proposed to be expanded. **Challenges** Wyndham City Council is undertaking strategic planning to ensure that the use and development of land around the hub is compatible with its ongoing operation. This includes adopting measures to regulate the establishment and siting of sensitive uses within proximity to the hub. This includes formalising planning tools to identify buffer separation distances so that amenity impacts from the landfill and resource recovery activities are minimised. Feedback indicates there is some community concern around the height of the landfill and a need to minimise the visual impacts of the site on the surrounding area. The Victorian Planning Authority (VPA) is developing a growth area Precinct Structure Plan (PSP) for land adjoining the site and has proposed the land adjacent to the landfill be set aside for complementary industrial/business purposes. **Future considerations** The Werribee landfill has potential capacity to operate beyond 2046. The site also has the potential to accommodate additional and improved resource recovery operations for organic and general waste over the long term. MWRRG will continue to support Wyndham City Council's strategic planning and ongoing community engagement at the site. If this site does not continue its landfill operations in the long term, Melbourne is at risk of having inadequate landfill capacity to manage waste for which there is no current resource recovery capacity in the network.

Map ID (Fig 5)	Waste and resource recovery hub	Description of hub location	Strategic assessment for metropolitan Melbourne
3	Ravenhall precinct (including Boral Quarry, Cleanaway Melbourne Regional Landfill Ravenhall)	**Location**: Quarry and landfill site generally bounded by Ballarat railway line Christies, Middle and Hopkins Roads **Landfill**: Putrescible solid inert PIW (Category C contaminated soil and asbestos) **Resource recovery:** Organics recovery and C&D recovery **Buffers**: The Landfill BPEM applies a 500 metre landfill buffer to sensitive uses from operating and closed landfill cells on this site	**Description & current role** The Ravenhall precinct includes a putrescible and solid inert waste landfill currently in the south east corner of the site and a quarry and C&D recovery operation. Pinegro, an open windrow organics reprocessor recently ceased operations and has relocated from the site. The landfill and C&D recovery operations are strategically important to Victoria – the landfill is the largest putrescible and solid inert waste landfill in the state and the C&D recovery operations reprocess significant tonnes of materials. The site has good transport connections adjoining the Western Highway, Hopkins and Middle Roads, the Deer Park Bypass, and proximity to the Western Ring Road. The site has a work authority to quarry the entire site but only has planning approval, works approval and licenses to operate a landfill in the south east corner of the site below Riding Boundary Road. Current approved landfill airspace will last 7-10 years depending on fill rates. Further planning and Works Approval applications were lodged with Melton City Council and the EPA respectively on 29 February 2016. The Planning Minister called in the planning application to Melton City Council and details on the process for considering the application have not been released at the time of writing this plan. **Challenges** Growth area precinct structure planning has commenced for land located to the west of the site as part of the Mt Atkinson and Tarneit PSP. This is expected to deliver a mixed residential, industrial, business precinct with an activity centre and new railway station for approximately 20,000 residents. Land to the south of the site is also subject to growth area planning for future industrial development. The impacts of buffer separation distances to sensitive uses proposed within the PSP are being managed through the identification of buffers and zoning. There is significant community concern with the site's current operations, particularly odour, off site litter, and frequent and heavy truck movements through local roads. There is also significant objection to the landfill operating beyond its current planning permit. There is feedback that site operations have recently improved, however a strengthened and sustained effort will continue to be needed to continue to minimise adverse amenity impacts on the local community. **Future considerations** The Ravenhall precinct has potential capacity to operate beyond 2046. The landfill gas produced on site is captured and used to power generators with the electricity being fed back into the local electricity grid. The site also has the potential to accommodate additional resource recovery operations over the long term, in line with the strategic directions of the State Infrastructure Plan. MWRRG wishes to see continued and sustained improvements in operations at the site to minimise amenity issues. MWRRG will continue to work with Cleanaway, Melton City Council and EPA Victoria to establish appropriate buffer zones from the landfill and reprocessing operations. MWRRG also supports the promotion of best practice operations at the site. If this site does not continue its landfill operations in the medium term (beyond the current 7 – 10 years of approved airspace), Melbourne is at risk of having inadequate landfill capacity to manage waste for which there is no current resource recovery capacity in the network. If the entire site is not appropriately acknowledged in current precinct structure planning processes, its long term role may be compromised with implications for the metropolitan waste and resource recovery system. If subsequent planning permit/s are not issued, a new landfill hub of similar capacity will need to be scheduled by 2021, built and commissioned by 2026.

Map ID (Fig 5)	Waste and resource recovery hub	Description of hub location	Strategic assessment for metropolitan Melbourne
4	Laverton precinct	**Location:** Western industrial node Laverton North, Laverton and Altona industrial areas **Resource recovery:** C&D and C&I recovery and reprocessing, logistics	**Description & current role** The precinct is located close to Melbourne's CBD and the Port of Melbourne with good access to major regional centres of Geelong, Bendigo and Ballarat. This hub is identified in the Victorian Planning Provisions (VPP's) as state significant industrial land. **Challenges** The Laverton North industrial precinct is home to significant industrial development across a range of sectors including C&D reprocessing. Like the adjoining Brooklyn precinct, the waste and recovery sector has contributed to amenity impacts from site operations. The growth of the precinct particularly in the waste sector has been driven by locational advantage, its affordability and the availability of large parcels of land. **Future considerations** This is a key industrial precinct for growth across all sectors. Specifically the hub has the capacity to provide for a range of waste and resource recovery operations. MWRRG will work with local government and EPA Victoria and expects existing and new facilities to incorporate best practice operations to improve the amenity of the precinct.
5	Cooper Street precinct, Epping	**Location**: Land adjoining Cooper Street and Hume Freeway from Merri Creek in the west to Northern Hospital/ Epping Plaza in the east. **Landfill**: Closed landfills **Resource recovery:** Organics composting and reprocessing: C&D Timber Melbourne Markets Transfer Station for food, organics, paper cardboard and waste	**Description & current role** This hub is in a predominantly industrial area. It is home to organics reprocessing and C&D recycling operations. A number of operating and closed quarries and closed landfills are located in the area. New developments have provided opportunities for growth including the new Melbourne Markets (fresh food wholesaling) that includes a transfer station to handle waste and recycling produced on site. **Challenges** Growth area precinct structure planning has seen significant growth adjoining Cooper Street. Structure planning has set aside the land along Cooper Street, adjoining the Hume Highway and O'Herns Road, for industrial and business purposes. This land provides future opportunities for new waste and resource recovery industries. **Future considerations** This precinct could provide opportunities for growth in new recovery and recycling opportunities that could receive waste material streams from sites that are generating significant volumes of C&I and organics waste like the Melbourne Markets, Northern Hospital and Epping Plaza shopping centre. The Cooper Street hub has the potential to take advantage of its access to the Hume Highway and Western Ring Road. With a significant range of waste generators along Coopers Street (including markets, hospital and medical precinct, shopping centres and industrial developments) a place based approach to planning for the management of waste and recovery of resources in the future could be beneficial and is one that MWRRG would support.

Map ID (Fig 5)	Waste and resource recovery hub	Description of hub location	Strategic assessment for metropolitan Melbourne
6	Hanson Landfill Wollert	**Location**: Wollert landfill site bounded by Masons Rd, Epping Road and Bridge Inn Road **Landfill**: Putrescible & solid inert, PIW Category C (contaminated soil and asbestos) waste **Buffers**: The Landfill BPEM applies a 500 metre landfill buffer to sensitive uses from operating and closed landfill cells on this site.	**Description & current role** The Wollert landfill and quarry is a key landfill and resource recovery site for Melbourne located on the edge of the urban growth boundary. The site has planning and works approvals for its entire site. The site has capacity to manage significant volumes of waste as well as land for resource recovery. A road reservation for the future E6 Freeway adjoins the western boundary of the landfill site and acts as a boundary between the hub and future Wollert PSP area to the west. **Challenges** Growth area precinct planning has commenced for the Wollert PSP on land to the west of the site. This is expected to deliver a mixed residential, industrial, business precinct including a major activity centre for approximately 37,000 residents. The future use and development of land within a defined landfill buffer of 500 meters hub is being considered in the design and development of land use planning controls in the Wollert structure planning and an industrial zone is planned for land immediately west of the hub. **Future considerations** The Wollert landfill has potential capacity to operate as a landfill beyond 2046. With planning and works approvals already in place the roll out of future capacity will be relatively straight forward based on market demand and Hanson business planning. The site also has the potential to accommodate resource recovery operations including transfer station facilities for the growing community in the region over the long term, in line with the strategic directions of the Metropolitan Implementation Plan. As this hub grows it is important that appropriate transport access is provided. If this site does not continue its landfill operations in the long term, Melbourne is at risk of having inadequate landfill capacity to manage waste for which there is no current resource recovery capacity in the network.
7	SUEZ Hallam	**Location**: SUEZ Landfill and resource recovery site generally bounded by Hallam Road, South Gippsland Highway, Golf Club Road and the Urban Floodway Zone to the East. **Landfill**: Putrescible and solid inert waste, C&D Recovery **Buffers**: The Landfill BPEM applies a 500 metre landfill buffer to sensitive uses from operating and closed landfill cells on this site.	**Description & current role** The SUEZ Hallam landfill is the principal landfill and resource recovery site serving the south east of Melbourne. The site has planning and works approvals for its entire site. **Challenges** The site has been encroached by residential development to the north, east and west. Further encroachment from residential development needs to be carefully managed through the planning system. In the past odour has impacted the community. In 2012 EPA Victoria along with the site operator implemented an 'enforceable undertaking' to require best practice management for future cells as well as investment in community engagement projects. A range of community projects and resources have been undertaken. **Future considerations** This is a key site for landfilling putrescible waste for Melbourne's south east. The site will be increasing its capacity for putrescible landfilling following the closure of putrescible landfills in the Clayton South area and Mornington Peninsula over the next 5 years. The site will need to be carefully managed to ensure odour and dust impacts are managed and minimised due to the proximity of residential development surrounding the site. The hub has capacity for improved resource recovery activities on the site, as maximising recovery will provide additional airspace for disposal. It is expected these opportunities will be further explored as the sites limited disposal capacity nears its end and landfill cells are progressively rehabilitated across the site.

Map ID (Fig 5)	Waste and resource recovery hub	Description of hub location	Strategic assessment for metropolitan Melbourne
8	SUEZ Lyndhurst	**Location**: SUEZ Landfill site generally bounded by Taylors Road, Bayliss Road and National Drive Lyndhurst **Landfill**: Putrescible and PIW **Resource recovery:** Soil Remediation and Recovery **Buffers**: The Landfill BPEM applies a 500 metre landfill buffer to sensitive uses from operating and closed landfill cells on this site. .	**Description & current role** The site is within the developing Dandenong South/Lyndhurst industrial precinct. It has significant road connections adjoining through industrial areas to Greens Road, East Link, South Gippsland Highway and Monash Freeway. This is Victoria's only landfill licensed to receive Category B prescribed industrial waste (PIW). This site also receives some Category C PIW and is licensed to receive putrescible waste. **Challenges** The site is moving to increase its MSW waste streams due to significant reduction in PIW waste volumes. This may impact on landfilling capacity for PIW waste in the longer term. **Future considerations** PIW is out of scope for the State Infrastructure Plan and the Metropolitan Implementation Plan however MWRRG notes future policies and direction for managing PIW waste across the state will impact this site. The site will play an important role in managing waste displaced from the closure of sites in the Clayton area and contingency planning for emergency events that could require the closure of Hallam Road site as Lyndhurst site has planning and works approval for MSW cell.
9	Ordish Road precinct, Dandenong South	**Location**: Dandenong South Industrial 2 Zone (IN2 Zone) generally bounded by Greens Road, Hammond Road including Ordish Road. **Resource Recovery:** The precinct has a number of transfer stations, organics reprocessing, and recycling facilities (SUEZ Taylors Road PIW/ MSW Landfill is to the immediate east of the Ordish road precinct). **Buffers**: The IN2 zone has a 1500 metre buffer embedded in the planning scheme.	**Description & current role** A significant concentration of waste and resource recovery infrastructure is located along Ordish Road. The precinct is zoned Industrial 2 (IN2) in the Victorian Planning Provisions and is state significant industrial land. **Challenges** The Ordish Road precinct is one of only two IN2 zones in Victoria; the zone provides a 1500 meter buffer. This and the precinct's proximity to the transport network has resulted in a high level of industry competition for land within the precinct. **Future considerations** The Ordish Road precinct sits within the Dandenong South Employment Cluster as identified in Plan Melbourne. The zoning of this precinct makes it a suitable location for future waste and resource recovery activities.

Map ID (Fig 5)	Waste and resource recovery hub	Description of hub location	Strategic assessment for metropolitan Melbourne
10	Owens Illinois (OI), Spotswood	**Location**: Industrial site in and IN1 zone bounded by Simcock Avenue, Booker and Hudsons Street. **Resource recovery:** Glass reprocessing	**Description & current role** This site is a long standing operation and is a major glass reprocessor for the metropolitan region and the state. The site is located in an Industrial 1 (IN1) Zone south of the Westgate Freeway. It reprocesses glass sourced mainly from metropolitan MRF operators. **Challenges** Owens Illinois is the only large scale glass reprocessor in the state. There are other smaller glass reprocessors located in Laverton. Market factors affecting the viability of glass reprocessing include commodity prices, the quality of cullet and the ability to sort fines. If markets and recovery options for glass fines are not secure or profitable the outcome will be increased landfilling of glass fines. **Future considerations** This operation is significant to the metropolitan region and the state and will be into the future. There is a need to further investigate glass reprocessing activity in the region to further understand why there is a contraction in the glass market. MWRRG will work with Sustainability Victoria to implement the *Victorian Market Development Strategy for Recovered Resources* in relation to the market for recycled glass.
11	SKM Materials Recovery Facility (MRF), Maffra Street Coolaroo	**Location**: Industrial site on Maffra Street adjoining the Upfield railway line **Resource recovery:** Commingled recyclables from 12 metro local government, regional councils, commercial industrial government health and education sites.	**Description & current role** SKM recycling processes a significant portion of the metropolitan region's recyclable material collected from municipal and commercial sectors. Recyclable material received is sorted then sold for reprocessing. **Challenges** SKM are proposing to expand capacity to meet growing demand at a new location in Laverton North. The new site is still to obtain planning approvals (expected in 2016). This existing site is expected to remain as part of the SKM network. **Future considerations** SKM MRF Coolaroo will remain an important facility for metropolitan Melbourne.
12	Veolia Organics Facility, Bulla	**Location**: Co-located on Hi Quality Bulla Landfill site 580 Sunbury Road Bulla **Landfill**: Solid Waste Only **Resource recovery:** Organics in vessel composting	**Description & current role** This facility processes MSW mixed organics from 11 local governments in the northern and western areas of the metropolitan region. The site is also co-located with a solid waste landfill accepting Category C Prescribed Industrial Waste and C&D recovery operation. **Challenges** In order to retain a good operational buffer, the site owner has purchased surrounding land to ensure a buffer of at least 500 meters. Growth area precinct structure planning has commenced for the Sunbury PSP on land to the west of the site. It is intended that the land adjacent to the site be set aside for industrial and business purposes. **Future considerations** This hub will continue to be a significant part of the metropolitan organics network over this life of this plan and beyond.

Map ID (Fig 5)	Waste and resource recovery hub	Description of hub location	Strategic assessment for metropolitan Melbourne
13	Citywide Resource Recovery Centre, West Melbourne	**Location**: Industrial site adjoining Dynon Road Footscray. **Resource recovery:** Transfer station and MSW and recovery	**Description & current role** This is a large, significant inner city transfer station and consolidation centre that provides public transfer station and consolidation services for MSW and C&I waste generated principally in the Melbourne CBD and surrounds. **Challenges** The hub is in close proximity to a major metropolitan freight activity centre which includes the Port of Melbourne. The site is well located for inner city local governments and businesses. Any potential expansion or improvements to the freight activity centre may have implications on the hub's ability to deliver waste and recovery operations in the long term. **Future considerations** Appropriate land use planning measures to support the site should be considered. Proximity to the port is a strategic advantage that could be leveraged. If the site was to be impacted by port and road infrastructure related projects the site would need to be relocated as the operations are essential for Melbourne and inner metro businesses and waste generators. MWRRG would need to work with the City of Melbourne, industry and port authorities to find a suitable replacement location in close proximity to the CBD.
14	Clayton South Precinct Hub	**Location**: North of Fraser Road including the Clayton South Industrial Precinct that adjoins Fairbank and Clayton Roads. **Landfill**: Putrescible & Solid Inert disposal Closed Landfills **Resource Recovery:** C&D, organics, commercial and community transfer stations **Buffers**: The Landfill BPEM requires a 500 metre buffer area from the operating and closed putrescible landfills and a 200 metre buffer area from the operating and closed solid inert landfills.	**Description and current role** The Clayton South hub includes the operating Fraser Road Landfill and closed Clayton Road landfill that abuts Deals Road. It also includes resource recovery operators and transfer station facilities (including the Alex Fraser resource recovery operation), making it a significant hub for the metropolitan region. Cleanaway has received planning permission on its Fraser Road site to construct its South East Melbourne Transfer Station. The Alex Fraser resource recovery operation has planning permission to operate for a further 8 years. It is a significant metropolitan facility for C&D reprocessing. As a consequence of the approval of Planning Scheme Amendment C143 and City of Kingston's long held intention to advance its open space strategy the Chain of Parks, the area of closed and closing landfills outside the urban growth boundary is now incorporated into the closed landfill section of this plan at Section 2.6.4. **Challenges** The transition away from waste and resource recovery industries occurring in the south provides opportunities for the Clayton South precinct particularly in the land zoned for industrial and commercial activities. Appropriate buffer separation distances are needed from operating and closed landfills adjoining Deals Road during the post closure and rehabilitation period and will need to be defined, protected and maintained. The Landfill Schedule reflects that within the next seven years it is likely that all landfilling in this precinct will close. **Future considerations** Cleanaway Fraser Road and South East Melbourne Transfer Station will play an important strategic role for the South East of Melbourne. The Alex Fraser resource recovery operation is a significant metropolitan facility and consideration should be given to supporting its relocation. MWRRG, in consultation with the City of Kingston, community and industry need to develop a master plan for the next phase of rehabilitation and development of this hub together with the significant area of closing and closed landfills to the south and west. This hub also provides opportunities to explore industrial ecology and place based approaches to promoting increased resource recovery and connections between industries and potential users of waste streams. The food manufacturing industry is a priority sector that can take advantage of new organics recovery infrastructure being developed in the precinct.

Table 16: Regional waste and resource recovery hubs receiving waste from Melbourne

Map ID	Waste and resource recovery hub	Description of hub Location	Strategic assessment for metropolitan Melbourne
Hubs outside Metro	Maddingley Brown Coal	**Location**: Large active coal mine site off Cummings Road, Bacchus Marsh **Landfill**: Solid Inert Waste Only **Resource recovery:** Organics, wood/timber, blended residual pulp/ soils recovery, C&D recovery mostly at transfer station feeder sites	**Description & current role** This site is listed as a hub of state importance in the Grampians region. It includes a large solid inert landfill that receives significant tonnages of its waste from within the Melbourne metropolitan region. Importantly, this is the only landfill currently accepting shredder flock. **Future considerations** The role of this hub will be further developed following the preparation of the Grampians Central West Implementation Plan. If the landfill ceased to accept shredder flock it would severely affect reprocessing end-of-life cars and white goods across the state.
	Gippsland Water Dutson Downs	**Location**: Large active sewerage treatment plant south of Sale on the Longford Loch Sport Road **Resource recovery:** Soil and organics recycling, liquid and solid prescribed waste recycling	**Description and current role** This site is listed as a hub of state importance in the Gippsland region. The site transforms organic compounds (e.g. green organics, bio solids, food waste, petroleum hydrocarbon and animal fats) into soil conditioner/compost. The site accepts MSW mixed organics loads from Melbourne and will continue to be a significant hub. **Challenges** There are opportunities for source separated organics to continue to be sourced from Metropolitan Melbourne for use at this site. Future considerations and opportunities. The role of this hub will be further developed following the preparation of the Gippsland Implementation Plan.

SECTION 4: ANALYSIS OF METROPOLITAN MELBOURNE RESOURCE RECOVERY AND WASTE INFRASTRUCTURE

9 THE STATE OF WASTE IN THE METROPOLITAN MELBOURNE REGION

This section at a glance:

- In 2014-15 around 10.4 million tonnes of waste was managed in metropolitan Melbourne. Of this, around 7.6 million tonnes (73%) was recovered and 2.8 million tonnes (27%) was disposed to landfill. This recovery rate has increased substantially over the last 10 years.
- Around 80% of Victoria's waste is managed in Melbourne, highlighting the importance the metropolitan area plays in the statewide waste and resource recovery network.
- The metropolitan region plays a significant role in managing waste materials from across Victoria. Melbourne's proximity to reprocessing industries and export infrastructure makes it the ideal location to perform this role.
- By 2041-42 waste volumes are projected to grow by 63% meaning around 16.5 million tonnes of waste will need to be managed each year. A significant boost in new infrastructure will be needed to manage this growth.

9.1 The metropolitan region

The metropolitan region is a city of 4.3 million people that spans nearly 10,000 square kilometres. It is home to nearly 75% of Victorians.

In 2011 there were 1,163,659 separate houses, 345,006 medium density dwellings and 118,402 high density dwellings.[21]

As at December 2012, 200,995 (73%) of Victoria's businesses were based in metropolitan Melbourne. High concentrations of businesses exist in central Melbourne (the City of Melbourne), in the north (City of Hume) and the south east (cities of Monash and Dandenong).

Melbourne is growing. Population is projected to increase to 7.8 million people in 2051. This population growth will drive an increase in the amount of waste that is generated and managed in Melbourne.

9.2 Waste managed in the metropolitan region

In 2014-15 around 10.4 million tonnes of waste was managed[22] in metropolitan Melbourne. Of this, around 7.6 million tonnes (73%) was recovered and 2.8 million tonnes (27%) was disposed to landfill.

Around 80% of Victoria's waste is managed in Melbourne, highlighting the importance the metropolitan area plays in the statewide waste and resource recovery network.

The main materials managed across the metropolitan network of waste and resource recovery infrastructure are shown in Table 17.

[21]Victoria in Future, DELWP, 2015
[22]Because waste and resource recovery data is not collected at the point of generation (for example the household, or office) but at the point of receival for disposal, processing or consolidation, the term 'managed' is preferred to 'produced' or generated'.

Table 17. Main materials managed in the metropolitan region 2014-15[a] (tonnes)

Material category		Recovered	Landfilled[b]	Managed	% Recovered	% Landfilled
Organics	Food	7,000	627,000	634,000	1	99
	Garden Waste	299,000	178,000	476,000	63	37
	Wood/Timber	150,000	197,000	347,000	43	57
	Other	268,000	0	268,000	100	0
Paper/ Cardboard		1,297,000	320,000	1,618,000	80	20
Glass		172,000	56,000	228,000	75	25
Plastic		145,000	282,000	427,000	34	66
Rubber incl. tyres[c]		78,000[d]	4,000	82,000	95[e]	5
Metals		1,372,000	47,000	1,420,000	97	3
Aggregates, Masonry and Soil		3,798,000	618,000	4,416,000	86	14
Textiles		4,000	103,000	108,000	4	96
Other		0	410,000	410,000	0	0
	Total	**7,591,000**	**2,842,000**	**10,433,000**	**73**	**27**

a Modelled data: Metropolitan Waste and Resource Recovery projection model v19.
b Tonnes landfilled do not include prescribed industrial waste (PIW).
c Data for rubber and tyres is incomplete. It is understood that a large proportion of end of life tyres have been stockpiled (Sustainability Victoria: Victorian Recycling Industries Annual Survey report, 2013/14). The tonnages in these stockpiles are not represented in this data.
d Estimate, source: Victorian Recycling Industries Annual Survey 13/14
e The recovery rate shows the proportion of tyres being recovered from the total tonnage being actively managed. That is, it does not include the stockpiled tonnages. There is considerable effort from government and industry to address environmental and health and safety issues associated with stockpiled tyres.

Waste materials are generated from three source sectors: municipal solid waste (MSW) and solid industrial waste comprising of construction and demolition (C&D) and commercial and industrial (C&I) waste.

Construction and demolition waste comprises the largest component of the total tonnes managed as the waste materials generated by this sector are heavy (for example, soils, masonry and aggregates). See Table 18. This is followed by commercial and industrial sources of waste, including waste from offices, factories, manufacturers, schools, universities, government agencies, and small to medium enterprises.

Municipal solid waste is the smallest sector, accounting for about one quarter of all waste managed in Melbourne. Municipal solid waste is made up of all kerbside recycling and waste collections, materials that are dropped off at transfer stations, and waste materials generated from council activities (for example, offices, parks and gardens, maternal and child health centres).

Only 48% of all municipal solid waste is recovered, the lowest recovery rate of the three sectors. Municipal waste also represents nearly half (46%) of all material disposed in metropolitan landfills each year.

Table 18. Waste managed in the metropolitan region by sector, 2014-15 (tonnes)

Source Sector	Recovered	Landfilled	Total Managed	% Recovered
MSW	1,223,000	1,300,000	2,523,000	48%
Solid Industrial Waste (C&I)	2,397,000	926,000	3,322,000	72%
Solid industrial waste (C&D)	3,972,000	617,000	4,589,000	87%
Total	7,591,000	2,842,000	10,433,000	73%

Source: Metropolitan Waste and Resource Recovery projection model v19

9.3 Waste flows into metropolitan Melbourne

The metropolitan region plays a significant role in managing waste materials from across Victoria. Melbourne's proximity to reprocessing industries and export infrastructure makes it the ideal location to perform this role.

Waste managed within Melbourne is generated by regional and metropolitan communities and businesses. The State Infrastructure Plan notes that *"...the metropolitan region contains reprocessing hubs for most materials. This reflects its large population, manufacturing base and access to transport..."*

The flow of waste from regional Victoria impacts on the waste and resource recovery infrastructure of the metropolitan region and has been considered in infrastructure planning to ensure sufficient capacity is available to meet future needs.

Flows of kerbside MSW into the metropolitan region are represented in Table 19. The main component is kerbside recycling, which is transported from other regions into Melbourne material recovery facilities (MRFs) for processing.

Table 19. Waste flows into metropolitan region, 2013-14

Waste stream	Tonnes per annum
Landfill	40,000-60,000
Commingled recycling[a]	100,000-130,000
Paper/cardboard	36,000
Plastic	2,000
Glass	18,000
Metals	1000
Total	**197,000- 247,000**

Note:
a Includes mixed recyclables from kerbside collections.

Sources:
Sustainability Victoria, SRU Survey and analysis of regional reprocessors and material recovery facility operators;
Data provided by Regional Waste and Resource Recovery Groups - values are approximate.

The bulk of recyclable material sorted at regional MRFs is transported to the metropolitan region for reprocessing or for export to overseas markets.

Data for C&I sources of waste entering the metropolitan region from other regions is limited.

9.4 Waste flows out of metropolitan Melbourne

Some waste generated in the metropolitan region also moves to regional areas for reprocessing as shown in Table 20. The most significant component of this is solid inert material, with 350,000 tonnes of waste sent to regional landfills per annum. The remaining outflow is made up mainly of aggregates, masonry and soil (9,000 tonnes) and paper and cardboard (100,000 tonnes).

In addition, approximately 141,000 tonnes of organics from Melbourne was processed outside of the metropolitan region in 2013/14.

Table 20. Waste flows out of metropolitan region, 2013-14

Waste stream	Tonnes per annum
Waste (solid inert)[23]	350,000
Organics	141,000
Paper and cardboard	100,000
Aggregates, masonry and soil	9,000
Plastic	1,000
Total	**601,000**

Sources:
Sustainability Victoria, SRU Survey and analysis of regional reprocessors and material recovery facility operators;
Sustainability Victoria, Victorian Local Government Annual Survey.

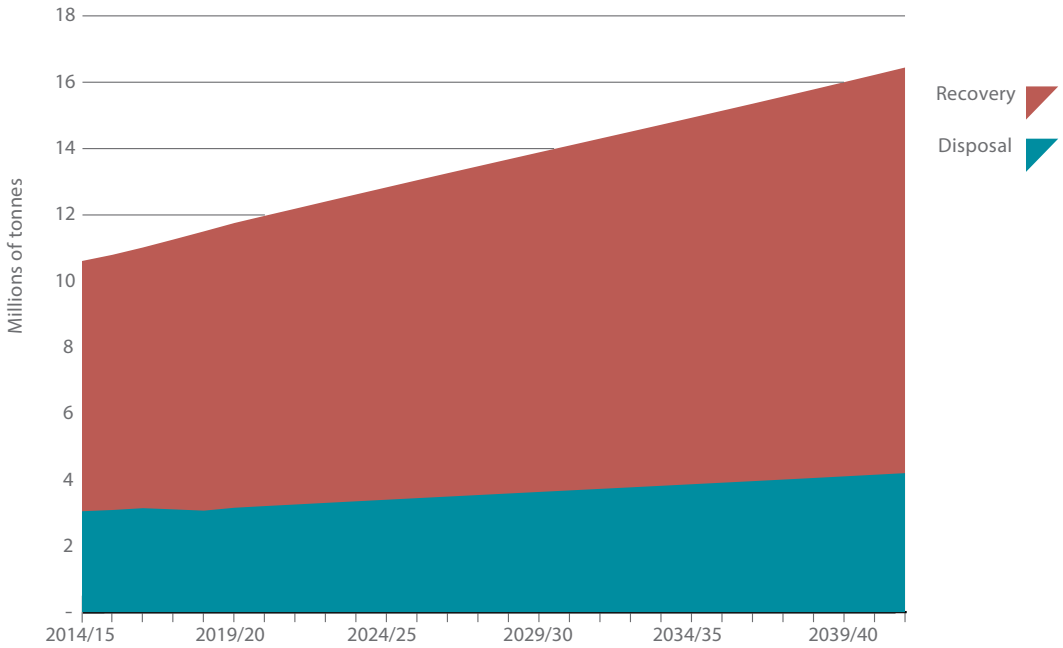
9.5 Future projections of waste to be managed in metropolitan Melbourne

The amount of waste the metropolitan region generates will continue to grow along with our population (Figure 6). By 2041-42 waste volumes are projected to grow by 63% meaning around 16.5 million tonnes of waste will need to be managed each year. A significant boost in new infrastructure will be needed to manage this growth.

These projections indicate that by 2041-42, Melbourne will need:

- one million tonnes of new landfill capacity each year
- five million tonnes of new resource recovery capacity.

Figure 6. Future waste projections



[23]Includes shredder flock, for which there are no current reprocessing markets

10 OVERVIEW OF EXISTING WASTE AND RESOURCE RECOVERY INFRASTRUCTURE

This section at a glance:

- A diverse mix of waste and resource recovery infrastructure is located in metropolitan Melbourne. Infrastructure audits have identified over 150 facilities, which collectively manage around 10.4 million tonnes per annum.

A diverse mix of waste and resource recovery infrastructure is located in metropolitan Melbourne. Infrastructure audits have identified over 152 facilities, which collectively manage around 10.4 million tonnes per annum.

While a large percentage of the waste managed by metropolitan infrastructure is generated in the metropolitan region, some material is also received from regional areas for disposal and processing. Further detail on the regional inflows and outflows of waste is provided in Chapters 9.3 and 9.4.

10.1 Metropolitan waste and resource recovery network overview

Table 21 provides a summary of resource recovery infrastructure across the metropolitan region. This table shows estimated capacity and through-put for facility types. As data is not available for all the facilities operating in the metropolitan region, tonnages are indicative only.

Table 21. Summary of consolidation and resource recovery infrastructure types in metropolitan Melbourne, 2013/14

Infrastructure type		Tonnes currently managed	Installed Capacity	Under-utilised capacity	Projected tonnes (BAU recovery rates) 2026
Resource Recovery	Resource Recovery drop off	178,000	213,000	35,000	1,363,000
	Resource Recovery RRC/TS	929,000	1,427,000	498,000	
	MRF	751,000	1,079,000	328,000	913,000
Reprocessor Organics		254,000	296,000	42,000	370,000
Reprocessor Paper/card		724,000	794,000	70,000	1,603,000
Reprocessor Glass		*	*	*	202,000
Reprocessor Plastics		19,000	20,000	1,000	178,000
Reprocessor Tyres		*	*	*	98,000
Reprocessor Wood/timber		*	*	*	192,000
Reprocessor Metals		1,219,000	1,596,000	377,000	1,733,000
Reprocessor Aggregates, masonry and soils		3,416,000	5,282,000	1,866,000	4,940,000
Reprocessor Textiles		*	*	*	5,000
Total		**7,489,000**	**10,706,000**	**3,217,000**	**11,597,000**

*Data is withheld in order to protect commercially sensitive information

Sources: Metropolitan Waste and Resource Recovery Infrastructure Capacity Assessment project, Metropolitan Waste and Resource Recovery Projection Model, v19;

Infrastructure is categorised by primary function and according to main material managed. It is acknowledged that some facilities may manage a range of material types. Where there are a number of materials managed in one facility, capacity has not been specified for each material type but for the facility as a whole. Therefore capacity for each infrastructure type is not an exact match for materials recovered.

Engagement with owners/operators in 2015 indicated that there are expansion and/or upgrade plans for a number of facilities, including potential new facilities. Installed capacity (current operating capacity) excludes facilities that were not operational for the data gathering period.

Regional facilities play a large role in managing metropolitan Melbourne's garden waste – this table only includes metropolitan region facilities

There are 21 landfills in metropolitan Melbourne. In 2014 -15 they received approximately 2,842,000 tonnes[24] of waste. By 2026 this volume is expected to grow to 3,266,000 tonnes per annum.

The following chapters provide a detailed analysis and assessment, including future need, for all infrastructure types. This analysis underpins the Resource Recovery and Waste Action Plan for Melbourne (Section 1) and the Infrastructure Schedule (Section 2). Appendix D: Infrastructure maps and Appendix E: Main data sources and major data assumptions and definitions support the information presented in Section 4.

[24]Modelled data: Metropolitan Waste and Resource Recovery Projection Model v19

11 NETWORK ENVIRONMENTAL AND FINANCIAL PERFORMANCE

This section at a glance:

- Resource recovery has better environmental outcomes over landfilling. Well managed resource recovery infrastructure provides a range of benefits to the environment, including the diversion of carbon producing materials destined for landfill, which reduces methane emissions from landfills.
- A key environmental factor is the management of emissions and the associated amenity impacts on the local community. Odour remains the most prevalent issue, being particularly relevant to landfills and organics processing facilities. Noise and dust remain common factors impacting the performance of reprocessing infrastructure.
- Community acceptance of waste and resource recovery facilities is reliant on a level of trust and mutual understanding between operators and the community potentially affected by their operations. It is the responsibility of operators to conduct community consultation and respond to community concerns.

There are many factors influencing the performance of waste and resource recovery infrastructure and the potential effects that vary across infrastructure type, location and size. An analysis was undertaken in 2015 to identify key financial and economic factors that may influence the performance of metropolitan region waste and resource recovery infrastructure. This information has been used to assist planning and decision making.

A broad outlook for the metropolitan waste and resource recovery network follows. Detailed analysis for infrastructure types can be found in the subsequent chapters.

11.1 Financial and economic factors

11.1.1 Market economics

The waste and resource recovery market has considerable impact on the financial performance of a facility. A key factor currently impacting infrastructure performance is the condition of end markets, both locally and internationally, for recovered materials and/or reprocessed products. Local reprocessors need healthy markets for end products in order for their operations to be viable. Some types of infrastructure are reliant on export markets, which can be affected by both commodity prices and international policy decisions. For example, export markets for tyre derived products and mixed low grade plastic and paper have contracted in recent years impacting the performance of related infrastructure types. Operations that are based on a high volume, low value business model are particularly vulnerable to market fluctuations.

11.1.2 Policy settings (including land use planning)

Current and potential future policy and regulatory settings impact performance of infrastructure. In Victoria, the policy and regulatory framework has many elements and covers the activities of local government and private industry. The landfill levy is one of the key instruments aimed at driving waste out of landfills and into resource recovery. Potential changes to policy settings such as product stewardship schemes (typically implemented at the Commonwealth level) and a ban on e-waste to landfills may have significant impacts on the economic performance of some waste and resource recovery infrastructure.

Residential development has reduced the separation distances to some facilities resulting in community concern. Overall, the availability of land for waste and resource recovery management near urban areas has declined. Recent developments in the regulation of composting facilities to protect the community and environment may increase the costs of establishing and operating composting infrastructure and are likely to make siting facilities in the metropolitan area more challenging.

11.1.3 Economies of scale

Consolidating material streams can secure quantities of material available for reprocessing and provide opportunities to achieve economies of scale. This is important for establishing business cases for investment in waste and resource recovery infrastructure which requires up front, significant capital expenditure. Consolidation of materials can be achieved through collective tendering for services, as has successfully been done through MWRRG's MSW organics reprocessing facilitated procurement.

11.1.4 Community willingness to pay

For material streams where the cost of recovery is greater than the cost of landfill, the willingness of the community to pay for recovery is key to achieving diversion. Willingness is linked to a range of factors including attitudes and competing priorities.

11.2 Environmental factors

Resource recovery has better environmental outcomes over landfilling. Well managed resource recovery infrastructure provides a range of benefits to the environment, including the diversion of carbon producing materials destined for landfill, which reduces methane emissions from landfills. Landfill airspace is also only utilised for those materials that are not recoverable.

11.2.1 Management of emissions and amenity issues

A key factor affecting environmental performance is the management of emissions and the associated amenity impacts on the local community. Odour remains the most prevalent issue, being particularly relevant to landfills and organics processing facilities. Noise and dust remain common factors impacting the performance of reprocessing infrastructure, in particular those facilities processing concrete, brick and masonry. The generation of leachate at many landfill sites contributes to odour issues and the treatment and discharge of leachate is an ongoing challenge.

In light of the ongoing issues with emissions and amenity impacts, a key factor improving the performance of infrastructure is the rigorous compliance and monitoring framework.

High impact infrastructure such as landfills and organics processing facilities must be managed in accordance with EPA Victoria guidelines such as the Landfill BPEM and the recently released *Designing, Constructing and Operating Composting Facilities Guideline*. These guidelines require operators to implement management controls which are monitored through licenses and regular site inspections.

11.2.2 Post closure rehabilitation of landfill sites

A key factor that is impacting the current and future financial and environmental performance of landfill facilities relates to environmental and financial planning for landfill sites (including rehabilitation costs, and financial assurances for closed or capped landfill cells) and the overall rehabilitation of landfill sites. Recent changes to the Landfill BPEM's technical specifications are likely to drive improved environmental performance at current operating and closing landfills.

11.2.3 Social licence to operate

Community acceptance of waste and resource recovery facilities is underpinned by a level of trust and mutual understanding between operators and the community potentially affected by their operations. It is the responsibility of operators to conduct community consultation and respond to community concerns. A social licence to operate is also dependent on a community's understanding of the essential nature of waste and resource recovery services.

11.3 Climate change

The waste and resource recovery sector is a significant contributor to greenhouse gases. Every year in the metropolitan region we put around 805,000 tonnes of food and garden waste into landfill, or just under half (42%) of all municipal solid waste and commercial industrial waste we send to landfill. As organic waste in landfill breaks down it generates methane, a potent greenhouse gas. Solid waste disposal accounted for 1.2% of Victoria's total greenhouse gas emissions in 2013[25].

The impacts of climate change on Victoria's waste and resource recovery industry will be varied and may include issues such as changes in the timing, form and amount of precipitation, as well as potential increases in extreme events such as droughts and floods. These impacts can affect waste infrastructure, remediation and containment strategies as well as local water quality. Managing these risks is discussed in Chapter 17.

The Victorian Government will continue to apply climate change considerations across all government decision making processes including planning and service delivery with climate change impacts in mind. The government expects all sectors to consider climate change resilience in business planning and service continuity.

The government is also committed to putting communities at the centre, and recognises that ultimately effective action on climate change is achieved through local place-based action. Through effective engagement, the Victorian government and its portfolio agencies will work with communities, especially vulnerable ones, and local and regional leaders to make our towns and cities climate ready.

The waste and resource recovery sector (encompassing government and commercial entities) has a number of opportunities to contribute towards action on climate change including:

- incorporating climate resilient considerations into the design and management of waste infrastructure
- contributing to effective reductions in Victoria's greenhouse gas emissions from the waste sector across operations and facilities, landfills and reprocessing of materials such as organics
- assisting the development of markets for reprocessed materials
- reviewing the risk factors and current assumptions about remediation and containment methods in light of climate change impacts
- considering current waste management capacity, including interim capacity, to handle surges in treatment and disposal of waste generated from climate events (floods, bushfires, etc)
- contributing to improvements in soil quality through the provision of compost
- continuing to engage to increase the community's adaptive capacity and resilience to climate change impacts.

[25]Australian National Greenhouse Accounts State and Territory Greenhouse Gas Inventories, 2013

12 RESOURCE RECOVERY CENTRES AND TRANSFER STATIONS

This section at a glance:

- This section provides a summary of the resource recovery and transfer station network of facilities across Melbourne used to collect, sort, separate and recover materials.
- Transfer stations mostly aggregate kerbside waste and recycling as well as offer drop off facilities for residents and businesses.
- The metropolitan RRC/TS network will need to grow and respond to a number of challenges over the next 10 to 15 years. MWRRG is developing a RRC/TS Growth Strategy to manage future waste volumes and increase resource recovery from the metropolitan RRC/TS network.
- The growth strategy will lead to a measurable increase in diversion rates through greater aggregation and collection of recoverable materials. New capacity will be required in the south east, central and northern sub-regions.

Resource Recovery Centre and Transfer Station (RRC/TS) facilities are an important link in the waste and resource recovery infrastructure network. These facilities receive a range of waste materials from commercial and municipal waste collectors, residents and businesses. These materials may then be sorted into separate material streams, recovered, and compacted and consolidated to reduce the costs of transporting waste to reprocessing facilities or landfill.

A summary of the function each facility plays is provided in Table 22.

Table 22. Summary of type and function of RRC/TS

Facility type	Function
Resource recovery centre/transfer station	Receives, sorts and/or consolidates a range of material streams (depending on the facility) including hard, organic and residual waste and commingled recyclables for transport for materials recovery, processing or disposal to landfill Accepts materials from all sectors and can be publically or privately owned and operated May include a resale centre
Drop off facility	Recovers selected materials and goods mainly dropped off by householders for recycling and reuse May include aggregation for transport to a resource recovery centre or transfer station

Melbourne's 31 councils have been divided into five planning sub-regions to inform analysis of current and future need of the network of RRC/TSs. The five sub-regions are in Table 23. Not every council has an RRC/TS and some councils have more than one.

Table 23. Metropolitan sub-regions

Sub-region	Local government area
Central	Melbourne
	Stonnington
	Maribyrnong
	Port Phillip
	Yarra
Eastern	Boroondara
	Knox
	Manningham
	Maroondah
	Monash
	Whitehorse
	Yarra Ranges
Northern	Banyule
	Darebin
	Hume
	Mitchell (part)
	Moreland
	Nillumbik
	Whittlesea
Western	Brimbank
	Hobsons Bay
	Melton
	Moonee Valley
	Wyndham
Southern	Bayside
	Cardinia
	Casey
	Frankston
	Glen Eria
	Greater Dandenong
	Kingston
	Mornington Peninsula

12.1 Current status

Within the metropolitan region 58 RRC/TS and drop off facilities were operating in 2014. With the closure of the Healesville Regional Waste Transfer Station and the Clayton Regional Transfer Station in the intervening period, there are now 56 operating facilities within the region. Table 8 includes new RRC/TS facilities with approvals but that are not yet operating at the time of preparing this Metropolitan Implementation Plan.

Collectively the facilities for which information was obtained[26] received approximately 1.1 million tonnes of waste in the 2013-14 financial years and had capacity to receive and transfer at least 1.6 million tonnes of waste per year. This indicates around half a million tonnes of spare capacity within the network.

Table 24 summarises the existing RRC/TS metropolitan network, and Figure 7 illustrates the breakdown of waste and material types that were managed by the network in 2013-14.

Table 24. Summary of existing RCC/TS metropolitan network

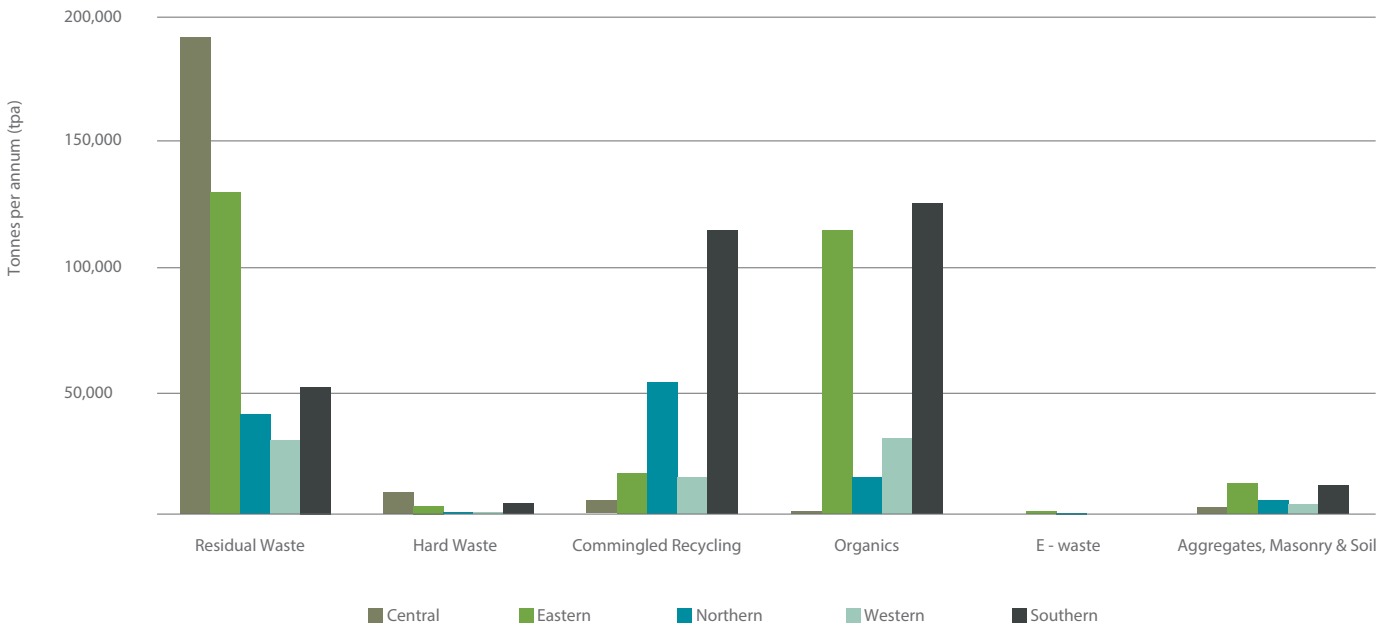
Sub-region	Number of RRC/TSs	Number of drop off facilities	Installed capacity	Throughput (tonnes per annum) - 2014
Central	3	2	300,000	220,000
Eastern	11	2	460,000	341,000
Northern	7	3	154,000	123,000
Western	8	2	189,000	103,000
Southern	14	6	537,000	322,000
Totals: 2014	**43**	**15**	**1,640,000**	**1,109,000**

Notes:

Clayton Regional Transfer Station and Healesville Regional Waste Transfer Station has closed in the Eastern Sub-region since 2014.

Sources: Metropolitan Waste and Resource Recovery Infrastructure Capacity Assessment project; Metropolitan RRC/TS Growth Strategy Report

Figure 7. Metropolitan RRC/TS network material breakdown by sub-region 2013/14



[26]Data on tonnages was not collected for all the facilities operating in the metropolitan region in 2013/14. Tonnages are indicative only.

12.2 Analysis of future needs and challenges for the RRC/TS network

The metropolitan RRC/TS network will need to respond to a number of challenges over the next 10 to 15 years. These challenges are likely to include the:

- closure of landfills in the southern sub-region
- commitment to ban e-waste from landfill – which is being designed at the time of writing this plan
- need to improve the management of hard waste
- need to divert organic waste from landfill
- need to increase the recovery of dry recyclables.

Environmental and financial factors affecting RRC/TS are presented in Table 25.

Table 25. Environmental and financial factors affecting RRC/TS

Infrastructure category	Resource Recovery Centre / Transfer Station
Environmental and Financial Performance in the Region	**Economies of scale** • RRC/TS infrastructure requires significant volumes of material usually achieved through council contracts to be viable **Market conditions** • Insufficient end markets for materials including timber, polystyrene and mattresses impacts performance of this infrastructure **Management of emissions and amenity** • Noise and odour associated with putrescible waste and on site processing of organic waste can be an issue for facilities close to residential development • Stockpiles of some materials, such as timber or garden waste, could be a fire risk if not managed appropriately
Opportunities	• Emergence of product stewardship schemes for materials such as tyres and mattresses may improve conditions for these commodities

To assess the potential impact of these challenges on the metropolitan RRC/TS network, MWRRG undertook projection modelling to forecast future waste growth through the transfer network resulting from population growth and potential increased MSW flows resulting from landfill closures in the southern sub-region. The results of the scenario modelling are shown in Table 26, with an indicative range of available capacity for the period 2031-40.

Table 26. The impact of population growth and potential landfill closures on the RRC/TS network.

Sub-region	Spare capacity (2014)	Spare capacity with population growth and landfill closures (2031-2040)
Central	80,000	-22,000 to -65,000
Eastern*	119,000	-96,000* to -121,000
Northern	31,000	-17,000 to -43,000
Western	86,000	35,000 to 5,000
Southern	215,000	-115,000 to -169,000
Totals	**531,000**	**-215,000 to -393,000**

Notes:

* Spare capacity projections for 2031 take into account closure of Clayton Regional Transfer Station and Healesville Regional Waste Transfer Station in 2015/16.

Sources: Metropolitan RRC/TS Growth Strategy Report (including RRC/TS projections)

Victoria In Future 2015 ER Population projections used to 2031, extended projections (2040) based on 5 year average population growth in sub-regions (2026-31)

Landfill closures in the southern sub-region, together with population growth could see an additional 900,000 tonnes enter the network by 2040. As shown in Table 26 this is likely to have a significant impact on the eastern and southern sub-regions. In this scenario the metropolitan region as a whole may have a deficit of around 215,000-393,000 tonnes with only the western sub-region having any spare capacity after 2031 if further action is not taken to increase resource recovery.

Calculations of existing spare capacity in the network do not discriminate between putrescible and inert waste. Not all RRC/TSs are equipped and/or approved to accept and manage putrescible waste. The projected shortfall in capacity to manage this waste stream is expected to be considerably larger than represented in Table 26.

Engagement with the network owners/operators in early 2015 indicated that there are expansion and/or upgrade plans for a number of RRC/TS facilities, including potential new facilities. The progress of plans range from the preliminary discussion phase through to 'in development'. Given a level of uncertainty in relation to timing, deliverability and scale of potential expansion and/or upgrades, planned additional capacity has not been factored into calculations of future spare capacity.

An e-waste ban could have a significant impact on the RRC/TS network, both in terms of capacity and operational practices. However, with the mechanisms for implementing the e-waste ban yet to be determined, it is difficult to predict the scale of the impact at this stage. If implementation results in e-waste entering the RRC/TS network the overall capacity deficit in the metropolitan region may be in the order of 430,000 tonnes per annum by 2031 (without planned expansions).

12.2.1 Resource recovery in the RRC/TS network

To minimise the amount of waste that will be received at metropolitan landfills it is necessary to maximise the resource recovery function of the RRC/TS network. The current resource recovery rate across Melbourne's RRC/TS network is estimated to be between 40-50%[27]. Achieving a significant increase in this rate will require operational improvements and upgrades to existing infrastructure, as well as investment in new infrastructure capable of effectively sorting residual waste to recover recyclable materials. With the closure of southern sub-region landfills the necessary RRC/TS infrastructure must be in place to ensure that only materials not able to be viably recovered are sent to landfills in the north and west.

In respect to e-waste recovery early projections indicate approximately 80,870 tonnes of e-waste was generated in Melbourne in 2014, a figure that is likely to increase with population growth[28]. A large proportion of Melbourne's e-waste is currently managed through the RRC/TS network e.g televisions, computers and refrigerators and possibly through other schemes operated by retailers and other organisations.

The Victorian Government's e-waste ban to landfill could result in more of this material stream entering the RRC/TS network and will need to be managed.

At this stage it is difficult to determine what impact increasing levels of e-waste generation will have on the metropolitan transfer network and how much e-waste will need to be managed through the RRC/TS network. MWRRG will continue to assess the capacity of the RRC/TS network to manage e-waste in future to support the implementation of any e-waste ban to landfill. As part of reviewing the Metropolitan Implementation Plan in 2019, MWRRG will assess whether new resource recovery infrastructure including RRC/TCs will be delivered within the 10 year timeframe of this plan.

Based on an understanding of the composition of materials entering putrescible landfills in metropolitan Melbourne it is considered reasonable to expect that 25% is recoverable through effective technology and processes at RRC/TSs. For further discussion of the recoverable materials in the residual stream see Figure 10.

[27]Internal data collected through the Metropolitan Waste and Resource Recovery Infrastructure Capacity Assessment project
[28]Source: Victoria in Future 2015 (VIF 2015), Department of Environment, Land, Water and Planning, 2015

12.3 Future opportunities

MWRRG is developing a Metropolitan RRC/TS Growth Strategy to provide a framework to support change within the metropolitan RRC/TS network. This framework will need to be able to respond to local, regional and statewide needs. The growth strategy will focus on four strategic directives that will facilitate the growth of the metropolitan RRC/TS network in order to manage future waste volumes and increase resource recovery:

- enabling the network to reduce the impacts of landfill closures in the south east region through increased resource recovery and efficient consolidation and transport of materials, e.g. e-waste, organics, timber
- prioritising the aggregation and collection of priority materials and other emerging local issues
- identifying and facilitating opportunities for local employment and economic participation through social enterprise and boutique business
- partnering with local government to fill the gaps in local drop off services.

It is anticipated that these directives will lead to a measurable increase in diversion rates above the 2015 rates across the metropolitan region. Additional capacity is needed in the south east, central and northern sub-regions to encourage greater aggregation and recovery of material to minimise the amount of material sent to landfill. Recovery will be encouraged in a viable and sustainable way. That is, resource recovery will be increased for materials where there is a viable business case, where there is a demonstrated market for the goods and services using the recovered materials, and where better community, environmental and public health outcomes can be demonstrated.

Table 27 sets out options for the growth of the RRC/TS network to respond to future challenges. The preferred option is Option 3. This provides comprehensive coverage of the strategic directives of the Metropolitan RRC/TS Growth Strategy (the required actions are outlined in Section 1: Strategy). The factors affecting the environmental and financial performance of waste and resource recovery infrastructure are outlined in Section 4 and are relevant to the options described below in Table 27.

Table 27 Options for metropolitan RRC/TS network

Option	Summary	Strengths	Weaknesses
Option 1 - Business as usual	Support the RRC/TS network to expand to manage projected volumes, including infrastructure required to efficiently consolidate and transport additional residual MSW due to closure of south east landfills	Addresses growth in waste to be managed through the network Reduces the impact of south east landfill closures by providing efficient consolidation and transport of waste for disposal in other sub-regions	Limited increase resource recovery through the RRC/TS network Residual waste stream not targeted
Option 2 - Option 1 plus maximise resource recovery in existing network	Support the RRC/TS network to expand to meet projected need and maximise resource recovery in existing network, focusing on priority materials	Reduces impact of landfill closures and growth in waste through the network Facilitates incremental improvement in resource recovery	Opportunity for increased resource recovery limited by existing network constraints Residual waste stream not targeted
Option 3 - Option 2 plus new pre-sort infrastructure	Drive 25% diversion from residual MSW through new infrastructure, achieved through landfill contract	Significant lift in resource recovery and reduced pressure on existing landfill, through targeting residual waste stream	Potential risk that market will not respond

13 RESOURCE RECOVERY (MRFs) INFRASTRUCTURE

This section at a glance:

- The most common form of resource recovery infrastructure is material recovery facilities (MRFs).
- Metropolitan Melbourne has 10 MRFs that receive waste and/or recycling materials that have been collected from households and businesses by local governments or private contractors across Melbourne.
- There is capacity in the network to manage greater volumes of commingled recyclables.
- Future challenges facing MRF's sector include:
  - an increasing range of products and materials requiring recovery (e.g. polystyrene, soft plastics)
  - managing contamination rates (requiring on-going effort to minimise contamination through education)
  - fluctuating commodity prices.

Resource recovery infrastructure receives waste and/or recycling that has been collected from households and businesses by local governments or private contractors. Large commercial facilities do not generally allow for drop off of materials by householders or businesses in the metropolitan region.

The most common form of resource recovery facilities are material recovery facilities (MRFs). These receive commingled recycling from MSW and C&I waste streams collected by local government or private contractors. The recovered material is sorted and sent to reprocessors. Any residual material (material that cannot be reprocessed into new items) is sent to landfill for disposal.

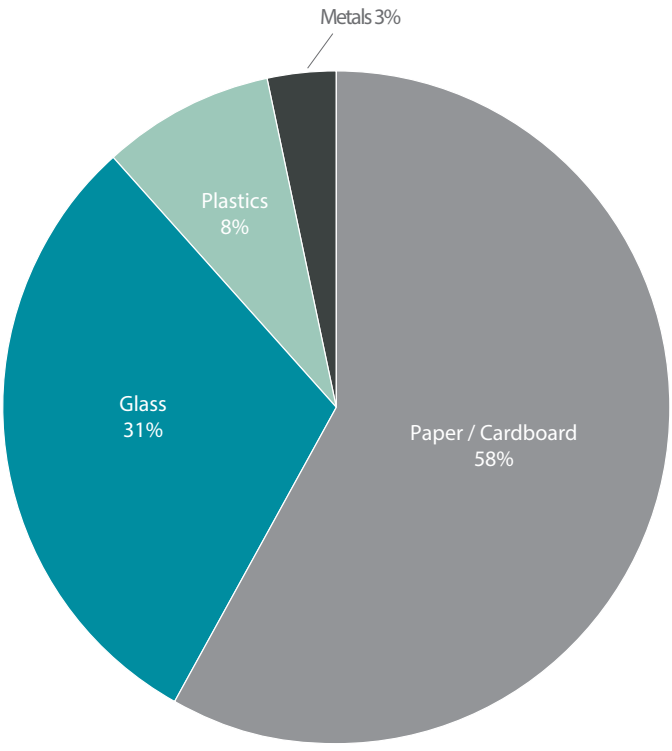
13.1 Current status

Recovery facilities in the metropolitan region include material recovery facilities (MRFs) and food recovery facilities. The network of MRFs has a combined estimated capacity to manage around 1,079,000 tonnes of material each year.

In the 2013-14, MRFs received and processed approximately 751,000 tonnes of waste. This indicates spare annual capacity of 328,000 tonnes. As noted in Table 21, MRFs in the metropolitan region play an important role in processing materials from other regions particularly commingled recyclables. The recovery of materials via MRFs in the metropolitan region is exclusively handled by the private sector.

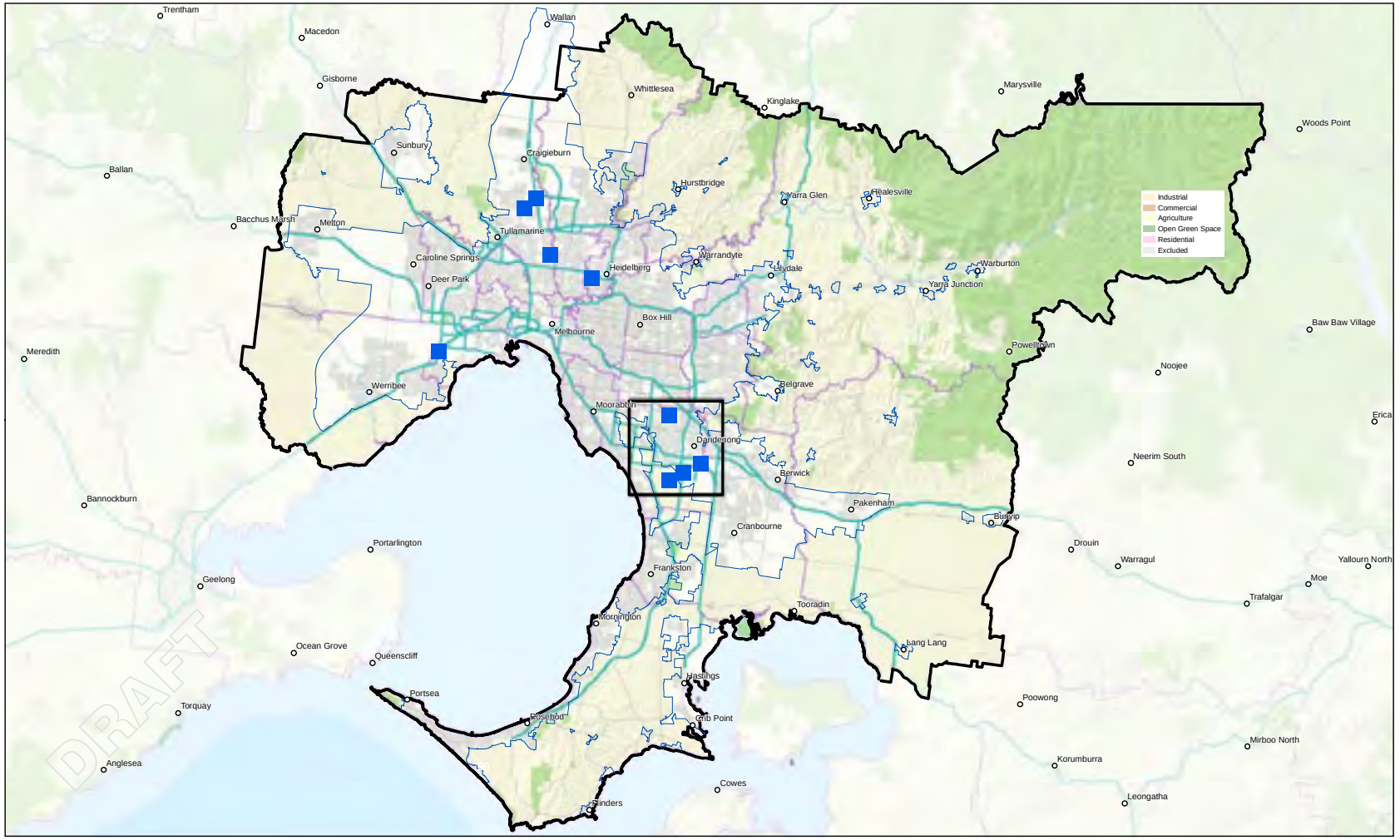
Figure 8 shows a breakdown of the materials that are received and processed at Melbourne's recovery facilities with the majority being paper/cardboard and glass (locations in Figure 9).

Figure 8. Materials that are received and processed at Melbourne's recovery facilities



Source: Metropolitan Waste and Resource Recovery Infrastructure Capacity Assessment project report

Figure 9. Locations of metropolitan resource recovery facilities



Paper Size A3

0 2.5 5 10 15 20

Kilometres

N

LEGEND

Material recovery facility

Study Area Boundary
Principal Freight Network
Urban Growth Boundary (UGB)
Major Roads
Major Watercourses

LGA Boundaries
Major Water Areas
Residential Areas
Parks and Reserves

Job Number	31-33086
Revision	D
Date	09 Mar 2016

13.2 Analysis of future needs

It is projected that by 2026, 913,000 tonnes will need to be managed through metropolitan recovery facilities. This still leaves 166,000 tonnes of annual of spare capacity available.

Future challenges facing the MRF sector include:

- an increasing range of products and materials requiring recovery (e.g. polystyrene, soft plastics)
- managing contamination rates (requiring ongoing effort to minimise contamination through education)
- fluctuating commodity prices.

The factors affecting the environmental and financial performance of MRFs is detailed in Table 28. If market conditions become unfavourable, some facilities may opt to send unsorted material to South East Asia for processing.

Ongoing effort is required to minimise contamination through education and through optimising kerbside services. This is discussed further in Section 5.

Table 28. Factors affecting the environmental and financial performance of MRFs

Infrastructure category	Materials Recovery Facility (MRF)
Environmental and Financial Performance in the Region	**Market conditions** • Significant falls in commodities prices are impacting profitability (e.g. plastics, metals and glass) • Many commodities separated at MRFs are dependent on export markets which have contracted in the last few years due to stricter controls on waste imports **Economies of scale** • Able to secure volumes through MSW kerbside recycling contracts **Policy settings** • Increasing levy rates have been one of a number of factors that have driven additional material into MRFs. The levy rate stabilises in 2015/16 **Management of emissions and amenity** • Main concerns are with odour and noise from operations **Sustainability and other benefits of recycling/recovery** • Separation and recovery of materials provides an environmental benefit
Opportunities	• Improve sorting efficiency and quality of recovered products (tied to the ability of the operator to secure MSW contracts and access capital) • Increase volumes of recyclables by facilitating aggregation of C&I with existing MSW flows • Reduce contamination (and associated disposal costs) through community and business education (Victorian Waste Education Strategy) • Business model for MRF operators may change with ongoing commodity price risk • End market conditions are likely to persist as related to commodities prices. However, as commingled recycling is a recognised core service for most councils the market will continue to support MRF operators • Potential for the development of a methodology which may allow MRF operators to access Emissions Reduction Fund (ERF)

13.3 Opportunities

There is capacity in the network to manage greater volumes of commingled recyclables that could be collected through source separated commercial collections, or through municipal collections.

Audits of putrescible landfills indicate significant scope for recovering more commingled materials, including[29].

- paper/cardboard, which comprises 223,000 tonnes per annum or 10% of all material entering landfills
- plastics, which comprises 334,000 tonnes per annum or 15% of all material entering landfills
- glass, which comprises 67,000 tonnes per annum or 3% of all material entering landfills.

Targeted programs to increase aggregation and collection of commingled recyclable materials may increase annual through-put tonnages above the 'business as usual' projection for MRFs. This plan seeks to increase the amount of recyclable materials recovered from the residual municipal solid waste stream through long term, stable group contracts. Given these potentials, it is assumed that the market would respond and boost the number of MRFs to match the available material quantities. Existing MRF infrastructure may adapt, expand or new infrastructure may play a role, ultimately however, this is a market decision.

[29]EC Sustainable – Metropolitan waste to landfill compositional audit project, 2014. Note: the 2014 metropolitan landfill compositional audit results produce different figures than those generated through the Metropolitan Waste and Resource Recovery projection model. The 2014 landfill compositional audits were undertaken for C&I and MSW source sectors only. The results are indicative and provide supplementary data to the projection model.

14 REPROCESSING INFRASTRUCTURE

This section at a glance:

- Reprocessing facilities receive recyclable materials that have been either separated at source, or have been sorted into separate material streams at a recovery facility.
- This section analyses the future infrastructure needs of a range of dry materials including: plastics, paper, glass, textiles, metals, C&D, rubber and tyres, wood and timber, and organics.
- Reprocessing is subject to a variety of market factors including the availability of materials and technology, quality of feedstock (contamination of material streams), viability of current business models, international commodity markets and end markets for manufactured products.
- MWRRG can play a role by assisting with the consolidation of MSW dry recyclables streams through collective contracting/procurement and identifying other opportunities to achieve economies of scale, such as facilitating connections between commercial generators and processors/reprocessors.

Reprocessing facilities receive recyclable materials that have been either separated at source, or have been sorted into separate material streams at a recovery facility. Reprocessors change the physical and/or chemical structure of materials to manufacture either end products or feedstock materials to be used in other manufacturing processes.

14.1 Plastics reprocessing

14.1.1 Current status

Plastics reprocessors in the metropolitan region receive segregated material via MRFs or through direct collection/drop off arrangements. Plastic reprocessors have a combined annual capacity of 20,000 tonnes per annum, and process around 19,000 tonnes a year. The export market also plays a role in plastic processing.

Plastics can be reprocessed to make a range of products. Rigid plastics are chipped or shredded before being used to manufacture new products. Flexible, lightweight plastics (commonly used in product packaging) are reprocessed to make products such as fence posts, bollards, outdoor furniture and decking.

The recovery of flexible plastics has been challenging due to difficulties with separating it from other kerbside commingled recyclables. Most of the material currently recovered comes from source separated collections. A metropolitan MRF has partnered with four councils to collect soft plastic in the kerbside recycling bin, and this project may provide a future metropolitan wide pathway for collecting this material for reprocessors.

Expanded polystyrene (EPS) is common in the packaging of white goods and in the transportation of fresh produce and medical products. Challenges for EPS processors include:

- high transportation costs impacting on quantities made available to reprocesses
- food contamination
- falling prices for reprocessed EPS product/s.

14.1.2 Analysis of future needs

It is projected that 178,000 tonnes of plastic will be recovered in 2026, requiring a boost in reprocessing capacity of 157,000 tonnes. It is anticipated that the export market will continue to play a major role in taking recovered plastics, and so this additional reprocessing capacity may not need to be located in Melbourne. However, there is an identified need for local EPS reprocessing to offer protection against low export prices. Table 29 provides further analysis of the factors affecting the environmental and financial performance of plastics processing infrastructure.

Table 29. Factors affecting the environmental and financial performance of plastics processing infrastructure

Infrastructure category	Plastics
Environmental and Financial Performance in the Region	**Market conditions** • There are limited local end markets leading to reprocessors sending material offshore • International markets play a large role in receiving recovered plastics and performance is influenced by commodity prices • Exports of mixed plastics and low grade plastics has been constrained in recent years by increased scrutiny of waste coming into Asian ports **Consumer trends** • There is a trend toward flexible, multi-layered plastics, especially in food packaging. This material increases the shelf life of fresh products but presents a challenge for recycling in Victoria **Management of emissions and amenity** • There are some potential emissions impacts (mainly air) associated with recycling plastics however most are managed well **Sustainability and other benefits of recycling/recovery** • There are considerable benefits from recycling plastics (mainly relating to offsets in energy and oil consumption), however studies suggest a net cost associated with water usage
Opportunities	• Plastics value is dependent on the degree to which it can be separated by type. Clean, well separated plastics can generate strong prices. Improved technology to sort plastics by type could generate greater returns however must be weighed up against the significant infrastructure costs • Export of material is likely to continue to play a significant role for recovered plastics

14.1.3 Opportunities

Flexible plastic has been identified as a priority material within the *Victorian Market Development Strategy for Recovered Resources*. Initiatives that increase aggregation and collection of flexible plastic will complement state market development programs.

Because EPS is a very voluminous and lightweight material, supporting and facilitating an increase in local EPS reprocessing could help reduce residual waste transportation, and reduce disposal to existing landfill.

Boosting plastic reprocessing infrastructure can provide a buffer against unfavourable international markets, however, favourable local markets for reprocessed products would need to exist.

Plastic could also be reprocessed as a component of residual waste collection and processing, and this may also help provide a buffer in the event of internal markets becoming unfavourable.

14.2 Paper and cardboard

14.2.1 Current status

Paper/cardboard reprocessing facilities operating in the metropolitan region have a combined annual capacity of 794,000 tonnes. In 2013-14 these facilities processed around 724,000 tonnes of paper/cardboard, sourced mainly from the C&I sector. It is understood that much of the material for reprocessing is supplied by retail and industry and through commercial collections from offices. Of all paper/cardboard managed in Melbourne, 55% is reprocessed in Melbourne and it is assumed that the balance is exported for reprocessing.

Products from paper/cardboard reprocessing include recycled paper, boxes and packaging.

14.2.2 Analysis of future needs

Recovery of paper and cardboard is linked closely with commodity prices as noted in Table 30. While there is an apparent shortfall in reprocessing capacity to manage recovered materials, the export market is likely to continue to play a major role in processing paper and cardboard recovered in metropolitan Melbourne.

Table 30. Factors affecting the environmental and financial performance of paper/cardboard processing infrastructure

Infrastructure category	Paper / Cardboard
Environmental and Financial Performance in the Region	**Economies of scale** • Access to high quantities of clean material is a key factor. Around two thirds of paper/cardboard is generated in the C&I sector. Tendering of MSW contracts can provide access to the remaining third of feedstock **Market conditions** • Local reprocessing plays a significant role in taking separated paper/cardboard material and manufacturing new packaging products • Export markets are also important, taking separated paper/cardboard materials which have different values and desirability according to quality. Therefore fluctuations in demand and price have an impact • Stricter enforcement on poorly sorted materials entering the Asian economies has had an impact on mixed low grade paper/cardboard. It is likely that this will continue into the future **Management of emissions and amenity** • There are some potential minor issues with odour and liquid waste discharged to the sewer related to paper/cardboard reprocessing. Commercial and industrial discharges to sewer (known as trade waste) are permitted by water authorities and managed to ensure trade waste does not pose a risk to health and safety, the sewerage system or the environment
Opportunities	• Gains in source separated paper/cardboard from the C&I sector through engagement with business may provide an opportunity for increasing economies of scale • Markets for well separated office paper remain strong nationally and internationally • Waste to energy is also an option for paper/cardboard that is highly contaminated

14.2.3 Opportunities

Similar to plastics, boosting local supply of paper/cardboard reprocessing facilities, or collecting and processing paper/cardboard as part of residual collection and processing may provide a buffer for unfavourable international market conditions.

14.3 Glass reprocessing

14.3.1 Current status

There are limited options for glass reprocessing in the metropolitan region.

In 2013/14, 170,000 tonnes of glass was estimated to have been recovered. Of the amount reprocessed in metropolitan Melbourne[30] around 82% is from the MSW sector and 18% from the C&I sector[31]. It is estimated that over 300,000 tonnes of recovered glass is stockpiled in Victoria[32].

Some recovered glass is in a form too fine to undergo reprocessing and is currently stockpiled due to a weakness in the market for products made from crushed glass (fines), and due to contamination with ceramic and stoneware, Pyrex and plastic.[33]

There are challenges associated with glass recovery through kerbside commingled collections, including contamination and crushing. Contaminated and broken glass of mixed colours must undergo optical sorting (beneficiation) to be refined sufficiently to be made into new glass products.

[30]Tonnage reprocessed unspecified to preserve commercial in confidence
[31]Infrastructure Capacity Assessment Report, Hyder Consulting 2015
[32]Sustainability Victoria, Fact Sheet- Market summary – recycled glass, 2013
[33]*Victorian Market Development Strategy for Recovered Resources*

14.3.2 Analysis of future need

Investment in improved sorting infrastructure is needed to increase reprocessing of recovered glass.

Development of the market for glass fines would expand the outlet for fines that are not able to undergo reprocessing.

Table 31. Factors affecting the environmental and financial performance of glass processing infrastructure.

Infrastructure category	Glass
Environmental and Financial Performance in the Region	**Market conditions** • There are limited options for glass reprocessing in metropolitan Melbourne, with the quality of the waste glass material influencing the type of recycled products that can be made • High quality material (cullet) can be used in glass manufacturing is however limited as it can introduce impurities. While the primary application of cullet is for glass bottle production, it can also be used in place of glass fines in aggregate mixes[34] • The glass cullet market is likely to remain stable in coming years and may grow if investment in glass optical sorting infrastructure increases volumes of colour and size sorted material • Glass fines are a lower grade product which is used in asphalt, sand/abrasive grit blasting, asphalt (glassphalt), construction and road aggregates, concrete aggregate, sports turf/drainage, brick making, water filtration, insulation batts and an alternate day cover for landfills[35] **Management of emissions and amenity** • The key issue associated with glass processing has been the management of glass fines. A number of stockpiles exist, impacting on amenity. In the past this has led to notices being issued due to leachate reaching nearby surface water
Opportunities	• Recent work with Victorian water authorities to use glass sand as pipe bedding has improved the markets for this product. Further work in market development would assist in building demand for glass fines product

14.3.3 Opportunities

There are opportunities to complement state market development programs for glass fines by supporting existing industry and future investors to pursue infrastructure expansion.

Supporting the Owens Illinois hub (refer to Chapter 8) – Victoria's only large scale glass reprocessor - will also be important.

14.4 Textiles

14.4.1 Current status

Textiles reprocessing represents the smallest proportion of the overall reprocessing in Melbourne, with current levels of recovery being low.

MWRRG has identified through its research that the main textile materials reprocessed in the region are mattresses[36]. It is estimated around 232,000 mattresses were collected by councils in 2014 (with over 90% of them recycled)[37]. Of this, around 55% of the mattress materials are recovered, mostly metal, with only small amounts of textiles recovered. The recovered textile component does not currently enjoy a mature market. The balance material – mostly textiles – is landfilled. Indications are that mattress waste will continue to grow due to population increases and it presents a priority for the region.

Quantities of clothing textiles are also recovered for local reuse or for export, however the data available is limited.

[34]Sustainability Victoria, Fact Sheet- Market summary – recycled glass, 2013
[35]Sustainability Victoria, Fact Sheet- Market summary – recycled glass, 2013
[36]Infrastructure Capacity Assessment Report, Hyder Consulting 2015
[37]Mattress Recycling in Melbourne and Greater Geelong Report, MWRRG, 2015

14.4.2 Analyses of future needs

Advanced mattress reprocessing facilities are likely to be needed to manage and recover growing volumes of mattress waste.

Table 32. Factors affecting the environmental and financial performance of textile processing infrastructure

Infrastructure category	Textiles (including mattresses)
Environmental and Financial Performance in the Region	**Market conditions** • There are limited opportunities for recovery and processing of textiles primarily because costs are high and the value of end products generally low • The textiles market is almost entirely gate fee driven due to the limited resale value of end products • Performance of processing infrastructure is heavily impacted by end markets which have declined in line with general manufacturing **Capex costs/cost of labour** • Processing of mattresses in particular is expensive as it is either heavily automated and requires high capital expenditure (capex) costs, or is via manual deconstruction which requires high operational expenditure (opex)/labour costs **Community willingness to pay** • Consumers are often unwilling to pay the true cost of recovery, instead opting to use kerbside hard waste collections or seek lower rates at transfer stations **Business models** • The industry is strongly driven by through-put and low margins with many processors using lower cost labour alternatives (for example social enterprises) to maintain cost effectiveness. However, small changes in market conditions and high capex costs make recovery operations marginal and prone to issues **Environmental** • There are few environmental issues with textiles recycling
Opportunities	• Given that just 3% of textiles are recovered for reprocessing, there may be opportunities for greater recovery and investment in improved infrastructure where the business case is viable • Work underway within the industry to develop a product stewardship approach may influence recovery of mattresses • Energy from waste infrastructure may become a viable alternative given the market conditions and other factors discussed above

14.4.3 Opportunities

Local government group procurement facilitated by MWRRG could be used to facilitate greater industry uptake and investment in advanced mattress reprocessing that can recover more textiles.

14.5 Metals

14.5.1 Current status

The network of metal reprocessors in the metropolitan region has an annual capacity to reprocess 1.6 million tonnes. In 2013-14 the network handled around 1.2 million tonnes, leaving spare capacity of around 400,000 tonnes per annum.

Metal reprocessing accounts for about 20% of all reprocessing in the metropolitan region. It is understood that most recovered metals are reprocessed locally into a form which is then sold for use in manufacturing.

Shredder floc is a by-product of metal reprocessing, primarily from the recovery of end-of-life vehicles and white goods, including refrigeration and air conditioning equipment. Approximately 150,000 - 200,000 tonnes of shredder floc is generated each year in Victoria, all of which is sent to landfill.

14.5.2 Analysis of future needs

It is projected that 1.73 million tonnes of metal will be recovered in 2026. An additional 138,000 tonnes of annual capacity will be required to meet this need. It is not expected that minor expansions to existing facilities can meet this need.

A government market analysis of shredder floc indicates little market opportunity under current conditions[38]. Other factors affecting the environmental and financial performance of metal processing infrastructure is detailed in Table 33.

Table 33. Factors affecting the environmental and financial performance of metal processing infrastructure

Infrastructure category	Metals
Environmental and Financial Performance in the Region	**Market conditions** • Metals reprocessors are subject to fluctuations in overseas commodities prices for scrap metal • However, some non-ferrous metals are fetching record prices and as such this market is considerably stronger at present **Economies of scale** • The low price of scrap metals is leading to operators "hedging" through stockpiling as they wait for higher prices. This is also because many metals collectors are requiring greater volumes of material to justify transport expenses **Cost of labour/capex costs** • The recycling of scrap steel into steel billet is an energy intensive process and increasing energy costs have impacted margins • Disposal costs associated with the by-products of shredding cars and white goods (shredder floc) to reclaim scrap steel are increasingly impacting business • Local reprocessing of non-ferrous metals such as aluminium have also been impacted by energy prices **Management of emissions and amenity** • Noise issues associated with both scrap metal yards and centralised processing facilities (shredders mainly) have been noted within the industry • The disposal of shredder floc is limited to one licensed landfill and the presence of oils and polychlorinated biphenyls (PCBs) in the material offers some potential environmental risk
Opportunities	• "There are potential opportunities for operators to reduce operational costs as a way of buffering against fluctuating commodity prices. There are options for processing shredder floc using pyrolysis or gasification, however at this stage it is not cost effective to invest in such infrastructure. Ongoing increases in power and waste disposal charges may improve the business case for investment in this infrastructure

[38]Market Summary – shredder floc, Sustainability Victoria, 2014

14.5.3 Opportunities

There are opportunities for supporting industry investment in infrastructure expansion to make metals reprocessing more cost effective.

14.6 Aggregates, masonry and soil

14.6.1 Current status

Metropolitan facilities reprocessing aggregates, masonry and soils (AM&S) have an annual processing capacity of around 5.2 million tonnes. In 2013-14, the network handled 3.4 million tonnes.

AM&S material is sourced exclusively from the construction and demolition sector. The C&D sector contributes almost half of all materials reprocessed in the metropolitan region.

There is currently spare annual capacity of around 1.8 million tonnes.

14.6.2 Analysis of future needs

Demand for AM&S processing is closely linked to economic conditions, in particular construction activity, as noted in Table 34. The fluctuation of AM&S processing demand is understood by industry and the over supply of capacity can be used to meet future requirements that may arise over the next decade. Further analysis of the factors affecting the environmental and financial performance of AM&S processing infrastructure is provided in Table 34.

Operators have indicated planned expansions to existing operations which will increase the spare capacity in the medium to long term. Some of these planned expansions are yet to obtain the necessary planning approvals and if these are not obtained, new sites and opportunities will need to be explored.

The Alex Fraser resource recovery facility in the Clayton South precinct hub only has planning permission to operate for a further eight years. If this facility does not remain in the region, the south east is at risk of inadequate AM&S reprocessing. MWRRG would work to facilitate and help identify alternative AM&S reprocessing capacity and additional new solid inert landfill capacity in the region would be considered as a last resort.

Table 34. Factors affecting the environmental and financial performance of AM&S processing infrastructure

Infrastructure category	Aggregate, masonry and soils
Environmental and Financial Performance in the Region	**Policy settings** • An ongoing driver supporting the diversion of masonry products is the landfill levy. When combined with increasing operational costs at landfills it makes the business case for recycling heavy materials strong **Transport/freight** • The cost of transport for AM&S materials impacts the cost of recovery where distances to reprocessors are great. This may impact reprocessing in the south east of Melbourne if new solid inert landfills are approved **Management of emissions and amenity** • Amenity issues associated with noise and dust impact the performance of AM&S processing infrastructure • Community concerns have impacted on the social licence to operate of a number of facilities
Opportunities	• The AM&S industry is intrinsically linked to the construction market which is predicted to increase over the next 5 years indicating positive signs for AM&S processing infrastructure • The uptake of end products for construction and road development projects is favourable with competitive pricing and work being undertaken by Victoria and NSW to increase the use of recycled aggregates

14.6.3 Opportunities

The Alex Fraser facility is a significant metropolitan resource recovery facility and consideration should be given for relocation within the south east so it can operate beyond the next eight years.

14.7 Rubber and tyres

14.7.1 Current status

An estimated 76,000 tonnes of tyres were recovered in 2013-14. The portion of these[39] that were locally reprocessed were primarily sourced from the C&I sector.

Many end of life tyres are directly exported overseas for tyre derived fuel, and many more have been stockpiled in the past despite the current availability of local reprocessing capacity. The practice of stockpiling tyres to avoid disposal or processing fees undermines best practice reprocessing operations.

Tyre reprocessing generally involves shredding, separating the steel fraction and grinding of the rubber to form granules or powder. These materials can be used to make a variety of products, including soft surfacing, matting and adhesives. Crumbed rubber can also be used in road construction. Shredded tyres can be used to form tyre derived fuel.

In 2015, EPA Victoria introduced stricter regulatory requirements for storage of tyres.

14.7.2 Analysis of future needs

Existing local reprocessing capacity falls short of projected recovery of tyres. Additional capacity will be required by 2026 to manage projected recovery. Exporting of tyres is expected to continue to play a role in supplementing local reprocessing capacity. Table 35 provides further analysis of the factors affecting the environmental and financial performance of rubber and tyre processing infrastructure.

Table 35. Factors affecting the environmental and financial performance of rubber processing infrastructure

Infrastructure category	Rubber and tyres
Environmental and Financial Performance in the Region	**Market conditions** • Local recycling of end of life tyres has contracted by around half in the past five years. This is due in part to limited local options for tyre derived products and cheaper off shore options for tyre derived fuel (TDF) **Policy settings** • The introduction of regulations for the management of end of life tyres is likely to improve the economic performance of infrastructure **Management of emissions and amenity** • Stockpiling of material for reprocessing or illegal storage constitutes significant risks for surrounding communities and the reprocessing facility in terms of potential fire and the associated impacts on air and waterways. Recent changes in legislation have been made to prevent this occurring • A significant proportion of tyres are exported for use as fuel in thermal processing facilities around the world. Adequate environmental management standards of destination countries are an important consideration
Opportunities	• There is a considerable price differential between local markets for high quality tyre crumb and international markets for TDF. Margins can be large enough to warrant investment in reprocessing technology to produce crumbed rubber. This is dependent on demand for high quality crumbed rubber which is currently limited in Australia • Improving local markets is a focus of the newly formed Tyre Stewardship Australia

[39] Tonnage reprocessed unspecified to preserve commercial in confidence

14.7.3 Opportunities

The Tyre Stewardship Australia (TSA) has been formed to implement the national Tyre Product Stewardship Scheme aimed at reducing stockpiling, landfilling and other undesirable end of life practices. There are opportunities for governments to partner with the TSA with the aim of maximising local recovery.

14.8 Organics

Case Study: Collecting biomass data from waste generators

In June 2015, SV was approached by the Rural Industries Research & Development Corporation (RIRDC) regarding Victoria's participation in the Australian Biomass for Bioenergy Assessment (ABBA), a national project to collect biomass data from waste generators across Australia with the potential for use as a feedstock in bioenergy generation. The RIRDC was seeking funding for the project from the Australian Renewable Energy Authority (ARENA).

In January 2016, funding of $3 million for ABBA was announced by ARENA. The project aligns with a number of key actions identified in the *Victorian Organics Resource Recovery Strategy*, namely:

- identification of the locations and volumes of available biomass across regional Victoria
- identification of the opportunities for the aggregation and/or consolidation of organic waste streams, particularly from the C&I sector to support business and industry investment in organic waste management facilities
- working with the Waste and Resource Recovery Groups (RWWRGs) to identify C&I organic waste streams (the target sector), identifying volumes and location as well as opportunities.

The project includes data collection, translation to the Australian Renewable Energy Mapping Infrastructure (AREMI) platform and development of analytics for increasing the quality of data interpretation to investors and organics recovery project proponents. The AREMI platform is the channel through which data will be translated into readily accessible mapped information. The mapping platform is currently being developed by National ICT Australia (NICTA), Australia's Centre of Excellence in Information and Communication Technology Research and Development. The project is a five year project, with key deliverables staged over the next 18 months.

Note: Biomass includes organic materials from animal waste and bedding, forest residues and timber waste, food and agricultural waste and can be converted into beneficial products such as fuel, power or soil conditioners.

14.9 Food and garden organics

Organics reprocessing facilities biologically reprocess organic material to produce a variety of products including mulch, compost, and soil conditioners.

The bulk of metropolitan organic waste is currently reprocessed in two ways:

- in open windrows, where organic matter is laid out to compost and then mechanically turned to aerate and encourage the physical breakdown of material
- in-vessel composting which uses more advanced technologies that processes organic material in a sealed building to provide optimal conditions for quick composting.

A number of metropolitan businesses and organisations also use small, on site processing technologies that process organic waste on site.

14.9.1 Current status

There are six organic reprocessors in metropolitan Melbourne, with a combined annual capacity of 296,000 tonnes per annum. In 2013-14 these facilities processed around 253,500 tonnes.

It is also estimated that around 140,000 tonnes of metropolitan municipal garden organics are processed in facilities in regional Victoria annually.

Regional processing plays an important role in managing seasonal fluctuations in garden waste volumes. Regional processing also provides a strategic link between Melbourne's municipal garden organic waste and agricultural markets.

There is limited food organics reprocessing capacity in metropolitan Melbourne.

MWRRG is managing the facilitated procurement of council contracts to recover and process municipal garden and food organics. These processes are projected to facilitate a metropolitan network of organics facilities that will have the capacity to process 400,000 tonnes annually by 2026.

Small, on site organic processing facilities are also emerging as a complementary suite of organics reprocessing infrastructure for metropolitan Melbourne.

Table 36 outlines a range of on site technologies in use across Melbourne.

Table 36. On site organics processing facilities

Site	Technology	Capacity	Outputs and end uses
Degraves Street, Ross House Melbourne City Council Town Hall	The dehydrator unit uses heat from steam, gas or electrical power to dry organics into a friable powder/ crumb that can be applied to land. These units are used by commercial kitchens and food outlets generating at least 30-50kg of food organics per day (e.g. ~0.5 x 240L wheelie bin).	The capacity of this dehydrator is 1,200 kg per day. Dehydrators can be modular and capacity can range from 30 kg to 2,000 kg per day.	Units are economical as they allow garbage to be collected less frequently where premises are charged on a per lift basis. City of Melbourne has trialled use of outputs in their landscaping operations. Restaurant owners are using some outputs in their vegetable gardens.
Melbourne Zoo	This aerobic composting unit is controlled and fully automated. The units progressively mix, aerate and move organic material through a chamber.	The capacity of this unit is 2,500 kg per day. A range of units are available: • 300-400 kg per day • 1-1.5 tonnes per day • 2.5 tonnes per day • 10 tonnes per day.	Units take good mixed organics feedstock including food packaging and animal manure. Outputs are a pasteurised product ready for application to land or blending. Zoo is reapplying outputs to its landscaping.
Healesville Sanctuary	This biological vermiculture system consists of a bin containing a number of chambers/baskets that operate as worm farms. These are fed at the top, and emptied to collection trays at the base.	The capacity of this unit is 350 kg per week There are a range of sizes: • 50kg/day • 100kg/day • 300-1,500kg/day. On average 4,000 worms can process 1kg of food per day.	These units work with sites with moderate to high generation of food organics. The worm juice and castings are used on site for landscaping.
Austin Hospital - Heidelberg, Barwon Health – Geelong, MSAC – Melbourne, Bentleigh West Primary School – Melbourne, Mars Petcare – Wodonga, Melbourne University - Parkville	These sites use contained heater units and a biological, thermophyllic ('heat loving') bacteria that can tolerate temperatures over 70C. The unit is loaded at one end and processed over a 24 hour period. The system reduces the volume and weight of food organics by 80-90%, and reduces the odour risks associated with food organics.	The capacity of these units vary from site to site. Different sized units are available (kg/ day): 4, 20, 60, 100, 200, 600, and 1,000.	The outputs are a dried friable material that can be applied to soil. Once dug into moist soil, outputs will rapidly degrade and add nutrient and organic matter. Mostly used in landscaping at venues.

14.9.2 Analysis of future needs

It is projected that 370,000 tonnes of garden organic waste will be recovered in 2026. Based on the anticipated capacity growth of the metropolitan network to 400,000 tonne per annum by 2026, Melbourne will have adequate capacity to process this waste.

Additional processing capacity will be needed to recover significant quantities of food organic waste (sourced from both the municipal and commercial sectors). It is expected that this will be achieved through closed, advanced systems within metropolitan Melbourne, or through open composting systems in regional Victoria. This is because environmental regulations are expected to largely limit metropolitan organics processing to facilities that are a closed system.

It is also likely that councils will need to increase the capacity of existing kerbside food and garden collections in order to recover greater amounts of food and garden waste. This could be achieved by moving to a universal garden bin collection system and/or moving to weekly collection. Alternatively, councils may look at options for achieving greater uptake of the user-pays collection service. Councils have a strong commitment to diverting food and garden waste away from landfill, but cost considerations need to be taken into account.

As noted in Chapter 18, some councils need flexibility in how they recover food and garden waste. For these councils, recovery through the residual bin may be a better option.

To support a successful organics recovery network, ongoing efforts will be needed to develop markets. The State Infrastructure Plan notes that "Increasing the amount of resources recovered from individual material streams requires market demand for products made from the recovered materials. Without this demand, and sustainable markets, recovery industries are not viable."

As noted in Table 37, the risk of contamination also needs to be minimised through community education and investigating the use of decontaminating technologies. Contaminants (for example, glass and plastic) diminishes the overall commercial viability of recycling organic waste and the confidence customers have in the product.

Technologies that process source separated commercial food waste are an emerging opportunity for Melbourne. The State Infrastructure Plan notes that:

- commercial food waste has low contamination levels, which offers an opportunity to use this material as base loads for producing energy, refuse derived fuels and other related products
- food waste can be used to supplement anaerobic digestion of sewerage at waste water treatments plants.

Consultation and market assessment processes indicate that there is industry interest and support to establish infrastructure that can treat organic waste. For example, Yarra Valley Water is currently commissioning an anaerobic digestion facility that will process 100 tonnes of waste each day, from local commercial waste producers such as markets and food manufacturing. See Chapter 15 for further information on the Yarra Valley Water facility. There is a need to support these emerging technologies. Technologies like anaerobic digestion can be commercially delivered across a wide range of annual processing volumes and at sites throughout the metropolitan region. This flexibility may lead to anaerobic digestion being the first Advanced Resource Recovery Technology type to be deployed across the region.

The Victorian Government can provide support by identifying and facilitating opportunities to aggregate commercial food waste.

Securing appropriate sites within metropolitan Melbourne is likely to be a challenge. While market processes will determine preferred locations, government has a facilitation role to play to help reduce market barriers and uncertainties.

Table 37 provides further descriptions of the factors affecting the environmental and financial performance of organics processing infrastructure and associated opportunities.

Table 37. Environmental and financial performance of organics processing infrastructure

Infrastructure category	Organics Processing
Environmental and Financial Performance in the Region	**Market conditions** • Compost markets are constrained. However, there has been some improvement in recent years with bulk movement of material occurring from Melbourne to Gippsland and into north east Victoria • End market conditions are intrinsically linked to contamination and quality of end products and products designed for specific uses. Gross contamination from household waste remains an issue • Transport costs associated with moving recycled organics into agricultural markets. Back-loading is commonly employed to off set this impact **Economies of scale** • Organics processing facilities benefit from the secure flow of feedstock from MSW kerbside services. New infrastructure is supported by MWRRG's collective procurement approach **Policy settings (including land use planning)** • Encroachment can impact the operation of some existing facilities • There is limited suitable land for development of new facilities particularly in built up areas **Community willingness to pay** • Most council kerbside organics services are optional, user pay services • In the absence of strong end markets, pressure is placed on facilities to recover investment through gate fees **Management of emissions and amenity** • EPA Victoria's guideline *Designing, constructing and operating composting facilities* details the expectations for the management of organic waste in order to meet the State Environment Protection Policies (SEPPs) and Regulations • *Designing, constructing and operating composting facilities* outline requirements for composting facilities that suggests it will be difficult to manage open windrow facilities in developed areas in the long term • The performance of open windrow composting facilities is considerably impacted by the generation of odour and potential leachate contamination of ground and surface water. Managing these issues remains a considerable challenge for operators
Opportunities	• Opportunities relate primarily to the value of, and demand for end products. Improvement of conditions for end markets may be achieved through introduction of new infrastructure and household education, for example through the Back to Earth Initiative • The potential for compost producers to generate credits under the Emissions Reduction Fund may present new opportunities to industry. CSIRO is investigating the ability of recycled organics to add carbon to soil • This industry is strongly driven by the tendering of MSW contracts and there are opportunities to combine C&I sources to achieve greater economies of scale • Expansion of existing kerbside services, including introduction of food waste, may present an opportunity

14.9.3 Opportunities

Recovering food and garden waste from landfill is a high priority for metropolitan Melbourne. Diverting organic waste will reduce the impacts caused by these materials when they break down in landfills, such as odour, leachate and methane.

Table 38 sets out options for maximising the recovery of organic waste material. The preferred option is Option 3 because this maximises the recovery of food and garden organic waste, which is in line with the strategic objectives of this plan.

Table 38. Options for maximising recovery of organic waste material across the metropolitan region

Option	Summary	Strengths	Weaknesses
Option 1: Business as usual	• Deliver an annual processing capacity of 404,000 tonnes, in line with local councils' contractual procurement commitments	• Adequate capacity to manage projected garden waste • Certainty of delivery • Limited changes needed to municipal kerbside services	• Inadequate capacity to recover significant tonnages of municipal food waste • Significant market development needed to support infrastructure
Option 2: Option 1 plus boost processing capacity in regional Victoria	• New facilitated group procurement to maintain and boost processing capacity in regional Victoria (up to 200,000 tonnes)	• Capacity to recover up to an additional 200,000 tonnes of food and green waste • Provides some capacity for commercial food and garden waste • Easier access to agricultural markets	• Significant market development needed to support infrastructure • Significant effort needed to minimise contamination arising from adding food into municipal green bins
Option 3: Option 2 plus boost commercial food waste processing capacity	Focused effort to: • aggregate commercial food waste quantities • support new investment and co-location with water treatment • support uptake of small, on site processing	• Makes clean, source separated food waste available for existing/ potential investors • Increases flexibility through on site options	• Significant market development needed to support infrastructure • Uncertainty regarding annual tonnages that can be achieved, and securing appropriate sites within metropolitan Melbourne

14.10 Wood and timber organics

14.10.1 Current status

The features and needs of reprocessing wood and timber organics is quite different from that used to reprocess food and garden organics. Because of these differences, this plan considers wood and timber separately from food and garden organics.

There is limited information available around wood reprocessing.

Approximately three quarters of wood/timber for reprocessing comes from the C&I sector, with smaller amounts from C&D and MSW. Most reprocessed timber is managed through dedicated reprocessing infrastructure, with a smaller portion shredded at some transfer stations.

14.10.2 Analysis of future needs

Local reprocessing capacity and viability is key to the recovery of wood and timber. A large portion of timber waste currently goes to landfill and significant additional reprocessing capacity is required to support greater diversion from landfill. There is a particular shortage of options for managing contaminated or treated timber products primarily because of the extra expense involved in ensuring safe processing and end use. Other factors affecting the environmental and financial performance of wood and timber processing infrastructure is presented in Table 39.

Table 39. Factors affecting the environmental and financial performance of wood/timber processing infrastructure

Infrastructure category	Wood / Timber Processing
Environmental and Financial Performance in the Region	**Market conditions** • There are significant issues in moving low quality, mixed timber in the market from RRC/TS, C&D and C&I sorting facilities to processors. Significant stockpiling is occurring as a result **Management of emissions and amenity** • Timber processing is generally a low impact activity. However, there may be some noise impacts associated with large shredder chipping and visual amenity impacts arising from stockpiling
Opportunities	• An opportunity in this area is the emergence of energy from waste technologies able to utilise woody biomass to generate power • New road projects could offer an opportunity for bulk movement of recovered timber for landscaping

14.10.3 Opportunity

Expanding the capacity of timber reprocessing will be required as projected recovery grows. Market development for end products will be needed for this to occur as processing is closely tied to the availability of market outlets for the recovered products.

Organics (including timber) have been identified as a priority material within the *Victorian Market Development Strategy for Recovered Resources*. There are opportunities to complement state market development programs for timber by supporting existing industry and future investors to pursue infrastructure expansion.

15 RESIDUAL WASTE PROCESSING

This section at a glance:

- There are currently no residual waste treatment facilities operating in the metropolitan Melbourne region that accept municipal waste and commercial waste.
- Market sounding has reveal significant interest in residual processing infrastructure.
- Group procurement facilitated by MWRRG is a significant market lever that can boost municipal recovery rates though establishing residual processing infrastructure in Melbourne.

Residual waste processing manages mixed municipal and commercial residual waste. This infrastructure recovers recyclable materials and/or energy where it is viable. The remaining residual material is sent to landfill.

There are two main types of residual treatment infrastructure (Table 40):

- Sorting, which uses a combination of mechanical and hand sorting processes to recover materials from the residual stream. Materials recovered are sent for reprocessing while unrecoverable residual material is disposed
- Advanced Resource Recovery Technology facilities (ARRTs) which may use or reprocess the residual waste stream:
  - as a feedstock to a mechanical process to produce organic compost material
  - to produce energy from waste.

Table 40. Residual waste processing infrastructure

Facility type	Description
Sorting	
Refuse derived fuel (RDF) production facility	A facility whose primary purpose is to process residual waste (MSW, C&I, C&D, PIW) to separate recyclables and manufacture RDF. The facility does not recover energy from the waste or fuel on site. Fuel products may be solid, liquid or gaseous. Unrecovered materials are sent to landfill.
Mechanical biological treatment (MBT) facilities	A facility that processes residual waste (MSW, C&I, C&D) to separate recyclables and an organic fraction from the residual waste. The recyclables are sent to reprocessors. The organic fraction is processed on site anaerobically and/or aerobically to recover energy and/or produce a soil improver. Unrecovered waste is sent to landfill or for energy recovery.
Dirty MRF	A facility that accepts a residual waste stream and then proceeds to separate out designated recyclable materials through a combination of manual and mechanical sorting. The sorted recyclable materials may undergo further processing required to meet technical specifications established by end markets while the unrecovered waste is sent to a disposal facility such as a landfill.
Wet MRF	A facility that combines a dirty MRF with water, which acts to densify, separate and clean the output streams. It also breaks down and dissolves biodegradable organics in solution to make them suitable for anaerobic digestion.

Facility type	Description
Mechanical heat treatment/autoclaving (MHT)	A facility that processes residual waste (MSW, C&I, C&D) to separate recyclables and produce an organic-rich fraction (floc). The recyclables are sent to reprocessors. The floc may be further processed on site anaerobically and/or aerobically to recover energy and/or produce a soil improver. Alternatively the floc may be incorporated into a refuse-derived fuel. Unrecovered waste is sent to landfill or energy recovery.
Advanced Resource Recovery Technologies	
Combustion processes	Combustion of mixed residual waste in an excess supply of oxygen or air. Energy is usually recovered through a water tube boiler and heat exchangers to generate steam. Steam is then fed into a steam turbine to generate electricity, and/or is supplied to a district heating/cooling network, or used in industrial processes.
Advanced thermal treatment processes	Processes include, but are not limited to: • pyrolysis – the thermal decomposition of a pre-prepared RDF in the absence of oxygen or air to produce a gaseous fuel, liquid fuel, or solid fuel • gasification – the thermal decomposition of an RDF in a limited supply of oxygen or air to produce a gaseous fuel • plasma gasification – the high temperature decomposition of mixed residual waste or an RDF through the use of plasma to produce a gaseous fuel
Anaerobic digestion	Production of methane rich biogas from food and/or garden waste that is separated at its point of production, or through mechanical pre-sorting of residual waste listed above.

15.1 Current status

There are currently no residual waste treatment facilities operating in the metropolitan Melbourne region that accept and process large volumes of municipal waste and commercial waste. Some industries operate small facilities to manage waste produced on site.

Yarra Valley Water is currently constructing an anaerobic digestion plant in Wollert. When operational in early 2017, the facility will process 100 tonnes of commercial waste (from sources such as markets and food manufacturing) each day[40].

15.2 Analysis of future needs and priorities

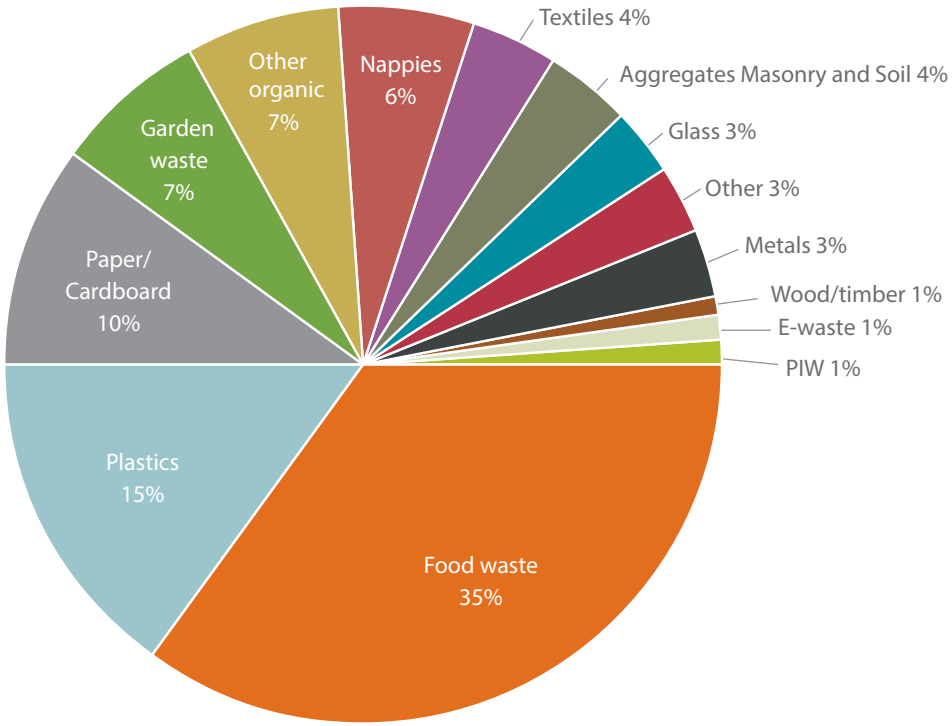
Residual processing infrastructure will need to be established to reduce reliance on landfills in metropolitan Melbourne. If these technologies are deployed as part of an integrated waste and resource recovery network, they have the potential to divert significant volumes of waste away from landfill.

There are significant quantities of materials entering metropolitan landfills that could be recovered through residual processing. Figure 10 shows the indicative composition of waste entering metropolitan putrescible landfills in 2014. Recovery opportunities from this composition include:

- food and garden waste, which makes up 42% of all municipal solid waste and commercial and industrial waste material landfilled
- dry recyclable materials, which makes up 36% of all municipal solid waste and commercial and industrial waste material landfilled.

[40]Yarra Valley Water, http://www.yvw.com.au, 2016

Figure 10. Indicative composition of MSW and C&I material entering landfills, 2014



Source: EC Sustainable – Metropolitan waste to landfill compositional audit project, 2014.

Note: the 2014 metropolitan landfill compositional audit results produce different figures than those generated through the Metropolitan Waste and Resource Recovery projection model. The 2014 landfill compositional audits were undertaken for C&I and MSW source sectors only. The results are indicative and provide supplementary data to the projection model.

Recovered waste materials, and the products manufactured from these materials need viable markets to underpin the commercial viability of residual processing infrastructure.

MWRRG engaged with the waste and resource recovery sector (through its 2015 Market Assessment process) to understand the sector's plans and aspirations. This intelligence has been used to inform the Metropolitan Implementation Plan. MWRRG's engagement indicated:

- significant interest from across the resource recovery industry in new or expanded resource recovery infrastructure
- a wide range of infrastructure proposals, from existing technologies currently used in metropolitan Melbourne to new advanced technologies
- a range of potential facility capacities and locations
- varying levels of proposal development status and readiness
- a limited number of proposals ready to proceed immediately
- many options requiring suitable land for siting.

Public consultation has confirmed broad support for moving towards landfill alternatives. This consultation also highlighted a number of barriers that industry and local government consider need to be addressed.

Common concerns include:

- identifying and securing suitable land for siting infrastructure
- securing aggregated, long term supply of waste feedstock
- long term policy direction around alternatives to landfill, in the context of higher gate fees for advanced technologies, compared to landfill gate fees, along with the desire for targeted investment to stimulate demand
- a lack of markets for recovered products and energy, and the need for government to assist with developing these markets.

There is also some concern that Advanced Resource Recovery (ARRT) Technologies may adversely impact on the established resource recovery processing.

15.2.1 Infrastructure selection

There is a broad range of technologies that have been deployed internationally to process residual waste. These technologies could be expected to be successfully established in metropolitan Melbourne.

Some stakeholders have expressed their preference for the Metropolitan Implementation Plan to clarify what technology it proposes for Melbourne. Deployment of technology types in Melbourne will need to be determined through market processes, as

this will ensure the sector puts forward and commissions technology options that can be sustainable in the metropolitan Melbourne context.

Any residual processing technology that is deployed within the metropolitan network will need to achieve the following outcomes:

- align with the Victorian Government's waste and resource recovery goals and strategic directions stated in this Metropolitan Implementation Plan, the State Infrastructure Plan, and the *Victorian Organics Resource Recovery Strategy*
- be a viable alternative to landfill that provides the best environmental, community and environmental benefit for the metropolitan community
- meet all necessary regulatory requirements
- be commercially sustainable with proven technologies that have been deployed at scale internationally
- meet the needs of municipal and commercial waste generators
- develop a social licence to operate.

Table 41 presents an indicative analysis of the technical, financial and commercial aspects of these technologies, based on a review of international facilities. An economic analysis commissioned by MWRRG to inform the Metropolitan Implementation Plan indicates that establishing residual processing infrastructure is likely to deliver a net economic benefit[41]. It is difficult to quantify technical, financial and commercial parameters within the Melbourne context outside a line market transaction.

Table 41 Residual waste processing infrastructure technology options

Material stream	Technology option	Outputs	Cost band (capex per tonne of capacity)	Scale (installed processing capacity – tonnes per annum)	Facility cost
Residual waste (MSW & C&I)	Combustion	Heat/electricity/metals/ bottom ash/fly ash	$650 - $1,350	20,000 – 1.5 m	$27 m - $975 m
	Pre-sorting / dirty MRF	RDF/recyclables/residues	$55 - $80	15,000 – 100,000	$1.2 m - $5.5 m
	Mechanical biological treatment	Organic fraction/RDF/ recyclables/residues	$220 - $875	50,000 – 500,000	$43.75 m - $110 m
	Mechanical heat treatment	Recyclables/organics/ residues	$280 - $550	50,000 – 500,000	$27.5 m - $140 m
Prepared waste or RDF	Plasma gasification	Heat/electricity/metals/ inert slag	$1,150	5,000 – 20,000	$5.75 m - $23 m
	Gasification	Syngas/electricity/heat/ ash/fly ash	$600 - $850	10,000 – 250,000	$8.5 m - $150 m
Separated food and/or garden waste	Anaerobic digestion	Biogas/electricity/heat/ digestate/compost	$350 - $600	5,000 – 100,000	$3 m - $35 m

[41]Energy from Waste in the Context of Metropolitan Melbourne, Arcadis, 2015

It is anticipated that the first Advanced Resource Recovery Technology deployed in metropolitan Melbourne will be a small to medium sized facility.

Technologies like anaerobic digestion can be commercially delivered across a wide range of annual processing volumes. This flexibility may lead to anaerobic digestion being the first technology type to be deployed across the region.

Table 42 presents a range of scenarios that indicates the scale of processing infrastructure that may be required to achieve increased resource recovery rates by 2026[42]. In assessing likely processing volumes for residual reprocessing, it is important to note that:

- the required processing capacity is greater than the tonnages of material recovered
- while advanced resource recovery technologies significantly reduce the volume of waste sent to landfill, they still produce a residual component that needs to be disposed to landfill. Some technologies produce material that must be landfilled in a prescribed industrial waste landfill.

Table 42. Reprocessing infrastructure scenarios

MSW recovery rate	Additional MSW recovery (tonnes per annum)	Required MSW processing capacity (tonnes per annum)	Additional C&I processing capacity (tonnes per annum)	Total required capacity* (tonnes per annum)
Mechanical biological treatment processing capacity				
49% (Business as usual)	0	0	0	0
55% (moderate increase)	165,000	276,000	55,000	331,000
65% (high increase)	442,000	737,000	147,000	884,000
Energy from waste processing capacity				
55% (moderate increase)	165,000	207,000	41,000	248,000
65% (high increase)	442,000	553,000	110,000	663,000

*Assumptions:

Mechanical Biological Treatment:

- Inputs 80% MSW and 20% C&I
- Outputs 5% recyclables, 30% compost product, 25% moisture and mass loss, 40% residuals to landfill (60% diversion).

Energy from Waste:

- Outputs: 10% recyclables, 70% mass loss, 20% ash residuals (80% diversion).

[42]Infrastructure Capacity Assessment Report, Hyder Consulting 2015

A detailed analysis and strategy will be needed to inform any procurement of these technologies. Successful deployment is likely to need:

- an understanding across all levels of government, industry and community of technologies types, their application to the Melbourne context, and the benefits such technologies could bring to Melbourne
- to successfully operate as part of an integrated metropolitan network of waste and resource recovery infrastructure that includes a broad suite of collection services, resource recovery and processing facilities and landfills (some material will always need to be landfilled, and capacity will be needed for responding to contingency events)
- appropriate land. The recent rapid deployment of energy from waste facilities in the United Kingdom indicates that securing suitable land is likely to be a major challenge
- secure access to a sufficient quantity of suitable waste over the lifetime of the facility (for some technologies, large continuous feedstocks of material are needed for long term contracts)
- to be bankable, with secure funding for capital investment available to achieve and maintain commercial viability
- secure long term contracts for the supply of energy to buyers through a power or purchase agreement
- adequate lead time to commission and deploy this new infrastructure, and to develop and strengthen markets for the products made from recovered residual waste. MWRRG anticipates around seven to 10 years to deploy Melbourne's first Advanced Resource Recovery Technology
- a clear and common understanding of regulatory requirements across all players
- engagement with all sectors of the community.

15.3 Opportunities

The landfill analysis in Chapter 16 underpining the Infrastructure Schedule flags that a boost in metropolitan infrastructure will be needed to manage the closure of landfills in the Clayton South precinct.

This increase in capacity is needed to reduce volumes of waste that would otherwise be landfilled in the remaining four large landfills serving Melbourne. This reduction will help reduce the burden that additional volumes may present to communities living in the vicinity of these landfills.

There is a major opportunity to slow the growth of waste to landfill over the next 10 years by establishing residual processing infrastructure and new organics processing facilities across the metropolitan region.

15.3.1 Municipal solid waste

Municipal solid waste is a consistent, secure and reliable stream of residual waste. Facilitated group contracts can aggregate this waste and make it available for potential investors of new infrastructure. This is a critical success factor for deploying Advanced Resource Recovery Technologies.

Municipal waste makes up just under half (47%) of all material landfilled in metropolitan Melbourne (around 1.3 million tonnes per annum). Much of this waste (around 1 million tonnes) is managed through group landfill service contracts that MWRRG facilitates on behalf of 26 councils. These contracts are due to expire in 2023.

Renewing these contracts is an opportunity for local government and their communities to ask the waste and resource recovery sector to put forward a wide range of solutions for managing its residual waste. A 25% recovery target by 2026 is considered achievable, and if all metropolitan councils participated in this facilitated procurement around 300-400,000 tonnes of waste every year could be diverted from landfill.

Table 43 sets out how a step change in managing municipal waste can slow the growth rate of waste to landfill, so that by 2026 waste can be kept at 2015 levels.

Table 43. Scenarios for contribution of municipal solid waste to landfill

	Waste to landfill (million tonnes per annum)			
	2015	2026: Business as usual	2026: 25% recovery of all household residual waste	2026: 25% recovery of all household residual waste + 200,000 tonnes new organics processing*
Municipal solid waste	1.3	1.4	1.1	0.9
Metropolitan total	2.8	3.3	3.0	2.8

*Chapter 14.9 – Reprocessing infrastructure organics, describes MWRRG preferred option, which is to establish 200,000 tonnes per annum of additional organics processing facilities by 2026 (this is in addition to the 400,000 tonnes per annum capacity that existing municipal contractual and procurement commitments are expected to deliver. This capacity is reflected in the Infrastructure Schedule)

Establishing Victoria's first tranche of residual processing infrastructure through municipal contracts is also likely to help establish and stimulate a wider market for ARRTs across Victoria.

There are also opportunities to explore on site treatment options for major infill redevelopments and new growth area suburbs within metropolitan Melbourne. These include locations like Fisherman's Bend where new existing waste infrastructure would have the capacity to meet growing community needs, reduce the need to transport waste out of these precincts and delivers local benefits from investment in local waste recovery opportunities.

15.3.2 Commercial and Industrial waste

Some commercial waste is expected to be processed at residual processing facilities that have been deployed through facilitated local government group procurements.

To attract investment in purpose-built commercial facilities, waste materials need to be aggregated and made available for the resource recovery sector.

An opportunity exists for the Victorian Government to partner with commercial waste generators and the resource recovery sector to facilitate the aggregation of waste volumes. At this stage it is difficult to estimate the recovery tonnages that may be achieved through this aggregation.

15.3.3 Realising the potential of converting waste to energy

The Metropolitan Implementation Plan supports and promotes the deployment of new, efficient technologies that convert waste into energy as part of an integrated waste and resource recovery network.

Australia has few major waste to energy facilities[43]. Most facilities are small-scale, generating less than 10MW of electricity (such as landfill gas capture projects). However, there is significant potential for growth in this industry and there are a number of major projects underway[44]. Major projects typically take at least seven years from conception to operation. Benefits of technologies that convert waste to energy include renewable energy and heat generation (including baseload power), lower carbon emissions and diversion of waste from landfill. However it is important to manage possible air, water and soil pollution and by-products. There are also challenges with reliable waste streams, contamination and financing.

The case studies below highlight significant and varied waste to energy projects underway.

Eastern Creek, Sydney, NSW

The largest proposed waste to energy project in Australia will cost around $500 million and generate 140MW of electricity. The facility will use moving grate incineration technology, one of the most common waste to energy technologies. It will be able to process up to 1 million tonnes of waste per year. It would be located next to a landfill, transfer station and Materials Recovery Facility in Western Sydney. It is estimated that this project will generate 65 full time jobs. Plans for the facility were submitted in 2013, and an EIS was exhibited in 2015. Issues raised by the public, councils and NSW EPA include concerns about: air pollution (including dust and odour), management of contaminants with the waste stream, processing of ash, pollution of waterways and soil and general lack of detailed information[45]. Construction is unlikely to start within the next two years.

Kwinana, Perth, West Australia

This $400 million facility is expected to generate up to 32MW of electricity. The incineration facility will use reverse-acting stroker grate combustion technology, a common waste to energy technology. The company have an agreement with eight local councils to process their post-recycling household waste, up to 400,000 tonnes per year. Planning for the facility has taken seven years - the WA EPA has recently recommended approval with conditions for air quality and ash management[46]. The final decision is now with the Environment Minister. It is estimated that the project will generate 800 construction jobs and 60 operational jobs[47].

Port Headland, Pilbara, West Australia

The $180 million facility was approved in 2013, with construction beginning in 2017 and operation in 2019[48]. It will process up to 130,000 tonnes per year, using gasification technology to generate syngas which then is burnt to generate 16.6 MW of electricity. The ash by-product can be used in road construction. The facility has received $50 million of funding from the Clean Energy Finance Corporation[49]. The facility will accept municipal waste from two councils, as well as commercial and industrial waste. A Materials Recovery Facility diverts recycling before the waste is converted to energy.

Landfill gas capture, Victoria

The Siting, Design, Operation and Rehabilitation of Landfills Best Practice Environmental Management ensures that no safety or environmental impacts are caused by landfill gas. It states "in order to manage landfill gas and minimise greenhouse gas emission, appropriate landfill gas containment ... and landfill gas collection systems must be developed, implemented and monitored." The landfill gas management system should be designed prior to establishing the landfill and should be progressively installed during the operational period of the landfill. The gas captured from landfills can be converted into electricity.

Local government action, Victoria

In the metropolitan region, a number of councils have expressed a desire to explore the potential of landfill alternative technologies such as those that convert waste to green energy, as a means to increase resource recovery and reduce the amount of waste sent to landfill. Action 1 of this plan is to facilitate and establish new infrastructure that can recover resource from residual municipal waste through the re-tendering of MWRRG's landfill services contracts.

[43] https://www.cleanenergyfinancecorp.com.au/media/107567/the-australian-bioenergy-and-energy-from-waste-market-cefc-market-report.pdf
[44] http://www.energybusinessnews.com.au/latest-news/1-8-billion-in-waste-to-energy-projects-in-the-pipeline/
[45] http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=6236
[46] http://www.epa.wa.gov.au/EIA/EPAREPORTS/Pages/1538-KwinanaWastetoEnergyProject.aspx
[47] http://www.phoenixenergy.com.au/projects/
[48] http://www.newenergycorp.com.au/projects/pilbara-wa/
[49] http://www.cleanenergyfinancecorp.com.au/investments/case-studies/waste-to-gas-project-reduces-landfill.aspx

A future including residual waste reprocessing

There are currently no residual waste treatment facilities operating in the metropolitan Melbourne region that accept and process large volumes of municipal waste and commercial waste.

Residual waste processing takes mixed municipal and commercial residual waste and recovers the recyclable materials and/or energy where it is viable. The remaining residual material is sent to landfill.

Yarra Valley Water is currently constructing an anaerobic digestion plant in Wollert to better manage organic waste. When operational in early 2017, the facility will process 100 tonnes of organic waste (from sources such as markets and food manufacturing) each day*.

MWRRG's public consultation on the draft Metropolitan Implementation Plan in November 2015 confirmed broad support for moving towards landfill alternatives and highlighted a number of barriers that industry and local government consider need to be addressed. This includes securing suitable land and aggregated, long term supply of feedstock, the policy setting for landfill alternatives and market development for the recovered products and energy.

It is anticipated that the first Advanced Resource Recovery Technology deployed in metropolitan Melbourne will be small to medium sized facilities. Over time, these facilities will play an important part of the integrated metropolitan waste and resource recovery network and will enable us to significantly increase resource recovery and to reduce the amount of waste we send to landfill.

Technologies like anaerobic digestion can be commercially delivered across a wide range of locations and annual processing volumes. This flexibility may lead to anaerobic digestion being the first technology type to be deployed across the region.

This type of technology can help us to manage waste close to where it is produced, reduce transporting requirements, and can potentially play a role in an integrated placed based solution. However, ultimately it is up to the market to respond to the objectives and directions of this plan and to invest in their choice of preferred technology.

Yarra Valley Water's waste to energy facility*

Yarra Valley Water is developing a waste to energy facility in Wollert, north of Melbourne. The facility will convert organic waste otherwise destined for landfills into biogas, and ultimately energy, resulting in more sustainable energy supply, less waste going to landfill and a reduction in greenhouse gas emissions.

The facility will process 100 tonnes of waste each day, delivered by trucks from local commercial waste producers, such as markets and food manufacturing.

Biogas is generated by putting the waste through a process called anaerobic digestion. This is a biological process that uses bacteria to consume organic waste, producing biogas as a by-product. The biogas is then used to power a one-megawatt generator, which will supply power to the facility, the adjacent Aurora sewage treatment plant, as well contribute sustainable electricity to the grid.

*Yarra Valley Water, www.yvw.com.au, 2016

Organics waste and residual waste processing

Organic waste is collected from kerbside and commercial sources via dedicated bins (source separated) and is also collected from the residual bin where it is mixed with other waste materials.

The metropolitan region is well serviced by a network of organic reprocessors that take the source separated organic materials to produce a variety of products including mulch, compost and soil conditioners. This plan seeks to grow this network to recover significant quantities of food organic waste from both the municipal and commercial sectors. It is likely that this will be achieved through closed, advanced systems, such as anaerobic digestion facilities, within metropolitan Melbourne or open composting systems in regional Victoria. Achieving this outcome will significantly reduce the amount of waste going to landfill, and the amenity and environmental impacts that disposing of organics to landfill can cause.

This plan also encourages new technologies to recover the organics contained in mixed residual waste bins to divert this valuable material from landfill. Some 42% of municipal solid waste and commercial and industrial waste landfilled is food and garden waste. These technologies can sort the organics from the residual waste to make it available for reprocessing and the remaining residual materials would go to landfill. While other Advanced Resource Recovery Technologies use the residual waste stream to produce energy from waste. There are a range of technology types that can take residual waste and recover the organic and other valuable materials it contains. It is up to the market to respond to this plan and invest in their preferred technology type for our unique circumstances.

The future will be an integrated system of facilities located throughout the region and neighbouring regions, that collectively divert significant quantities of organic waste from landfill. By 2026, this plan seeks to have the organics reprocessing network manage some 600,000 tonnes p.a of food and garden waste – waste that would otherwise have gone to landfill. Additionally, this plan seeks to establish new infrastructure that can recover resources from the residual municipal waste through the re-tendering of MWRRG's landfill services contracts.

16 LANDFILL INFRASTRUCTURE

This section at a glance:

- There are 21 landfills operating in metropolitan Melbourne. In 2014-15 these landfills received approximately 2.8 million tonnes, which is 27% of all waste managed in Melbourne.
- There is sufficient capacity within the metropolitan landfill network to meet the disposal needs of Melbourne as long as the significant landfills listed in the landfill Infrastructure Schedule continue to operate in accordance with the sequence of fill detailed in Table 11. The biggest change affecting the metropolitan resource recovery and waste network is the depletion of landfill capacity in the south east of Melbourne.
- The priority for this plan is to establish the advanced resource recovery facilities needed to boost recycling and reduce the pressure on existing landfills and the need for new ones.
- Scheduling additional landfills is not supported at this stage. MWRRG will need to review the infrastructure market in three years to assess whether there is an adequate pipeline of new resource recovery infrastructure that has a high likelihood of being commissioned within the 10 years.
- If there is inadequate indication that resource recovery alternatives will be commissioned within the 10 year period, MWRRG will need to review the Infrastructure Schedule with a view to including a new landfill/s.

Landfills are engineered waste disposal facilities that receive and contain waste in the ground. Some landfills capture gas to produce energy.

16.1 Current status

There are 21 landfills operating in metropolitan Melbourne, see Figure 11. In 2014-15 these landfills received approximately 2.8 million tonnes, which is 27% of all waste managed in Melbourne. Of this:

- 1.3 million tonnes (46%) is municipal solid waste
- 1.5 million tonnes (54%) is C&I and C&D waste.

Figure 11. Map of metropolitan licensed landfills

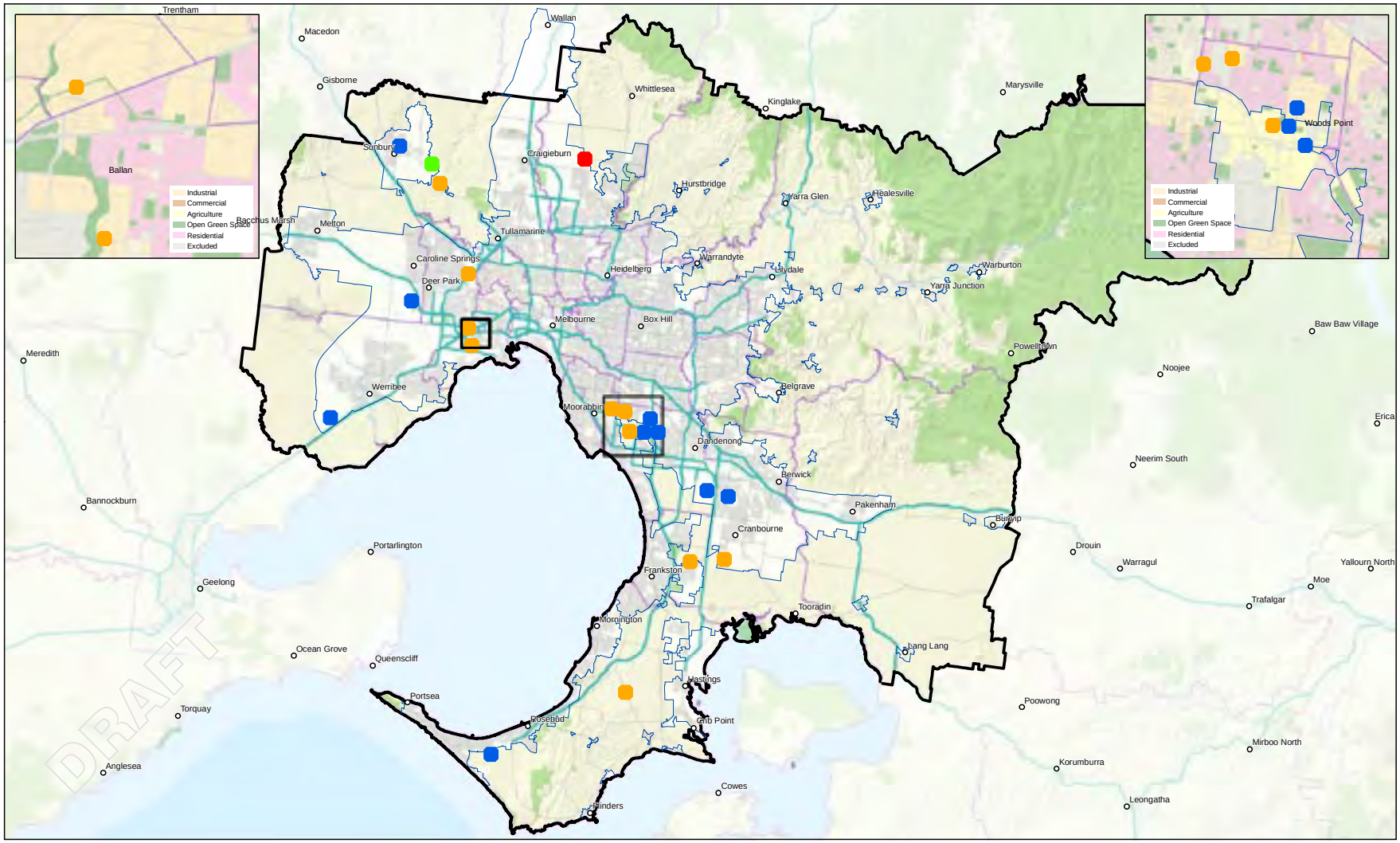


Figure 11 shows where Melbourne's landfills are located. The available infrastructure, transport and the market all interact to influence where waste is landfilled.

Landfills play a central role in protecting health and the environment by safely managing waste materials that have not been recycled. Landfills must be sited, designed, built and operated to the highest possible standards so that the risk they pose to the environment and community can be managed and minimised. Putrescible landfills (receiving material that breaks down and rots) need to be rehabilitated for at least 30 years. In Victoria the best practice standards that must be achieved are set out in the *Best Practice Environmental Management (Siting, Design, Operation and Rehabilitation of landfills) 2010 updated* (Landfill BPEM).

The landfill market has changed significantly over the past 20 years. Historically many small and medium landfills served local communities across metropolitan Melbourne. Knowledge of the environment is constantly evolving, and so is our understanding of how it responds to certain waste and resource recovery practices. This increased understanding has changed regulatory and industry standards for landfills. It has influenced the landfill market to consolidate to few, larger landfills that have been planned and designed as long term facilities. This consolidation has helped achieve the economies of scale needed to invest in advanced engineering technologies, and to operate landfills to best practice standards to better protect the environment.

Landfills are expected to progressively manage less waste because of government policy and programs driving recovery, as well as the growth in the recovery market. That said, it is projected that substantial tonnages of waste will still need to be landfilled in Melbourne over the next 30 years.

16.1.1 Capacity of the metropolitan landfill network

There is sufficient capacity within the metropolitan landfill network to meet the disposal needs of Melbourne for the next 30 years.

The capacity of Melbourne's landfill network is determined by assessing the potential airspace of all existing metropolitan landfills and the projected rates of waste generation.

MWRRG assesses airspace by estimating the potential airspace available for filling at each active landfill site. This is based on EPA Victoria landfill levy data, and on site assessment and surveys conducted with operators. Many landfills are located in quarries. The entire airspace that could become available after materials are quarried – over the next 30 years – is included in the assessment. (This is different from only including the portion of land that has already been quarried, or has a works approval to quarry materials in the short term). Including all the potential space that could be landfilled better informs long term planning, which includes preventing sensitive uses and protecting buffer separation distances.

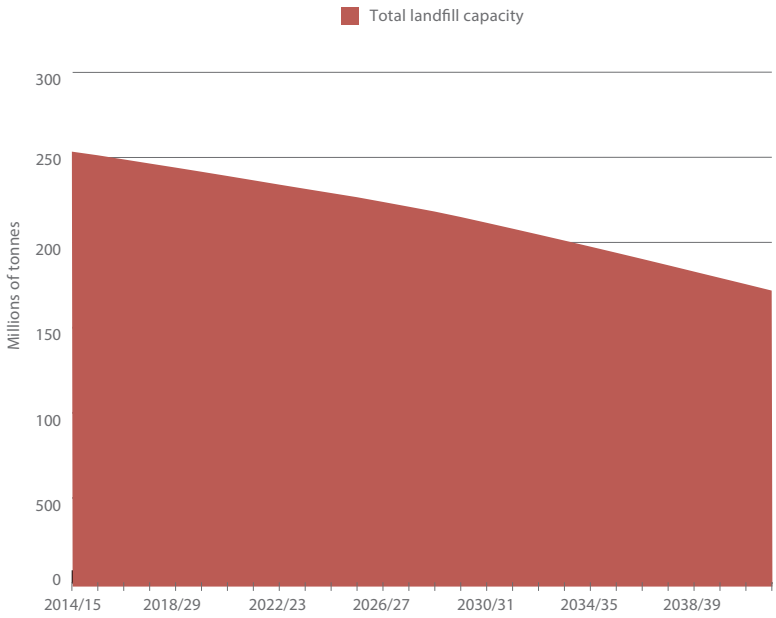
The amount of waste that is projected to be landfilled over the next 30 years is then subtracted from all the potential airspace that is available across all existing metropolitan landfills to calculate the likely capacity of the landfill network.

It is acknowledged that the potential airspace of landfills may not become available, or be needed for landfilling. This could occur for a number of reasons, including:

- land use planning and EPA Victoria approval processes
- market and site factors which may affect quarrying
- increased resource recovery, and new energy from waste technologies being established.

Figure 12 shows the likely disposal capacity of the existing metropolitan landfill network over a thirty year period. The figure shows an adequate supply of landfill within the existing landfill network to meet disposal requirements for metropolitan Melbourne over the next 30 years. However it also shows there will be a steady decrease in landfill capacity in the metropolitan region of about 45% by 2040, with an average decrease of 1.9% per annum.

Figure 12. Projected landfill capacity



16.1.2 South east region

The biggest change affecting the metropolitan resource recovery and waste network is the depletion of landfill capacity in the south east of Melbourne. All landfills in the Kingston Closed Landfull Precinct (part of the Clayton South hub) and the Rye landfill will close within the next three years. This will leave two landfills (SUEZ Hallam and SUEZ Lyndhurst) operating beyond 10 years.

SUEZ Lyndhurst has approval to accept PIW and MSW waste and has an additional MSW cell currently being planned. SUEZ Hallam is sequenced to close in 25 years (2040) but may fill faster than expected if alternative recovery options are not available.

Transport and economic modelling indicates that there is adequate supply of landfill in the northern and western catchment to manage projected landfill rates, and there is adequate transport capacity for hauling additional waste tonnages to the north and west within the principal metropolitan freight network. Feedback on the consultation draft Metropolitan Implementation Plan indicated potentially inadequate transport planning and management at the local level. Communities have reported increased local transport movements, impacts on local amenity and safety concerns.

Modelling assumptions

MWRRG's assessment of potential landfill capacity makes a number of 'business as usual' assumptions. These are:

- the volumes projected to be landfilled are based on historic tonnages with projected growth applied
- the assessment includes all potential airspace at existing sites
- following the loss of capacity in the south east catchment, south east tonnage is not apportioned to specific northern or western landfill sites, therefore reduction in capacity is shown in aggregate only
- the assessment is a base case scenario that assumes no increase in recovery based on the 2015 resource recovery rate of 73%, and no new landfill or landfill alternative is established in the south east following landfill closures.

16.1.3 Metropolitan and regional landfilling

Modelling results show that around 7% of all waste landfilled in metropolitan Melbourne comes from regional Victoria. There is also movement of inert waste generated in Melbourne, into adjoining regions, the most significant being to Maddingley Brown Coal landfill.

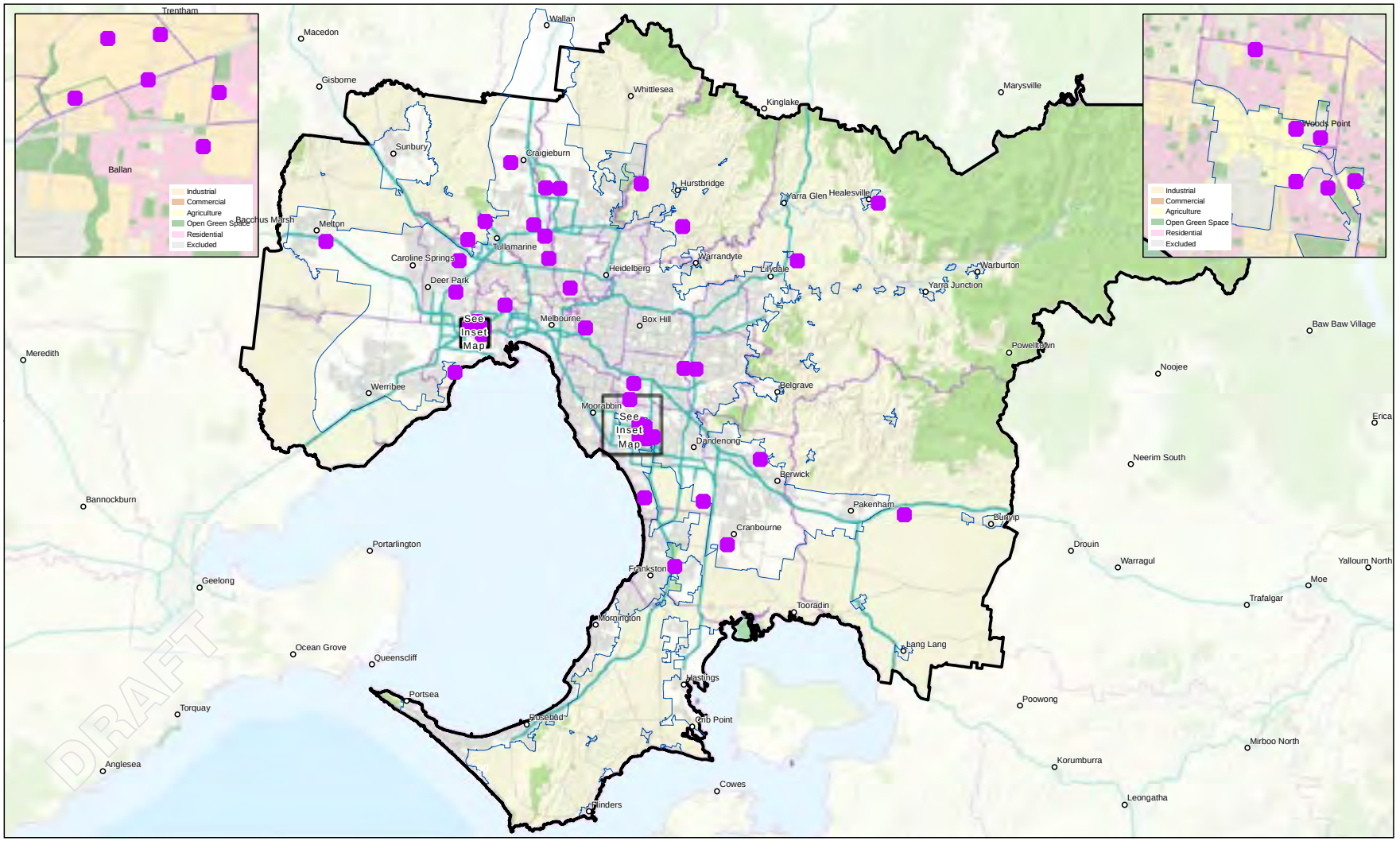
16.1.4 Materials being landfilled

There are significant quantities of material currently being landfilled that have potential to be recovered. There are also significant quantities of green and food waste being landfilled for the C&I and MSW sectors (42%). This is a particular concern given organics contribute to environmental and amenity impacts arising from landfilling, such as odour, leachate and greenhouse gas emissions.

16.1.5 Closed landfills

There are 48 closed landfills under active post closure management, and this list will increase after the Rye and Clayton landfills close (Figure 13). Closed landfills require ongoing management to ensure environmental and public health risks are minimised. Chapter 6.4 discusses closed landfills in more detail.

Figure 13. Map of closed metropolitan landfill



16.2 Analysis of future needs and priorities

It is projected that Melbourne will continue to need landfills over the next 10 years and beyond. There is adequate capacity in the existing network to manage Melbourne projected landfill needs.

However, MWRRG has assessed that a boost in infrastructure capacity across the metropolitan waste and resource recovery network is needed to manage the closure of landfills in the south east region. This boost in capacity is needed to respond to significant community concern with existing large, regional landfills accepting higher volumes of waste. Under a 'business as usual' scenario where no new capacity is deployed, three landfills in the north and west of Melbourne combined are projected to landfill 4 million tonnes per annum in 2041-42.

This boost in infrastructure capacity will need to be operational by the end of this 10 year plan.

There is also community concern with operational impacts from landfilling, including litter, dust, odours, contaminated ground water and visual intrusion into the surrounding place.

If the capacity currently being recovered at the Alex Fraser facility in Clayton South is not transferred to a new south east facility when the current permit expires in 2023, the role of solid inert landfills will need to be further explored. This facility is currently the largest provider of recycled material in the south east.

Local impacts of landfilling, such as transport on local roads, litter and odour, also need to be addressed. Section 3 details the option of preparing plans for hubs, which would identify local transport measures to reduce any impacts, and to drive continuous improvement above and beyond best practice standards so that the incidence of litter significantly decreases. There is a need for landfill operators to continue to embed continuous improvement in their operations, and to work with their communities to develop a social licence to operate.

Other factors affecting the environmental and financial performance of landfills is presented in Table 44.

Managing landfill closures

Landfills in the Clayton South precinct that have served Melbourne for many decades have reached capacity and are closing. This is a significant challenge and opportunity for the metropolitan region.

Melbourne will continue to need landfills over the next 10 years and beyond and there is adequate capacity in the existing network to manage Melbourne's projected landfill needs. However, the Victorian Government and the metropolitan community as a whole aim to make landfilling the last resort and only send waste to landfill that cannot be viably recovered.

The Metropolitan Implementation Plan will reduce the burden on existing landfills and the need for new ones by increasing the amount of organic waste recovered and by significantly boosting resource recovery. New, efficient advanced technologies will be deployed right across the metropolitan region and will be part of an integrated network to recover valuable resources from the waste (including organics) produced by households and businesses. This plan specifically seeks to recover resources from 25% of municipal waste collected through facilitated group procurements (some 300-400,000 tonnes p.a) via new, advanced technologies. This plan will also result in 600,000 tonnes of annual reprocessing capacity to manage food and garden waste from the municipal and commercial and industrial sectors. Technologies like Yarra Valley Water's waste to energy plant can offer place based solutions to waste, helping to manage the waste close to where it is produced and reducing the need for transporting and landfilling.

To minimise the amount of waste that will be sent to landfills it is also necessary to maximise resource recovery at Resource Recovery Centres and Transfer Stations (RRC/TS). These facilities play a critical role in receiving waste, sorting it for recovery and squashing what is left over. This reduces the amount of waste that needs transporting to and disposing of at landfill. The Metropolitan Implementation Plan will result in new RRC/TS facilities being established in the south east region in particular and a significant increase in resource recovery at RRC/TSs right across the metropolitan region.

Making this step change to the way we think about and manage our waste requires not only new and efficient resource recovery infrastructure, it needs an integrated network of facilities that operate according to best practice and have a culture of continuous improvement. Best practice operations, continuous improvement and effective community engagement can reduce impacts of waste and resource recovery facilities on communities and help facilities gain the social licence they need to operate over the long term. This contributes to businesses gaining the confidence they need to invest in the new, efficient technologies we need to significantly increase recycling and reduce the amount of waste sent to landfill. The Metropolitan Implementation Plan will encourage the network to operate in this way.

Table 44. Factors affecting the environmental and financial performance of landfills

Infrastructure category	Landfills
Environmental and Financial Performance in the Region	**Capex / opex costs** • A significant factor is operational costs associated with compliance and monitoring requirements **Policy settings (including land use planning)** • The impact of the landfill levy through its ability to drive diversion has had an impact on the performance of landfill infrastructure over the past decade • Encroachment of sensitive uses on facilities is a significant issue. Residential development has been approved close to, or into, buffers for landfill facilities impacting the long term viability of a number of sites **Consumer trends** • Victoria has an established system for kerbside recycling. Attitudes in the community toward the landfilling of valuable materials continue to shift and sending material to 'the tip' is generally viewed as no longer appropriate **Market conditions** • The challenges in some resource recovery markets continues to drive material being sent to landfill (e.g. timber, polystyrene and plastics) **Management of emissions and amenity** • Amenity issues relating to odour and wind borne litter as well as the management of leachate. Odour complaints can peak from time to time, generally resulting from increased rainfall and poor management practices • Compliance and monitoring requirements adds complexity and cost to landfill management but is generally aimed at improving environmental outcomes including managing greenhouse gas emissions • The need for suitable financial assurance to cover the cost of rehabilitation if sites are forced to close or if operators walk away from a site leaving materials for clean up. A Financial Assurance is required by EPA Victoria as a condition of a licence or a Works Approval for landfills **Post closure rehabilitation / legacy issues** • Whilst the Landfill BPEM is improving the management of new landfill cells, and the rehabilitation of sites currently closing and commencing rehabilitation, there are ongoing risks and amenity issues with some legacy closed landfill sites which predate the current standards

Opportunities	• The primary opportunities relating to the performance of landfill infrastructure are:
	  • improving environmental management (particularly odour and litter) and community engagement
	  • improving leachate management
	• Opportunities to improve economic performance of landfill infrastructure may include:
	  • encouraging operators' provisioning for after care and rehabilitation costs
	  • improved long term planning for cell development to reduce construction and design costs
	  • new provisions to transfer landfill gas projects from the former Carbon Farming Initiative program into the ERF
	• The installation of pre-sorting infrastructure that can extract recyclables from the front end of a landfill can improve margins and preserve airspace, however issues related to markets for RDF off takes will need to be overcome
	• Co-location of resource recovery facilities in general at landfills should also be considered
	• The ongoing focus on compliance and enforcement by EPA Victoria will continue to drive improvements in environmental management and possibly contribute to increased operational costs.
	• Economic performance at larger landfills should remain strong due to high barriers to entry and limited options for processing residual waste

16.3 Opportunities

16.3.1 Infrastructure capacity

Boosting infrastructure capacity across metropolitan Melbourne is needed to reduce volumes of waste that would otherwise be landfilled. This reduction will help reduce the burden that additional volumes may present to communities living in the vicinity of existing landfills, and will also reduce the need to schedule a new landfill for Melbourne.

The priority for this plan is to establish advanced resource recovery facilities to help manage waste that is currently landfilled in the south east. Recovery advances made over the next 10 years should aim at keeping annual landfilling tonnages from growing, maintaining 2015 disposal tonnage at 2.8 million tonnes, with a long term view of reducing tonnages to landfill below 2016 levels, see Table 43.

Table 45 sets out options for boosting capacity. The preferred option is Option 1, and is incorporated in the Infrastructure Schedule. Because an integrated approach to managing residual waste informs this analysis, Table 45 should also be read in conjunction with Chapter 15 – Residual Processing Infrastructure.

Table 45. Options for landfilling and managing residual waste 2016 - 2026

Option	Summary	Strengths	Challenges

Option 1: Boost metropolitan processing capacity by 500,000 tpa in 2026 by scheduling and deploying residual processing infrastructure and organics infrastructure	• Deploy 300,000 tpa residual processing infrastructure through facilitated group procurement of municipal residual waste with 25% recovery target*
	• Boost organics processing capacity by 200,000 tpa through new municipal group procurements facilitated by MWRRG
	• Priority given to establishing new resource recovery/ transfer stations in infrastructure in Melbourne's south east
	• All residual waste managed:
	  • by new Advanced Resource Recovery Technologies such as waste to energy
	  • By landfilling at existing landfills sequenced to operate over the next 30 years
		• Reduces the need to schedule a new landfill for Melbourne
		• Reduces annual tonnages received at existing landfills
		• Helps establish and stimulate a long term market for Advanced Resource Recovery Technologies such as waste to energy
			• Scheduled processing capacity can't be achieved without participation of all metropolitan councils
			• Range of market, regulatory, engagement and siting requirements are untested for Advanced Resource Recovery Technologies
			• Requires complementary market development to support sustainable recovery operations
			• Long commissioning period – evidence of delivery pipeline needed by 2019

Option 2: Schedule a new regional landfill with 500,000 tpa	• New large, regional landfill is established to accept metropolitan residual waste
	• All residual waste landfilled in:
	  • existing landfills sequenced to operate over the next 30 years
	  • new landfill
		• Reduces annual tonnages received at existing landfills
		• Existing local market and deployment of landfills
			• Does not increase recovery rates beyond 'Business as Usual'
			• Limited potential to achieve statewide recovery goals and strategic directions
			• Doesn't respond to community expectation of moving away from landfilling
			• long term rehabilitation needed post-closure for at least 30 years
			• Site likely to be in outer west, or outside metropolitan Melbourne +

Option	Summary	Strengths	Challenges
Option 3: Business as Usual, use existing infrastructure	• All residual waste landfilled in existing landfills sequenced to operate over the next 30 years	• Existing infrastructure is used to managed growth in waste and landfill closures	• Does not respond to community concern regarding existing landfills accepting all metropolitan residual waste • Limited potential to achieve statewide recovery goals and strategic directions • Doesn't respond to community expectation of moving away from landfilling

*All metropolitan councils participate in process; 25% recovery target.

+ the geology and availability of land in Melbourne is such that potential new putrescible landfill sites having a high likelihood of meeting all Landfill BPEM requirements is likely to be located in the west of Melbourne. Landfill options in the south east are likely to be located outside of the Melbourne. While landfilling waste outside the Melbourne region is an option:

- this needs to be a solution that also meets a local need within the Gippsland region. The Gippsland region will consult on their draft Implementation Plan this year
- MWRRG's analysis indicates that capital costs and transport costs combined may not make this the most economically competitive option. However, only a market transaction can confirm this.

16.3.2 Infrastructure performance

There are opportunities to build on and expand best practice management practices to improve the performance of the metropolitan landfill network, and to build and strengthen the social licence to operate landfill sites. This is discussed further in Section 3 – Waste and Resource Recovery Hubs.

16.3.3 Three year review

MWRRG will review this plan in 2019, to confirm that facilitated group procurements and the market can deliver this additional resource recovery infrastructure by 2026. This review will include new contracts, and planning permit and Works Approvals issued.

If there is adequate indication that resource recovery alternatives will not be commissioned within the 10 year period of this plan, MWRRG will review how it will meet the need to manage residual waste.

This could involve undertaking the scheduling process to identify opportunities to meet this need, and may include consideration of existing and new landfill(s) within and /or outside the metropolitan region. Any review and changes to implementation plans, including the schedule, will include stakeholder and community engagement within the region, and, if relevant, in other regions. Stakeholder and community consultation would be broad and in line with statutory obligations.

17 CONTINGENCY PLANNING

This section at a glance:

- Factoring contingency requirements into the assessment of landfill and waste recovery needs ensures that sufficient landfill capacity is available if an emergency or unexpected event occurs.
- Modelling indicates that in an emergency event there are multiple landfill sites within the metropolitan region that could accept material at EPA Victoria's discretion, therefore disposal requirements could be managed at short notice.
- Government is establishing and coordinating a waste and resource recovery contingency planning group to further investigate the waste management requirements caused by emergency events and oversee the process of decision making regarding waste management.

Metropolitan and regional waste and resource recovery groups must factor contingency requirements into the assessment of landfill and waste recovery needs. Planning for and allocating a contingency allowance ensures that sufficient landfill capacity is available if an emergency or unexpected event occurs. It also involves developing a contingency strategy should new waste and resource recovery infrastructure not be delivered as planned or existing waste and resource recovery infrastructure needed is not available.

Contingency events can include:

- predictions for Victoria's future climate, which includes more frequent extreme weather events such as extreme fire, harsher weather, sea storms surges, coastal erosion and more frequent intense downpours that may produce large quantities of waste requiring immediate disposal (or recovery) at short notice
- an adverse environmental event within or outside of the metropolitan region, such as a flood or bushfire that may produce large quantities of waste requiring immediate disposal (or recovery) at short notice
- an adverse event that closes a landfill in the short term requiring short term alternative disposal options. Examples include police operations, on site fires, equipment failure, extreme wind events and on site accidents
- failure of the landfilling industry to progressively plan the development of existing sites and landfill cells to ensure an ongoing cycle of planning, construction and approval of airspace to meet contractual and industry demands
- a proposed waste and resource recovery facility is not commissioned within expected timeframes
- the closure of significant waste and resource recovery infrastructure (e.g. through emergency event/industry or business failure)
- failure of industry to operate as planned and/or contracted, which can inadvertently result in potential stockpiling of source materials or end products that may ultimately mean the products will need to be landfilled.

17.1 Recovery infrastructure

The Metropolitan Implementation Plan relies on the development of new recovery infrastructure that, if not approved and constructed in a timely manner as outlined in the Infrastructure Schedule, could produce strategic failure risks. If a residual waste processing facility is not approved to provide increased resource recovery options new landfills may be required.

To mitigate this risk MWRRG will undertake a review in 2019 of the Infrastructure Schedule, which will include an assessment of council commitments, availability of new waste treatment technology and progress through the procurement and planning approvals processes to gauge the likelihood of delivery of new infrastructure as planned.

MWRRG is mindful that the State Infrastructure Plan promotes viable resource recovery over disposal. However in managing landfill capacity the Infrastructure Schedule must allow for additional capacity to provide flexibility and ensure additional contingency airspace capacity is available, if and when needed.

17.2 Landfill infrastructure

The Metropolitan Implementation Plan is required to sequence the filling of available airspace. The likely closure dates of existing landfills are based on airspace available for landfill disposal.

There is a potential risk that sequenced airspace may be unavailable or have restrictions due to the inability of the landfill site to obtain the necessary planning and Works Approvals for all airspace available. If a site's capacity is restricted alternative landfilling will need to be scheduled. This is particularly the case for large sites that have not secured planning and Works Approvals for the entire airspace available.

17.3 Emergency events

Emergency events can create an immediate need to safely landfill large quantities of waste.

Not having adequate landfill airspace would slow the management of a clean up effort and could cause significant delays in the demolition and removal of debris. This could potentially risk public and environmental health in both the short and long term.

There are operational challenges to providing contingency airspace in case of an emergency event. Sites with readily available airspace scheduled to accept the type of waste produced by an event may not be readily able to receive the waste at short notice. This may be due to procurement delays, contractual obligations or restriction in cell airspace availability.

Modelling has been undertaken to project the quantities of waste that may need to be landfilled in the event of an emergency. This has indicated that in an emergency event there are multiple landfill sites within the metropolitan region that could accept material at EPA Victoria's discretion, therefore disposal requirements could be managed at short notice.

Boosting infrastructure supply to manage landfill closures in the south east is essential for ensuring the metropolitan infrastructure network has ongoing, adequate capacity to accept large amounts of waste at short notice. For contingency planning, it is critical that the required resource recovery Infrastructure Schedule is delivered within the life of this plan. As previously stated, MWRRG will undertake a 3 year review in 2019 to confirm the likelihood of these facilities being established and assess the need for new landfill capacity.

17.4 Risk assessment approach

This plan indicates the metropolitan network has capacity to manage contingency events, based on infrastructure assessments and waste projections. However, operational changes may affect the availability of capacity across the network at any point in time. For this reason, MWRRG will also undertake an annual assessment and survey of landfill sites to determine where contingency capacity is available within the metropolitan network. Should this annual survey indicate changes in capacity, compared to projections in this plan, MWRRG will consider options, in consultation with EPA Victoria, Sustainability Victoria and RWWGs, and this may include recommending the need to schedule additional infrastructure, including landfills.

This annual inventory will be made available (on a confidential basis) to EPA Victoria and emergency services if an emergency event occurs.

Government is establishing and coordinating a waste and resource recovery contingency planning group to further develop a risk management methodology, to investigate the waste management requirements caused by emergency events and oversee the process of decision making regarding waste management. This group will be established in 2016. MWRRG will participate in the process as part of achieving alignment and integration with all regional implementation plans. Through participation, MWRRG may recommend revising its contingency planning approach set out in this plan.

SECTION 5: OPTIMISING WASTE AND RESOURCE RECOVERY INFRASTRUCTURE

18 COLLECTION SYSTEMS

This section at a glance:

- Current municipal kerbside collections provide an essential community service through the regular removal of waste materials from households. They also form part of the supply chain for recovered materials.
- Contamination of kerbside material continues to be a problem and average kerbside diversion rates vary considerably across councils.
- While wider adoption of best practice standards (including Australian Standards) would support consistent education and messaging around the use of bins (particularly relevant for residents moving between municipalities), the high cost of changing over bin infrastructure remains a barrier to uptake.
- To optimise the metropolitan municipal organics network, councils will need to start collecting food scraps in the green bin over the 10 year life of this plan
- There is a need to make hard waste collections more cost effective, and to increase the amount of materials that can be recovered from collections.

18.1 Municipal kerbside collections

Current municipal kerbside collections provide an essential community service through the regular removal of waste materials from households. They also form part of the supply chain for recovered materials by providing a secure supply of feedstock for processors of organic materials and commingled recyclables such as metals and plastics.

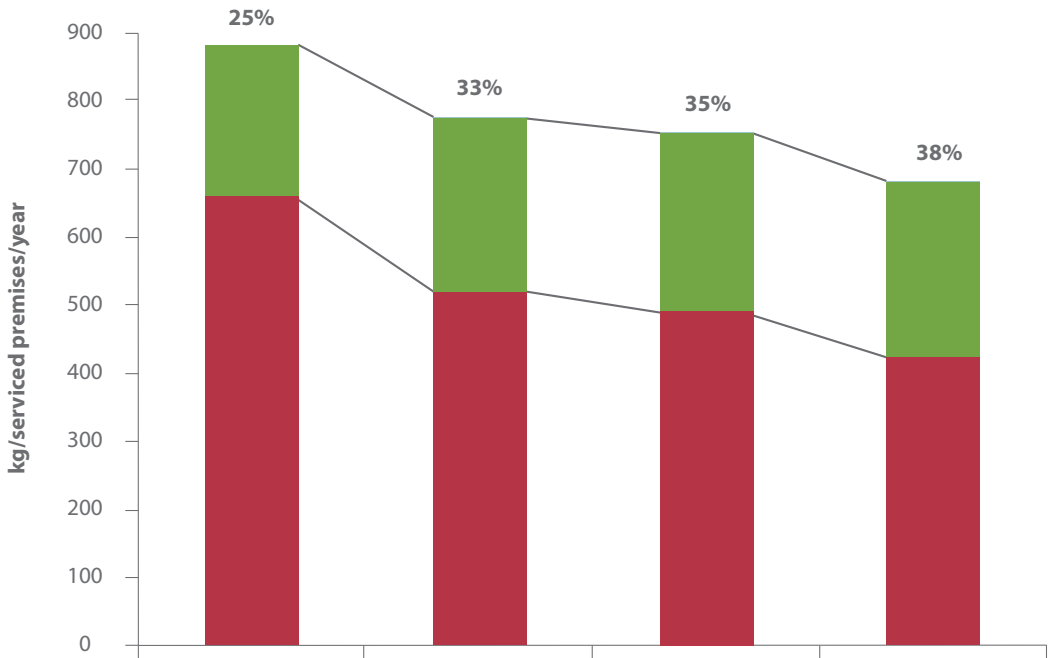
18.1.1 Current status

Municipal kerbside collection services are for the collection of residual waste (garbage), commingled recyclables and organic garden waste from households. Residual collections occur weekly. Commingled collections can occur weekly, or fortnightly, with garden collected on the alternative fortnight.

Residual and commingled bins are generally provided to all households. Most councils provide an organics bin to residents as an optional service, where residents choose this service and then pay a service fee in addition to their rates. However, some councils provide an organics bin to all households along with the residual and commingled bins. Some inner councils do not provide a garden service because of limited gardens that would generate waste, and limited space for storing bins and presenting them at kerbside. There is only a limited uptake of food collections in green bins.

There is a widely used Australian Standard (AS4123, in place since 2008) for bin size and bin lid colour, which is intended to reduce community confusion about how to correctly use bins. Standard bin lid colours help maximise use of the recycling and organics bin, and reduces contamination. The size of residual bins also influences the amount of residual waste and commingled recyclables that are collected, shown at Figure 14.

Figure 14. Comparison of average household weights of garbage and recyclables generated by households with different sized residual bins.



	240L	140L	120L	80L
% Recycled	25%	33%	35%	38%
Kg Recyclables per premises/year	224	256	264	258
Kg Garbage/premises/year	660	519	492	424

Standard bin size

(Source: Draft MWRRG Bin upgrade toolkit, 2015)

There is considerable variation in the configuration of bin colours and sizes that are used by councils across the metropolitan region. More than 75% of councils use a combination of bin lid and body colours that don't comply with the Australian Standard.

Contamination of kerbside material continues to be a problem. Visual truck audits have shown contamination of the green organics stream to be around 8%. Bin audits of the recyclables stream in 2012 showed contamination to be around 13%[50].

The amount of waste collected annually by metropolitan councils is reported in the Victorian Local Government Annual Survey. A snapshot of metropolitan Melbourne's collected waste is shown in Table 46. The most recent survey also shows that while metropolitan Melbourne has an average kerbside diversion (of waste from landfill) of 45%, rates vary across councils, from 20% up to 57%[51].

[50]Get It Right on Bin Night program: Report - Waste and Recycling Audits of Six Councils, 2012

[51]Victorian Local Government Annual Survey 2012-2013, Sustainability Victoria

Table 46. Kerbside services summary, metropolitan Melbourne, 2012-13

	Garbage	Recyclables	Green organics	State total
		Metro		
Annual service cost	$166,555,853	$39,812,515	$49,587,193	$255,955,561
Tonnes collected	813,316	442,099	300,095	1,555,510
Tonnes processed / recycled	—	417,731	289,192	706,923
Total households serviced*	1,717,420	1,681,495	917,860	—
Cost per tonne	$204.79	$90.05	$165.24	$164.55
Cost per household	$96.98	$23.68	$54.02	—
Household yield (kg)	474	263	327	—

* Total households serviced may also include some commercial and industrial properties. Refer to Appendix B and Glossary of Victorian Local Government Annual Survey 2012-2013.

Education is also an essential component of kerbside services to help residents to successfully use their bins. Local campaigns can be developed and delivered by councils, or alternatively councils can adapt metropolitan and statewide campaigns for local rollout. Major education campaigns usually coincide with a change in service or introduction of a new service. The Back to Earth Initiative is progressively being delivered across Melbourne in support of facilitated joint procurement contracts for organic facilities.

18.1.2 Analysis of future needs

While wider adoption of best practice standards (including Australian Standards) would support consistent education and messaging around the use of bins (particularly relevant for residents moving between municipalities), the high cost of changing over bin infrastructure remains a barrier to council uptake.

To optimise the metropolitan municipal organics network, councils will need to start collecting food scraps in the green bin over the 10 year life of this plan. Recent experience indicates that significant community education is needed to support residents to correctly place food in the green bin, with minimal contamination. Universal (provided to all residents along with residual and recyclable bins) weekly collections are also likely to be needed to divert more than 20% of household food scraps into the organics network (refer to Chapter 14.8).

For councils that need flexibility (for example, inner councils), it may be more suitable to divert food waste through the residual bin (refer to chapter 15).

18.1.3 Opportunities

Increasing the quality and quantity of recovered materials could be achieved through:

- upgrading kerbside services to best practice (including Australian Standard AS4123) at the time of contract renewal
- providing households with a larger 360 litre commingled recyclable bin, and a smaller residual bin (where appropriate) at the time of a council's kerbside contract renewal
- implementing metropolitan-wide education campaigns as well as providing ongoing localised household engagement programs
- providing a universal garden waste service for all metropolitan councils
- transitioning garden collections to a universal food and green collection service, in line with the rollout of the municipal organics processing network.

18.2 Municipal hard waste collections

Hard waste collections provide households with the opportunity to dispose of items not normally accepted or possible to fit into garbage bins, for example, white goods and furniture. All metropolitan councils provide hard waste collection services for residents. These are provided as a booked service, or a municipality wide collection scheduled once or twice a year.

18.2.1 Current status

In 2012-13 over 92,000 tonnes[52] of hard waste was collected across the metropolitan region. This is an average of 61 kg per serviced household. Over the past 12 years the:

- quantity of hard waste collected through the kerbside service has increased
- collection costs have more than doubled on a per household and per-tonne basis[53].

While materials recovered decreased significantly until 2011 (dropping from 22%to 9%)[54] it has increased to 24% in recent years, which is likely due to:

- increased awareness by councils of recovery opportunities
- commodity price fluctuations
- increased availability of recovery services
- change from a 'blanket' to a 'booked' hard waste collection service which allows for more recovery.

Hard waste collections from multi-unit developments are challenging if there is a lack of kerbside space and/or insufficient provision for on site hard waste storage and access for collection vehicles. These issues are exacerbated in some higher density areas characterised by high tenancy turn over rates, as residents often leave items behind when they move out.

Hard waste can be dropped off at some resource recovery centres and transfer stations (RRC/TS) as an alternative to kerbside collection.

[52]Victorian Local Government Annual Survey 2010-2011

[53]Victorian Local Government Annual Survey trend data provided by Sustainability Victoria

[54]Victorian Local Government Annual Survey trend data provided by Sustainability Victoria

18.2.2 Analysis of future needs

There is a need to make hard waste collections more cost effective, and to increase the amount of materials that can be recovered from collections.

Maintaining and increasing local drop off options for residents is likely to help reduce illegal dumping. Complementary approaches of education and enforcement may also be required to reduce illegal dumping of hard waste.

18.2.3 Opportunities

Opportunities exist to support councils to improve recovery through advising on best practice approaches to service design and delivery, and through new collective procurement approaches.

Collective procurement also provides an option of recovering mattresses and supporting uptake in advanced reprocessing technologies that can recover both metals and textile components (refer Chapter 14.4).

Renewing facilitated collective landfill contracts may also provide a pathway for recovering and processing greater quantities of hard waste (see Chapter 15).

19 WASTE MINIMISATION

This section at a glance:

- Reducing the amount of waste that is generated is an efficient way to minimise the environmental and amenity impacts of waste materials, and can maximise the capacity of existing resource recovery infrastructure.
- Minimising waste is a high priority for many stakeholders.
- A yearly program of waste minimisation projects, delivered within the framework of relevant state strategies, is a complementary pathway to reducing the need for landfilling, and to reducing environmental and community impacts of organics in landfill.

Reducing the amount of waste that is generated is an efficient way to minimise the environmental and amenity impacts of waste materials, and can maximise the capacity of existing resource recovery infrastructure. The principle of waste hierarchy, contained within the *Environment Protection Act 1970,* requires that waste should be managed in accordance with the following order of preference:

a. avoidance

b. reuse

c. recycling

d. recovery of energy

e. treatment

f. containment

g. disposal.

Minimising waste is high priority for many stakeholders. Activities such as choosing products that have less packaging or that can easily be repaired or recycled, home composting and repairing and reusing goods are practiced by many households and encouraged by local governments, many social enterprises, businesses and communities more broadly. In the metropolitan region, two organisations collect and redistribute food from restaurants and supermarkets at two facilities.

Waste minimisation opportunities for the commercial sector is often referred as resource efficiency. These practices derive the most value from material (and energy) inputs by efficiently converting them into finished products or services, while minimising environmental impacts. For most businesses material costs are the second biggest business expense after labour – and for many manufacturers it is the biggest expense. Material costs account for 30% to 80% of the cost of making a product.

Through Sustainability Victoria, government provides a range of support to help businesses achieve financial and environmental savings. MWRRG will support local government, through its Economic Development Network, to promote and implement state government resource efficiency programs across the metropolitan region.

MWRRG will partner with local government and the commercial and business sector to develop and deliver a yearly program of waste minimisation projects, delivered within the framework of relevant state strategies, as a complementary pathway to reducing the need for landfilling, and to reducing environmental and community impacts of organics in landfill.

Case Study: Morgan Technical Ceramics

A materials assessment for this Melbourne manufacturer highlighted the cost of materials (20% of the business's operating costs) and the true cost of wasted materials along with the significant and surprising savings that could be made by minimising waste.

A range of initiatives were identified to save materials, improve energy efficiency, reduce packaging, minimise waste, and upgrade machinery that have the combined potential to save Morgan Technical Ceramics more than $60,000 per annum.

Morgan Technical Ceramics Australia Pty Ltd, located in the Melbourne suburb of Notting Hill, is a subsidiary of the multi-national Morgan Advanced Materials. The company designs and manufacturers made-to-order zirconia ceramic components primarily used in the service valve and pump industries, oil and gas and metal forming industries. It exports approximately 80% of its products.

Morgan Technical Ceramics initially focused on its materials usage and in June 2014 successfully applied for a $15,000 grant through the Victorian Government's Smarter Resources Smarter Business (SRSB) program toward the cost of a detailed materials assessment of its operations at the Notting Hill site.

The materials assessment involved mapping the main material flows of its operations including packaging, quantifying intensity of use in mass or volume as well as dollars, and identifying opportunities for materials efficiency improvements and waste reduction.

The business received a $3,000 implementation bonus through the SRSB program toward the cost of implementing a number of recommendations from the assessment report to improve materials efficiency.

The assessment found that material costs, mainly expensive, high grade zirconia, accounts for 20% of operating costs.

The assessment also highlighted the real costs associated with process waste and therefore the potential savings available from reducing waste. It found that the purchase price of wasted materials was more than 50 times the disposal costs i.e. the purchase to disposal ratio.

Even more significantly, the true cost of rejected 'finished' product – which also accounts for energy, labour and other costs invested in a product – was found to be 213 times the disposal cost.

The assessment identified annual potential savings of more than $17,000 in material costs (mainly zirconia) by reducing the number of rejected products, $16,000 from reducing final machining and re-tooling of some machines, $6,000 from reduced packaging and a subsequent reduction in waste collections from five per week to one per week saving $10,458.

More information on this and other material and energy efficiency case studies are available from Sustainability Victoria.

Case Study: Food Know How

Food Know How is a food waste reduction program that was jointly designed by Yarra City Council and Cultivating Community with $352,000 funding from the Metropolitan Local Government Waste Resource Recovery Fund. The project commenced in March 2015 and builds on Yarra's previous Food Know How program while also broadening the program to include the Cities of Darebin, Whittlesea, Moreland and Maribyrnong. With council leveraging, the total project value is $686,000.

The project aims to:

- provide fun and engaging assistance and support to local residents to avoid food waste
- recruit and support 1,250 households across the project's five council areas
- reduce food waste to landfill by 20% in 70% of Food Know How Program participants (an average of 14% across all participants) across a six month period.

Since commencement, Food Know How has achieved the following:

- launch of the Food Know How website www.foodknowhow.org.au
- recruitment of 1,303 residents to the program (target reached)
- delivery of program tools, waste minimisation workshops and film events for local residents
- distribution of program communications through the project website and local media.

20 MARKET DEVELOPMENT

This section at a glance:

- Without market demand, and sustainable markets, resource recovery industries are not viable
- This plan supports market development through aggregating material streams, improving and expanding infrastructure, and assisting with education programs to improve the quality and quantity of materials that are recycled.

The State Infrastructure Plan notes "Without (market) demand, and sustainable markets, recovery industries are not viable." Maintaining and developing markets for recovered commodities and products sourced from recovered materials is a high priority for all stakeholders and the community.

It is critical that all actions listed in Section 2 the Action Plan (Chapter 2) build in complementary market development components that are aligned to the *Victorian Market Development Strategy for Recovered Resources*. Elements of this include improving product stewardship, new investment and market stimulation.

This Metropolitan Implementation Plan supports market development through aggregating material streams through facilitating collective procurements for landfill alternative technologies (eg waste to energy), improving and expanding infrastructure, and assisting with education programs to improve the quality and quantity of materials that are recycled.

21 USING LOCATION TO MAXIMISE RECOVERY AND RECYCLING OPPORTUNITIES

This section at a glance:

- When a number of businesses producing similar waste materials are located close to each other, the advantages of proximity can be used to promote cost effective resource recovery.
- Challenges and requirements needed to successfully explore place based opportunities include:
  - an analysis and detailed understanding of the waste stream
  - finding suitable sites for a range of infrastructure
  - sufficient stakeholder consultation and support.

Image courtesy City of Melbourne

When a number of businesses producing similar waste materials are located close to each other, the advantages of proximity can be used to promote cost effective resource recovery. The opportunities of place based approaches include:

- encouraging commercial, residential and industrial building designers and developers to include recycling services and on site treatment at the building design phase, which can then flow to better resource recovery during the operational stages of developments
- reducing transport, improved amenity and safety through fewer truck movements
- supporting industrial ecology, which can unlock significant savings where one business reduces disposal costs for a 'waste' material, and another reduces the costs of purchasing raw material inputs
- supporting planning for developing growth areas or infill residential development so that new communities have access to waste minimisation and recycling services
- using site based recycling technologies that can use waste to provide a local benefit.

The challenges and requirements needed to successfully explore place based opportunities include:

- an analysis and detailed understanding of the waste stream to identify, target and develop systems and technology suitable for collecting and processing that material.
- finding suitable sites for a range of infrastructure, and ensuring sites and operations are able to obtain the necessary planning and environmental approvals
- sufficient stakeholder consultation and support prior to establishing and installing waste and resource recovery infrastructure, and providing new or varied services.

The Metropolitan Implementation Plan supports place based recycling opportunities and small, on site technologies.

22 RESIDENTIAL MULTI-UNIT DEVELOPMENTS

This section at a glance:

- compared to single dwellings, resource recovery rates for multi-unit developments (MUDs) are often lower and contamination rates higher.
- There is a range of statutory and non-statutory planning tools, policies and processes already in place that impact on effective and efficient waste management and resource recovery within MUDs. However these planning tools are not consistent across all metropolitan councils.
- There is broad community and local government support for a better developed MUD policy to ensure the provision of adequate waste bin storage within a property, adequate collection services and off street space for infrastructure.

Melbourne's population growth has resulted in increasing numbers of high density residential and commercial mixed use developments. By way of example, 12 localities currently have had over 1,000 multi-unit developments (MUDs) developed in the past decade, and in the next decade this is projected to be 32[55]. Significant increases in the number of MUDs are expected in the future with more localities building more MUDs than previously.

Historically, the planning system has not adequately provided for developments to accommodate resource recovery. Poorly designed collection areas and infrastructure impact on amenity and are costly to address through retrofitting. The consequence is that, compared to single dwellings, resource recovery rates for MUDs are often lower and contamination rates (non-recyclable materials in the recycling bin) higher. Research commissioned by MWRRG in 2015[56] showed:

- average diversion rate of 22% across multi-unit sites. This is more than 10% lower than general metropolitan household diversion rates
- rate of recyclable materials not recovered (for recycling) of 42% from MUDs compared to 10% from general households
- contamination rates as high as 71% from apartment buildings and a waste and recycling audit of 26 multi-unit buildings within the City of Melbourne showed an average contamination rate of 25%, substantially higher than the 13.5% for general households.

There is a range of statutory and non-statutory planning tools, policies and processes already in place that impact on effective and efficient waste management and resource recovery within MUDs. However, in Melbourne these planning tools are not consistent across all metropolitan councils. This lack of consistency may act as a barrier to ensuring sustainable waste management practices are considered and implemented early in a development's design phase and throughout its operation.

Consultation has shown broad community and local government support for a better developed MUD policy to ensure the provision of adequate waste bin storage within a property, adequate collection services and off street space for infrastructure.

To support the provision of waste and resource recovery services, planners, waste managers, the waste industry and the building industry need clear and consistent standards for waste services and infrastructure in multi-unit/high rise mixed developments.

These standards may be achieved through:

- developing and maintaining appropriate best practice facility design and operational standards for services for multi-unit and mixed use development
- centralising all waste infrastructure and service standards in one location in planning schemes
- providing clear waste and recovery objectives with appropriate standards
- stating the needs and requirements clearly for waste service provision
- making waste management plans a requirement for all multi-unit, high rise and mixed use developments in Victoria
- increasing the level of coordination and consistency of waste and recycling collection services to multi-unit developments.

[55]Multi-Unit Development Waste & Resource Recovery Research Report, GHD report commissioned by MWRRG, April 2015

[56]ibid

23 LITTER AND ILLEGAL DUMPING IN METROPOLITAN MELBOURNE

This section at a glance:

- Cleaning up illegally dumped rubbish costs local government just under $6.3 million across 50 local governments, with a total of 19,074 tonnes collected from 24,308 call-outs.
- The cost of cleaning up roadside litter was nearly $4.2 million across 23 local governments, reporting 10,810 tonnes collected.
- The focus of this plan is to support initiatives that reduce litter and illegal dumping, within the framework of the Victorian Litter Action Alliance and other state based programs.

Litter and illegal dumping continues to pose a significant problem for councils, including environmental and amenity impacts, clean up and collection costs. As reported in the Victorian Local Government Annual Survey Report 2012-13, cleaning up illegally dumped rubbish costs local government more than $7.5 million across 48 local governments, with a total of 20,869 tonnes collected from 38,934 call-outs. The cost of cleaning up roadside litter was more than $4.2 million across 23 local governments reporting 10,810 tonnes collected[57].

While community education has reduced littering, more work is still needed to tackle and reduce littering and illegal dumping, particularly in shopping districts, at clothing bins, on industrial and housing development sites and in peri-urban areas.

Programs that consider the influence of the types and regularity of waste collection services and street cleansing, the positioning of bins, skips and litter traps and site specific locations such as landfills, sporting grounds, parks, shopping centres, construction and industrial zones are to be encouraged. Industry practices could also be addressed possibly as part of workplace training. The *Environment Protection Act 1970* provides a key enforcement strategy for combating the problem of littering in the community.

This plan supports initiatives that reduce litter and illegal dumping, within the framework of the Victorian Litter Action Alliance and other state based programs.

[57] Victorian Local Government Annual Survey 2012-2013, Sustainability Victoria

24 COLLECTIVE PROCUREMENT

This section at a glance:

- MWRRG has a statutory objective and function to facilitate efficient procurement through collective procurement by councils of waste management facilities and waste and resource recovery services
- This procurement process provides a number of advantages and opportunities for participating councils and commercial investors including:
  - achieving economies of scale by aggregating commercially viable quantities of waste to be treated by private sector service providers
  - securing the expected quality and quantity of feedstock over the commercial life of the facility
  - incorporating environmental regulatory requirements into contracts.

MWRRG has the statutory objective and functions to:

- "...facilitate efficient procurement...through collective procurement of waste management facilities and waste and resource recovery services"[58]
- "...facilitate the provision of...infrastructure and services" and "...the development of contracts for joint procurement."[59]

This procurement process provides a number of advantages and opportunities for participating councils and private sector providers. The process:

- provides certainty to commercial investors by:
  - achieving economies of scale by aggregating commercially viable quantities of waste to be treated by private sector service providers
  - securing the expected quality and quantity of feedstock over the commercial life of the facility
  - incorporating environmental regulatory requirements into contracts
- promotes innovation by specifying the desired state policy and strategy outcomes and local service delivery outcomes, while allowing the market to select technologies, processes and products to deliver these outcomes
- reduces the need for councils to have specialist tendering and contract management expertise for infrequent procurements
- improves the alignment between state and councils' plans and programs.

[58]Environment Protection Act 1970, S. 49G
[59]Environment Protection Act 1970, s. 49H

APPENDICES

Appendix A - Requirements of the *Environment Protection Act (1970)*

Division 2AD—Regional Waste and Resource Recovery Implementation Plans

50B Preparation of draft Regional Waste and Resource Recovery Implementation Plans

1. Each Waste and Resource Recovery Group must prepare a Regional Waste and Resource Recovery Implementation plan for its waste and resource recovery region.
2. Subject to subsection (3), each Waste and Resource Recovery Group must submit a draft Regional Waste and Resource Recovery Implementation Plan to Sustainability Victoria and to the Authority within 12 months after the State-Wide Waste and Resource Recovery Infrastructure Plan takes effect.
3. A draft Regional Waste and Resource Recovery Implementation Plan must be submitted by the Metropolitan Waste and Resource Recovery Group within 3 months after the date on which the first State-Wide Waste and Resource Recovery Infrastructure Plan takes effect.
4. The Authority must make any comments within 60 days after receiving a draft Regional Waste and Resource Recovery Implementation Plan.

50BA Objective of Regional Waste and Resource Recovery Implementation Plans

The objective of a Regional Waste and Resource Recovery Implementation Plan is to set out how the waste and resource recovery infrastructure needs of a waste and resource recovery region will be met over at least a 10 year period.

50BB Content of Regional Waste and Resource Recovery Implementation Plans

1. A Regional Waste and Resource Recovery Implementation Plan must include—
   a. a description and analysis of waste and resource recovery infrastructure within its waste and resource recovery region, including a consideration of—
      i. environmental and financial performance; and
      ii. current infrastructure and anticipated opportunities for providing infrastructure across the waste and resource recovery region; and
      iii. the waste and resource recovery infrastructure needs, priorities and preferred locations for the waste and resource recovery region; and
      iv. regional transport and land use planning; and
   b. a description of how the long term directions in the State-Wide Waste and Resource Recovery Infrastructure Plan will be implemented to give effect to local and regional infrastructure needs within the waste and resource recovery region; and
   c a schedule of existing and required waste and resource recovery infrastructure within the waste and resource recovery region including—
      i. the type, general location and other requirements of new waste and resource recovery infrastructure, other than landfills; and
      ii. the timeframe for when new waste and resource recovery infrastructure is needed; and
      iii. an identification of steps required to align the schedule with local planning schemes; and
      iv. the proposed sequence for the filling of available landfill sites for at least the next 10 years; and
      v. a program for replacing and rehabilitating landfill sites; and
      vi. the intended or likely date of closure of each landfill site; and
      vii. options for future landfill capacity and resource recovery infrastructure; and

d. any matters required by guidelines made under section 50CA.

2. Subject to subsection (3), a Regional Waste and Resource Recovery Implementation Plan must be consistent with any policy and any government policies.

3. If a Regional Waste and Resource Recovery Implementation Plan is inconsistent with a policy, the policy prevails to the extent of the inconsistency.

50BC Consultation during preparation of Regional Waste and Resource Recovery Implementation Plans

Before submitting a draft Regional Waste and Resource Recovery Implementation Plan to Sustainability Victoria and to the Authority under section 50B, a Waste and Resource Recovery Group must consult with—

b. the Secretary of the Department of Environment and Primary Industries; and

c. the Chairman; and

d. the Chairperson of Sustainability Victoria; and

e. the Chairperson of each Waste and Resource Recovery Group; and

f. the chairperson of the Urban Renewal Authority Victoria; and

g. the chief executive of each council within its waste and resource recovery region.

50BD Further preparation of Regional Waste and Resource Recovery Implementation Plans

1. On the submission of a draft Regional Waste and Resource Recovery Implementation Plan under section 50B, each Waste and Resource Recovery Group and Sustainability Victoria must work together to integrate the priorities and directions of the Regional Waste and Resource Recovery Implementation Plan and the State-Wide Waste and Resource Recovery Infrastructure Plan and to resolve any differences in the Plans.

2. Each Waste and Resource Recovery Group and Sustainability Victoria are jointly responsible for integrating the Plans for a period of up to 6 months.

3. Sustainability Victoria and each Waste and Resource Recovery Group must—

   a. take into account any comments made by the Authority under section 50B(4); and

   b. amend the schedule of existing and required waste and resource recovery infrastructure within the draft Regional Waste and Resource Recovery Implementation Plan if the Authority objects to the inclusion of a proposed landfill on the ground that it is unlikely to meet the requirements of a relevant policy.

4. The integration process in subsections (1) to (3) must comply with any guidelines issued under section 50CA.

5. A Waste and Resource Recovery Group must submit a draft Regional Waste and Resource Recovery Implementation Plan to the Minister for approval—

   a. no later than 6 months after submitting a draft to Sustainability Victoria and the Authority under section 50B; and

   b. not before either the Authority has provided its comments under section 50B(4) or the 60 days in which the Authority may comment on the Plan have expired.

6. On receiving a draft Regional Waste and Resource Recovery Implementation Plan under subsection (5) the Minister must—

   a. approve the Plan; or

   b. approve the Plan with amendments; or

   c. return the Plan to the relevant Waste and Resource Recovery Group for amendment.

7. If the Minister returns the Regional Waste and Resource Recovery Implementation Plan to a Waste and Resource Recovery Group under subsection (6)(c), the Minister must give directions as to the amendments required to be made to the draft Plan.

8. A Waste and Resource Recovery Group must comply with a direction of the Minister under subsection (7) within 30 days or a longer period specified by the Minister.

50BE Publication of approval of Regional Waste and Resource Recovery Implementation Plans

1. The Minister must cause to be published in the Government Gazette a notice of approval of a Regional Waste and Resource Recovery Implementation Plan.
2. The notice of approval must be published—
   a. in the next general edition of the Government Gazette; or
   b. in a special edition of the Government Gazette within 10 working days after the approval of the Plan.
3. A Regional Waste and Resource Recovery Implementation Plan takes effect on—
   a. the date on which the notice of approval is published in the Government Gazette; or
   b. a later date specified in the notice.
4. A Regional Waste and Resource Recovery Implementation Plan remains in force until it is replaced by another Regional Waste and Resource Recovery Implementation Plan.

50BF Publication of Regional Waste and Resource Recovery Implementation Plans

1. A Waste and Resource Recovery Group must publish a copy of its Regional Waste and Resource Recovery Implementation Plan on its Internet site within 7 days of a notice of approval of the Plan being published in the Government Gazette.
2. Sustainability Victoria must publish a copy of a Regional Waste and Resource Recovery Implementation Plan on its Internet site within 7 days of a notice of approval of the Plan being published in the Government Gazette.
3.. A Waste and Resource Recovery Group and Sustainability Victoria must each publish on its Internet site a revised copy of a Regional Waste and Resource Recovery Implementation Plan within 7 days of a notice of approval of an amendment or variation to the Plan being published in the Government Gazette.

50BG Amendment of Regional Waste and Resource Recovery Implementation Plans

1. A Waste and Resource Recovery Group may prepare draft amendments to its Regional Waste and Resource Recovery Implementation Plan at any time, including any schedule of existing and required waste and resource recovery infrastructure within the Plan.
2. The Minister may at any time direct a Waste and Resource Recovery Group to prepare draft amendments to its Regional Waste and Resource Recovery Implementation Plan within a specified period of time.
3. The Minister may at any time make a variation to a Regional Waste and Resource Recovery Implementation Plan that is declaratory, machinery or administrative in nature.
4. Sections 50BC, 50BD and 50BE apply to an amendment of a Regional Waste and Resource Recovery Implementation Plan under subsections (1) and (2) as if the amendment were a draft Regional Waste and Resource Recovery Implementation Plan.
5. Sections 50BD(6) to (8) and 50BE apply to a variation of a Regional Waste and Resource Recovery Implementation Plan under subsection (3) as if the variation were a draft Regional Waste and Resource Recovery Implementation Plan.

50BH Consistency with Regional Waste and Resource Recovery Implementation Plans

1. A council must perform its waste management functions consistently with the Regional Waste and Resource Recovery Implementation Plan applying to the council's municipal district.
2. If a council disposes of waste in a waste and resource recovery region other than the waste and resource recovery region in which the council's municipal district is located, the disposal of the waste must be consistent with the Regional Waste and Resource Recovery Implementation Plan applying to the other waste and resource recovery region.
3. Any person involved in the generation, management or transport of waste within a waste and resource recovery region must not do anything in relation to the waste that is inconsistent with the relevant Regional Waste and Resource Recovery Implementation Plan while the waste is in that region.

Appendix B – Stakeholder engagement and consultation processes

MWRRG undertook stakeholder engagement throughout all phases of the development of the Metropolitan Implementation Plan. The consultation process aligns with the *EP Act and Guideline: Making, amending and integrating the Statewide Waste and Resource Recovery Infrastructure Plan and Regional Waste and Resource Recovery Implementation Plans* (Guideline), developed by the Department of Environment, Land, Water and Planning (DELWP).

These guidelines stipulated minimum consultation requirements, and require SV, MWRRG and Regional WRRGs to work together to ensure that the long term strategic directions of the State Infrastructure Plan are appropriately addressed.

The requirements for consultation outlined the EP Act and Guideline have been meet. The following summary highlights the overall consultation and engagement process undertaken.

Engagement process overview

Engagement activities occurred throughout the development of the consultation draft Metropolitan Implementation Plan (consultation draft) in four main phases:

- Market Assessment process
- Pre-draft engagement
- Public consultation
- Portfolio consultation and integration.

Market Assessment Process

MWRRG undertook the Market Assessment process to engage with the waste and resource recovery industry in order to understand its plans and aspirations. More than 60 submissions were received, proposing a range of waste and resource recovery infrastructure options to service the metropolitan region. The information gathered through this process formed a key input into the consultation draft, in particular the Infrastructure Schedule.

Pre-draft engagement activities

The purpose of pre-draft engagement was to inform the contents of the consultation draft. Pre-engagement activities included:

- a workshop with the Metropolitan Local Government Waste Forum
- a Community Leaders Forum
- engaging via the metropolitan local government CEO cluster meetings
- targeted engagement with council representatives in strategic areas
- an online community survey.

Public consultation

The purpose of the public consultation process was to gather feedback on the consultation draft, and to identify further issues, interests and information. This information was used to inform the final Metropolitan Implementation Plan.

The consultation draft was released in November 2015 for five weeks (16 November – 18 December). A range of engagement activities with industry, local government, state government and the community were conducted. Activities included:

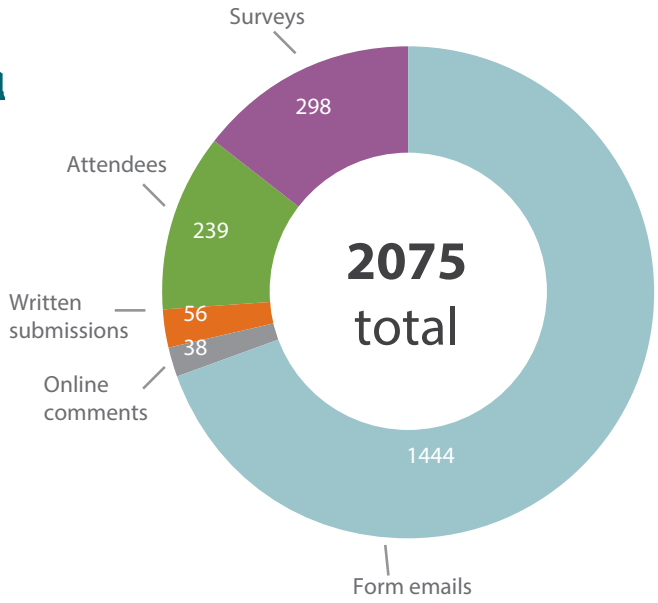
- special introductory briefing for industry (a special briefing was also scheduled for key community members however due to a lack of interest did not go ahead)
- four targeted workshops with industry, councils, state government and community leaders
- four pop-up stalls to engage with the general public
- four drop-in sessions in target areas close to important waste facilities or infrastructure
- online portal hosting information and multiple ways to provide feedback – a quick survey, short comment or formal submission
- a special portfolio workshop. Feedback from this workshop was collated with the formal submissions and considered in the final plan.

Throughout the consultation period general feedback on the draft was sought, with a focus on the 10 Priority Actions and Infrastructure Schedules.

Engagement activities were undertaken in strategic locations throughout Melbourne to ensure an even geographic spread, and as indicated in the diagram following over 2,000 stakeholders participated by providing feedback. The consultation was generally successful, with a high level of involvement from local government, industry and community groups.

Consultation event locations

Public consultation feedback received



Portfolio consultation and integration

Consultation and collaboration with state government portfolio partners occurred throughout the plan's development. The purpose of this consultation was to achieve alignment with the State Infrastructure Plan and other government strategies and policies.

MWRRG has sought to align the Metropolitan Implementation Plan with regional WRRG's plans and the State Infrastructure Plan. MWRRG has met with all regional groups including the chairperson of each regional group through the following forums:

- Regional Waste and Resource Recovery Group Chairs meeting
- Regional Waste and Resource Recovery Group Executive Officer Forum
- Regional Waste and Resource Implementation Plan working group. The working group provided a collaborative decision making structure to achieve integration of the statewide and regional plans
- Other meetings with WRRGs.

MWRRG has worked with SV and the WRRGs to align data collection, analysis and presentation. Critical to achieving this has been working with staff in SV and WRRGs as well as using the SV Regional Waste and Resource Recovery Implementations Plan Development Workbook.

Other portfolio forums used to consult with portfolio partners and achieve integration were the:

- Metropolitan Implementation Plan working group, convened by MWRRG
- Metropolitan Implementation Plan portfolio approval conference to further review the draft and undertake comprehensive one-on-one collaboration with key individuals to make sure feedback had been fairly and reasonably considered, convened by MWRRG
- Waste and Resource Recovery Project Control Board, convened by DELWP.

MWRRG has also coordinated the collection and collation of regional waste flow data to ensure statewide consistency.

While full integration must also be achieved with all other Regional Implementation Plans, statutory times requiring MWRRG to submit its final plan the Minister for Environment, Climate Change and Water nine months ahead of Regional Implementation Plans has meant full integration cannot be confirmed in this plan. MWRRG has sought alignment with Regional Implementation Plans to the extent possible at time of submitting this plan.

MWRRG will continue to engage and work with portfolio partners and other regional groups as they finalise and consult on their plans and incorporate portfolio, community and business feedback.

The EP Act requires MWRRG to consult with specific organisations prior to submitting the plan to the Minister. This has occurred and their feedback has been incorporated.

In line with requirements, once the plan is approved a Response to Comments document will be prepared and published on our website.

Further consultation details

Key stakeholders

A wide range of stakeholders were engaged throughout this process including:

- The Minister for Environment, Climate Change and Water
- Portfolio partners: Secretary, Chairpersons and staff from DELWP, EPA Victoria, SV, Victorian Planning Authority
- Other Victorian Government agencies
- Regional Waste and Resource Recovery Groups
- Local Government CEOs and staff and councillors
- Industry
- Community.

Other Victorian Government agencies

Government agencies such as the Victorian Planning Authority, Places Victoria and the Department of Economic Development, Jobs, Transport and Resources were contacted directly by letter announcing the release of the consultation draft and encouraging a formal submission. Face to face meetings were also held.

Local government

Local councils play an important role in waste management and as such it was critical that they were actively engaged in the pre-engagement activities as well as the public consultation phase and finalising the plan.

During pre-engagement we held a workshop with the Local Government Waste Forum in August 2015 to inform the development of key objectives and actions for the plan. During this time we also undertook briefings with council Chief Executive Officers, and staff in strategically important areas across the Metropolitan area and regions.

All councils in the Metropolitan Region received letters announcing the release of the consultation draft and encouraging formal submissions.

During the public consultation phase we held a workshop which targeted local government staff. This was attended by over 40 individuals from 27 councils representing interests in waste education, planning and waste infrastructure and maintenance. The feedback from this session was collated with the formal submissions and considered in the final plan.

During the preparation of the final plan one on one consultation occurred with councils to clarify submission feedback and content in the plan.

Industry

A special briefing was held with key industry stakeholders to announce the release of the consultation draft. In addition to this letters were sent to about 100 industry groups, site operators, waste generators and recycling businesses announcing the release of the consultation draft and inviting them to an industry focused workshop and to prepare a formal submission.

The industry workshop was attended by 59 industry representatives and the feedback from this session was collated with the formal submissions and considered in the final plan.

Community

A small group of individuals identified as having an keen interest in the outcomes of the plan were convened at a 'Community Leaders Forum' in August 2015 to help shape the contents of the consultation draft. At this forum we sought feedback on five shared challenges – these challenges closely aligned to the directions specified in the State Infrastructure Plan.

This forum group was convened a second time during the public consultation phase for a targeted workshop.

A special community leaders briefing was scheduled to announce the release of the consultation draft, however was cancelled due to a lack of interest. Community members that registered interest through our website received email notification that the consultation draft was available and invited them to attend any number of public events or find out more and prepare a submission through the "Participate" website.

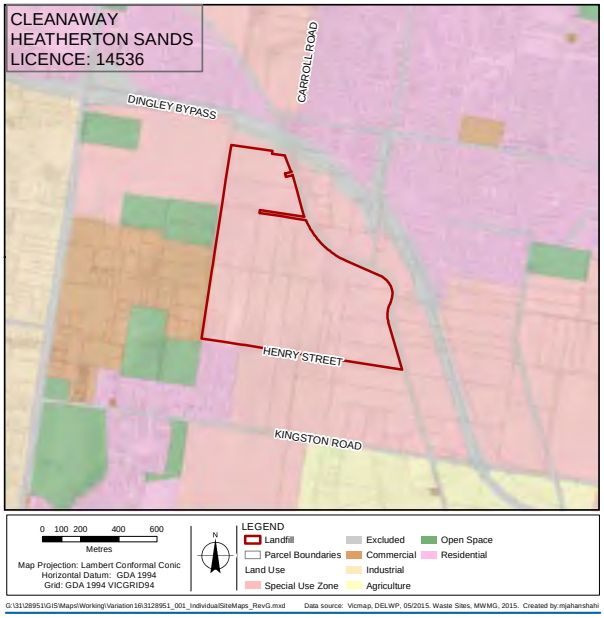
Public events were advertised and held in Werribee, Caroline Springs, Bulla, Craigieburn, Doncaster, Berwick, Clayton/Dingley and Rosebud and were attended by about 115 individuals. We received almost 40 comments through the website, almost 300 online surveys and 1,444 form emails.

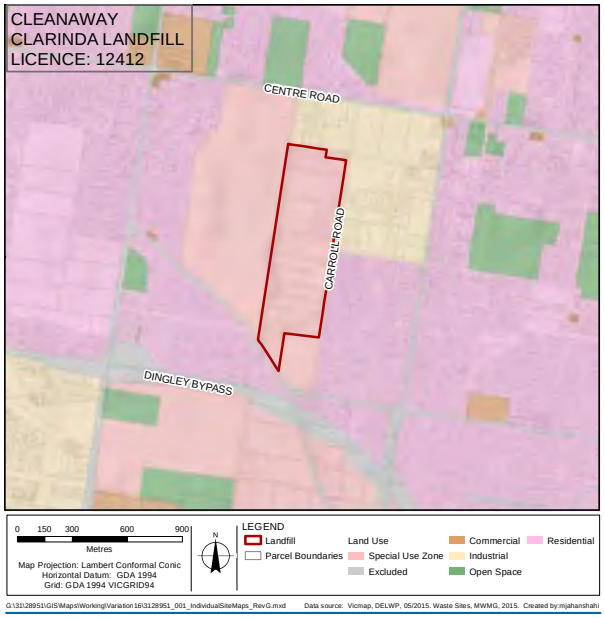
Confidentiality and probity

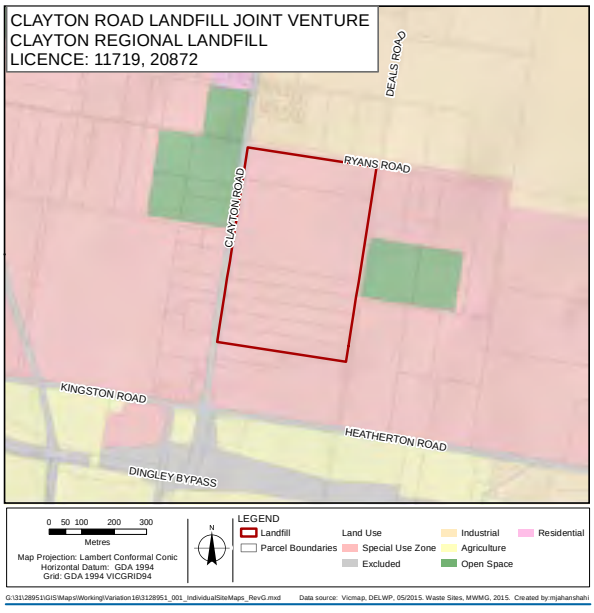
MWRRG in managing and utilising data obtained from local government, industry and the community has considered matters of confidentiality in how data and information has been stored, used and provided in the Metropolitan Implementation Plan. An overall risk register was prepared and maintained and issues of risk and probity have been considered throughout the development of the Metropolitan Implementation Plan to ensure fairness, impartiality, consistency and transparency of process. In the undertaking of the market assessment that informed the Metropolitan Implementation Plan an individual probity plan was developed that set out the overall probity requirements that applied to the market assessment to ensure processes demonstrated fairness, integrity and impartiality of deliberations.

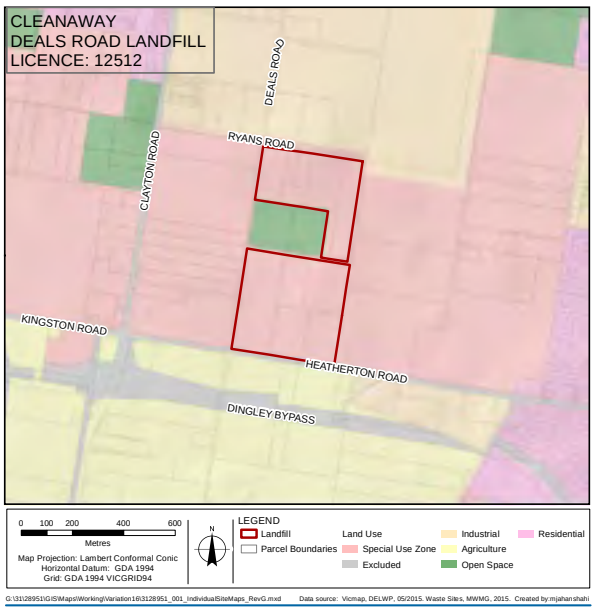
Appendix C: Metropolitan landfill site maps

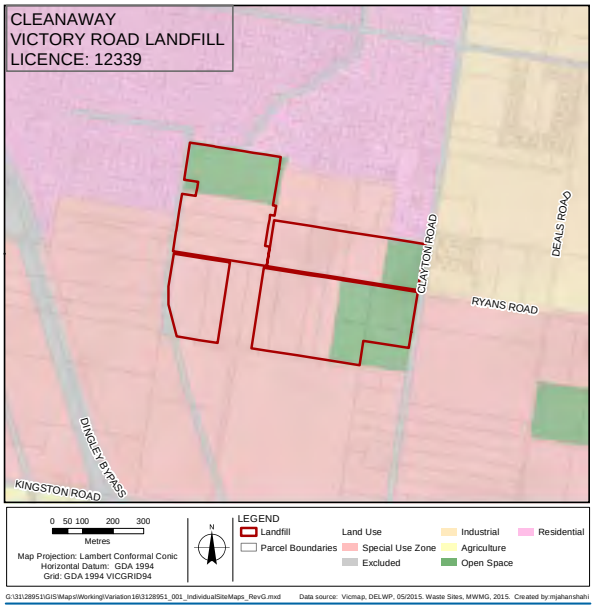
These maps show the general location of landfill sites and do not accurately represent EPA Victoria works approved and/or licensed site boundaries EPA Victoria can provide further site details including works approvals and licences that apply to landfill sites. Local Government can provide details of land use planning approvals that apply to the landfill sites. The purpose of providing the metropolitan landfill site maps is to provide a critical link between the waste and resource recovery system and the land use planning system.







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LICENCE: 12339
DEALS ROAD
CLAYTON ROAD
RYANS ROAD
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Map Projection: Lambert Conformal Conic
Horizontal Datum: GDA 1994
Grid: GDA 1994 VICGRID94
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Agriculture
Open Space
Residential
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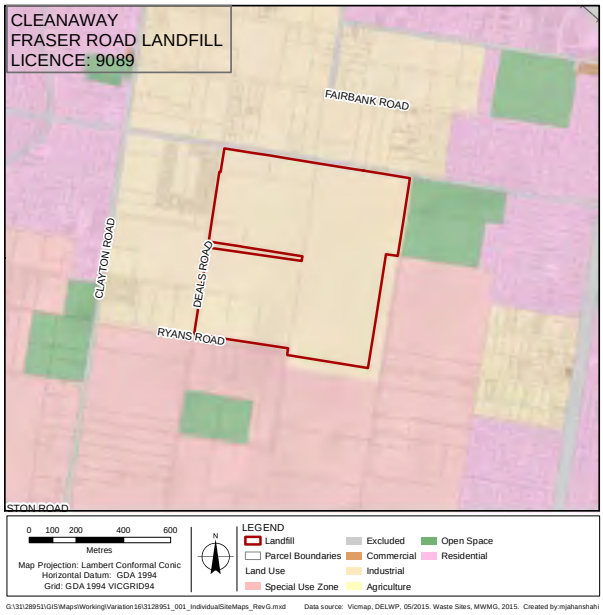
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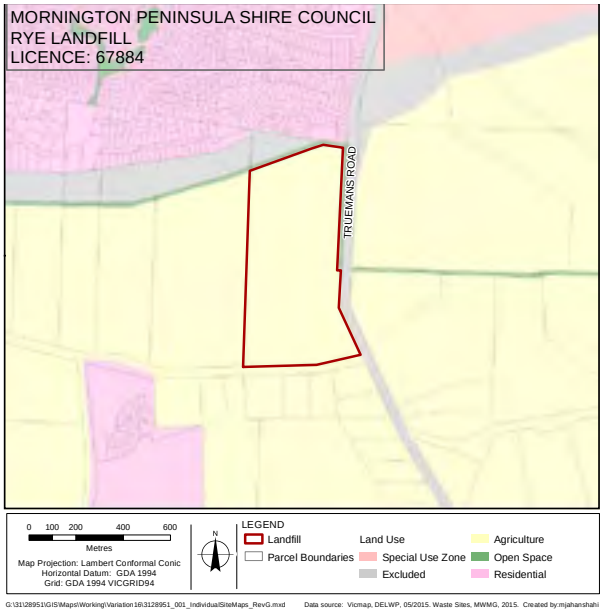
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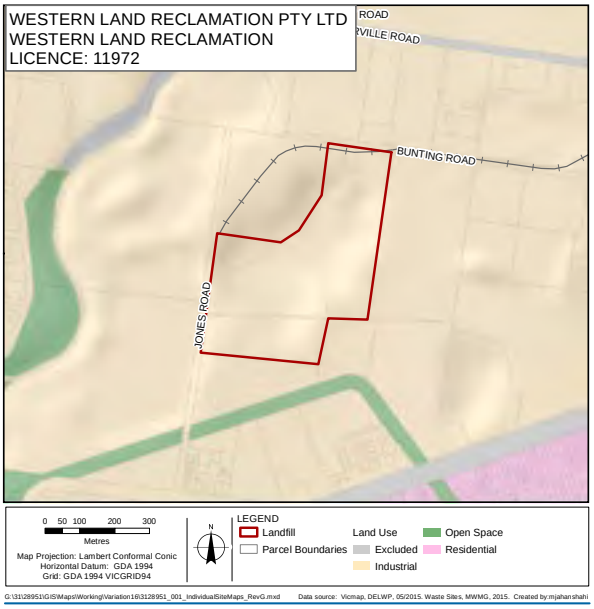
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WESTERN LAND RECLAMATION
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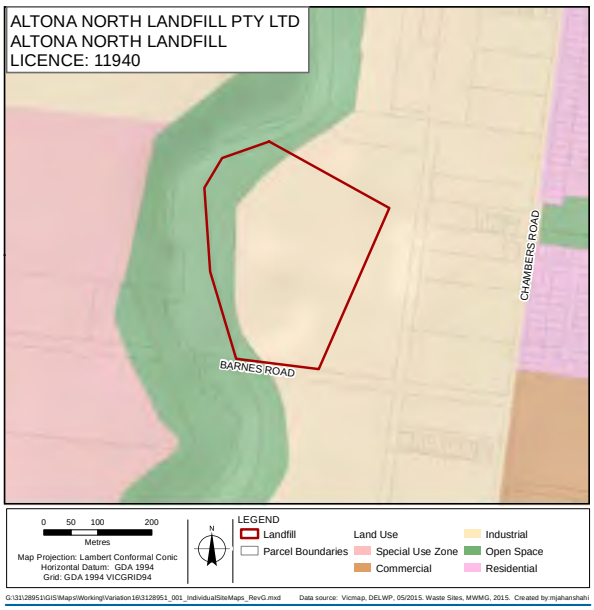
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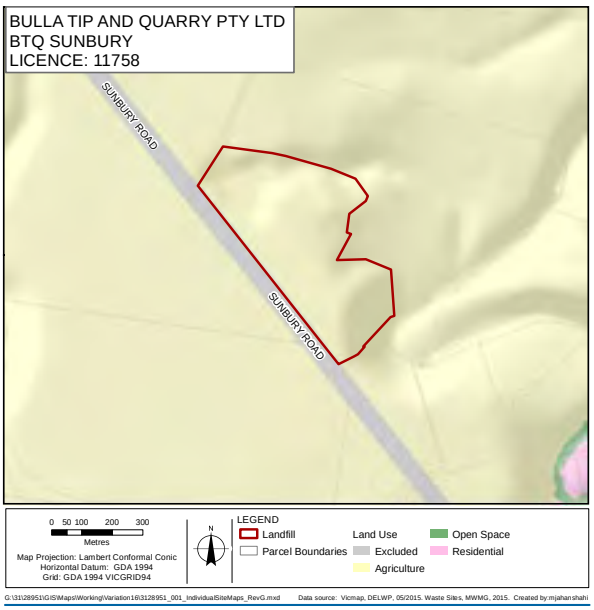
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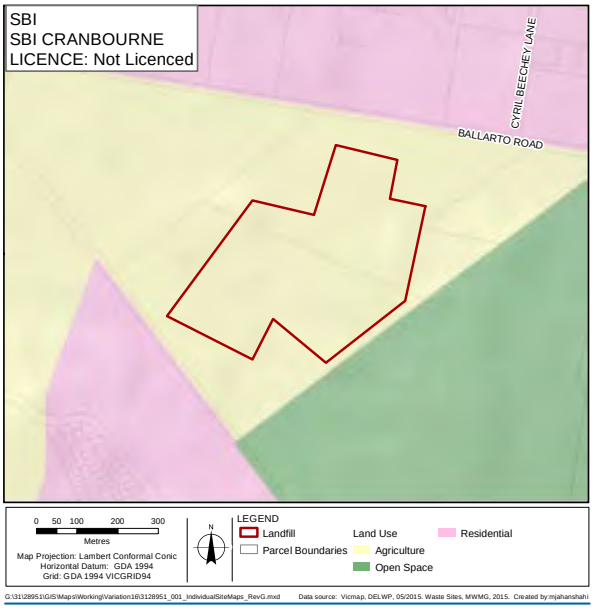
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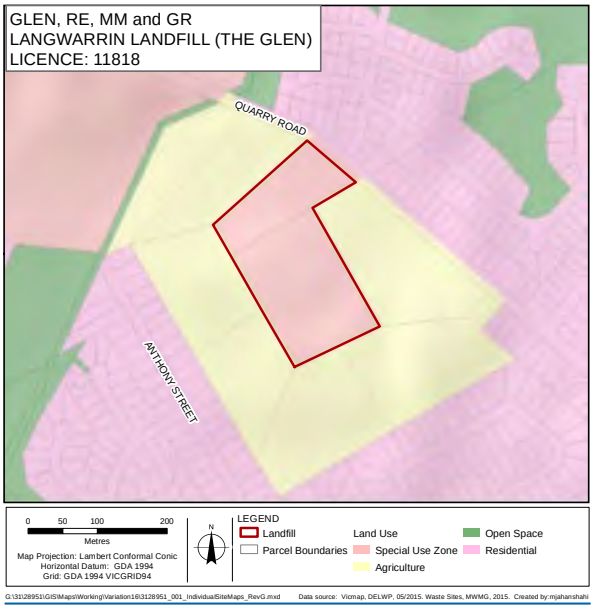
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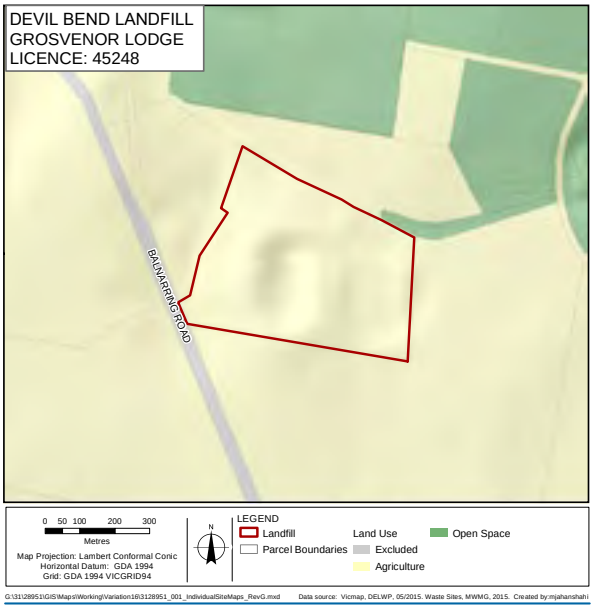
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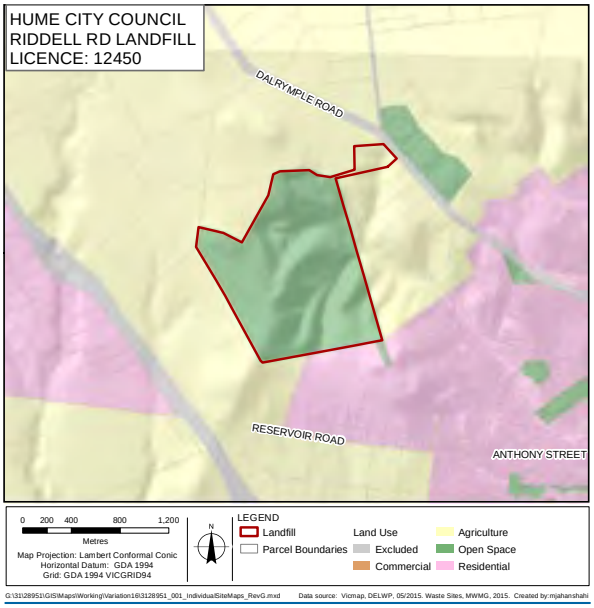
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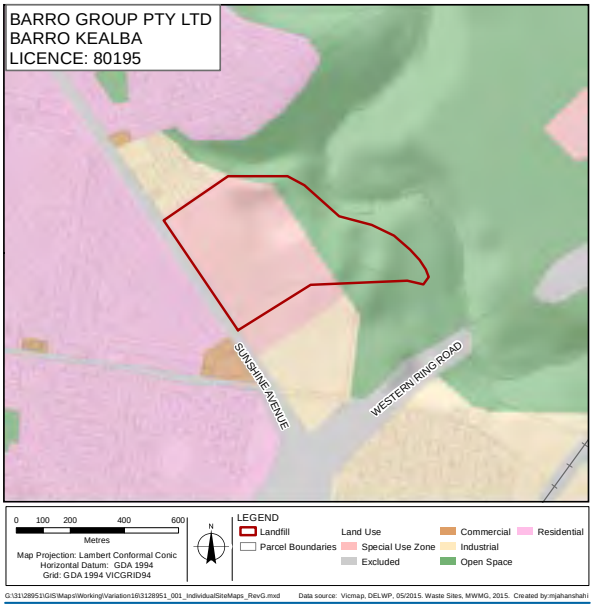
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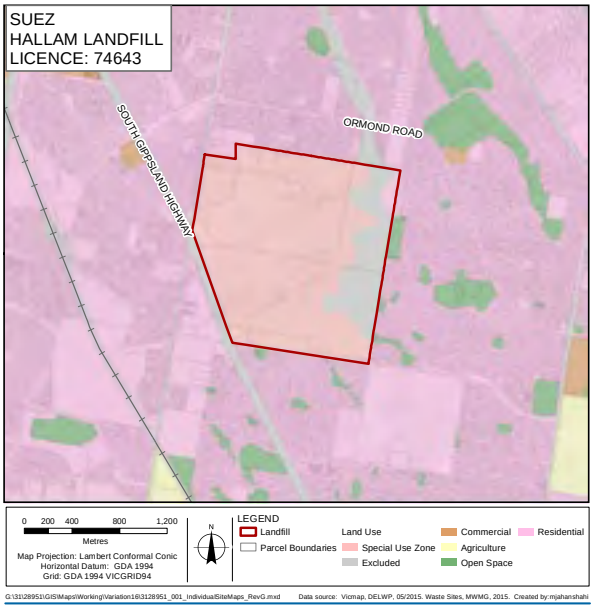
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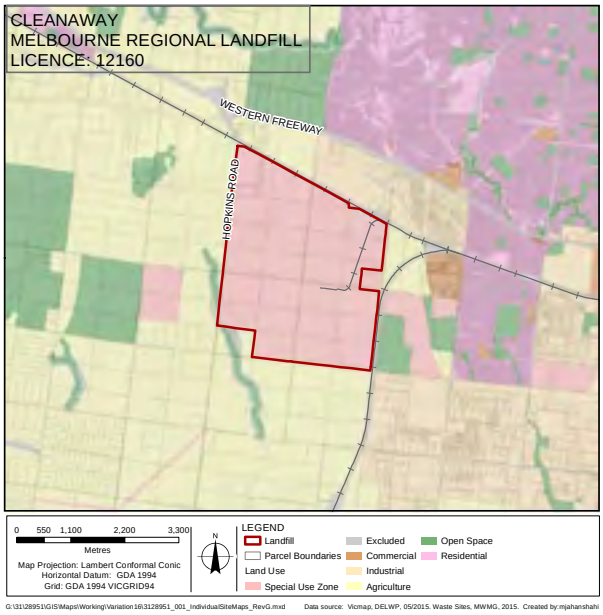
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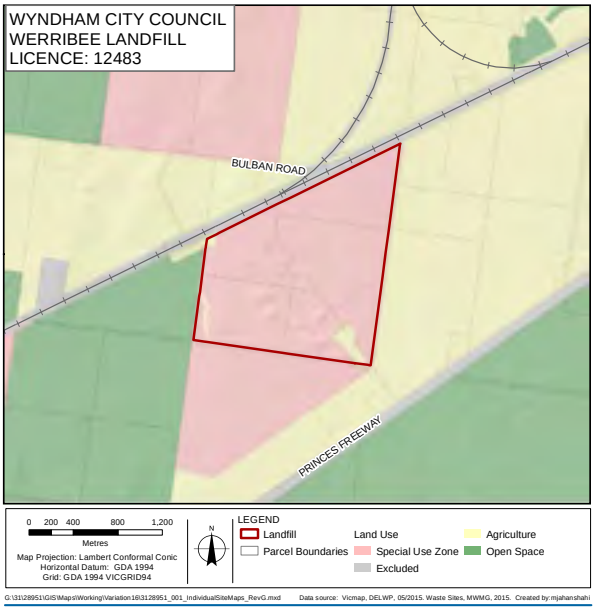
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BULBAN ROAD
PRINCES FREEWAY
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Metres
Map Projection: Lambert Conformal Conic
Horizontal Datum: GDA 1994
Grid: GDA 1994 VICGRID94
N
LEGEND
Landfill
Parcel Boundaries
Land Use
Special Use Zone
Excluded
Agriculture
Open Space
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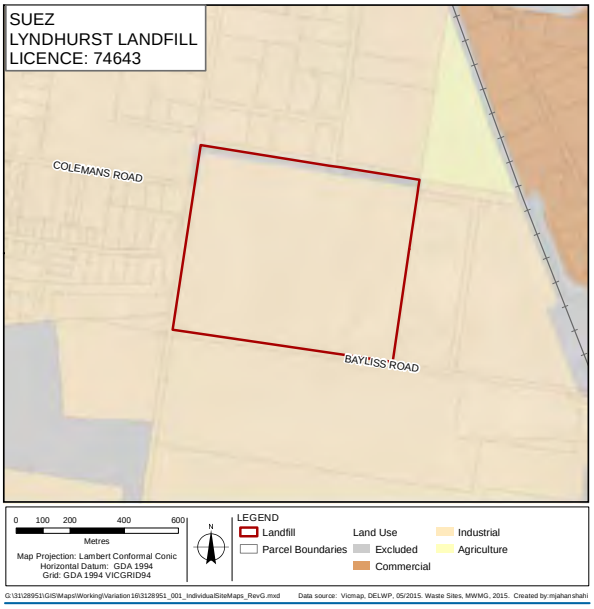
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LYNDHURST LANDFILL
LICENCE: 74643
COLEMANS ROAD
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Metres
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Horizontal Datum: GDA 1994
Grid: GDA 1994 VICGRID94
N
LEGEND
Landfill
Parcel Boundaries
Land Use
Excluded
Commercial
Industrial
Agriculture
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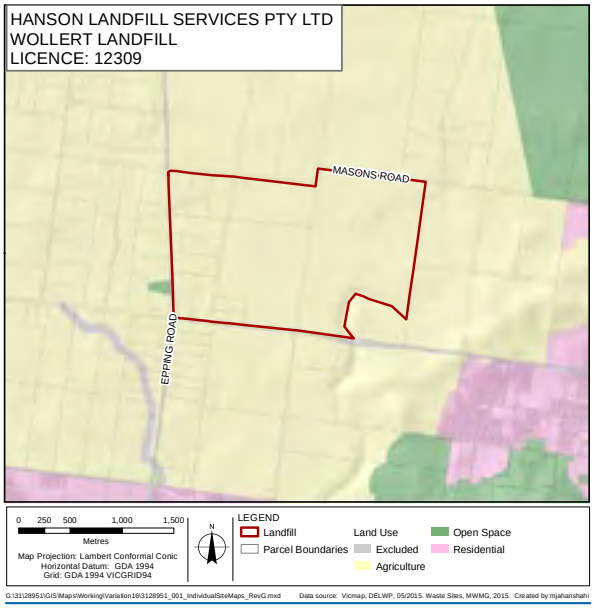
HANSON LANDFILL SERVICES PTY LTD
WOLLERT LANDFILL
LICENCE: 12309
MASONS ROAD
EPPING ROAD
0 250 500 1,000 1,500
Metres
Map Projection: Lambert Conformal Conic
Horizontal Datum: GDA 1994
Grid: GDA 1994 VICGRID94
N
LEGEND
Landfill
Parcel Boundaries
Land Use
Excluded
Agriculture
Open Space
Residential
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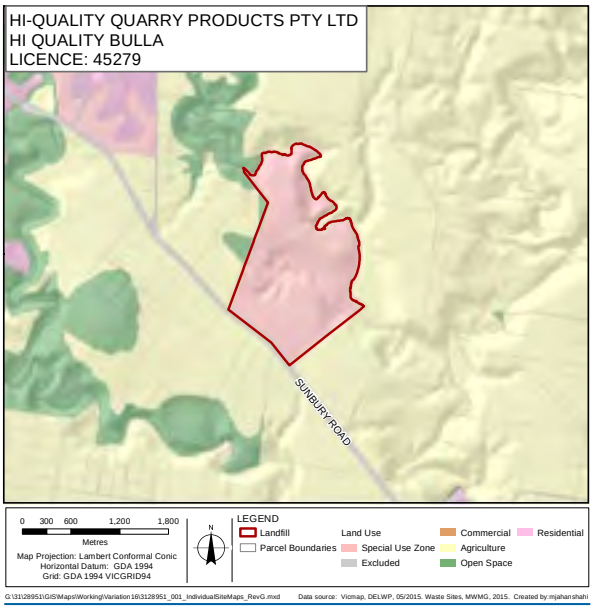
HI-QUALITY QUARRY PRODUCTS PTY LTD
HI QUALITY BULLA
LICENCE: 45279
SUNBURY ROAD
0 300 600 1,200 1,800
Metres
Map Projection: Lambert Conformal Conic
Horizontal Datum: GDA 1994
Grid: GDA 1994 VICGRID94
N
LEGEND
Landfill
Parcel Boundaries
Land Use
Special Use Zone
Excluded
Commercial
Agriculture
Open Space
Residential
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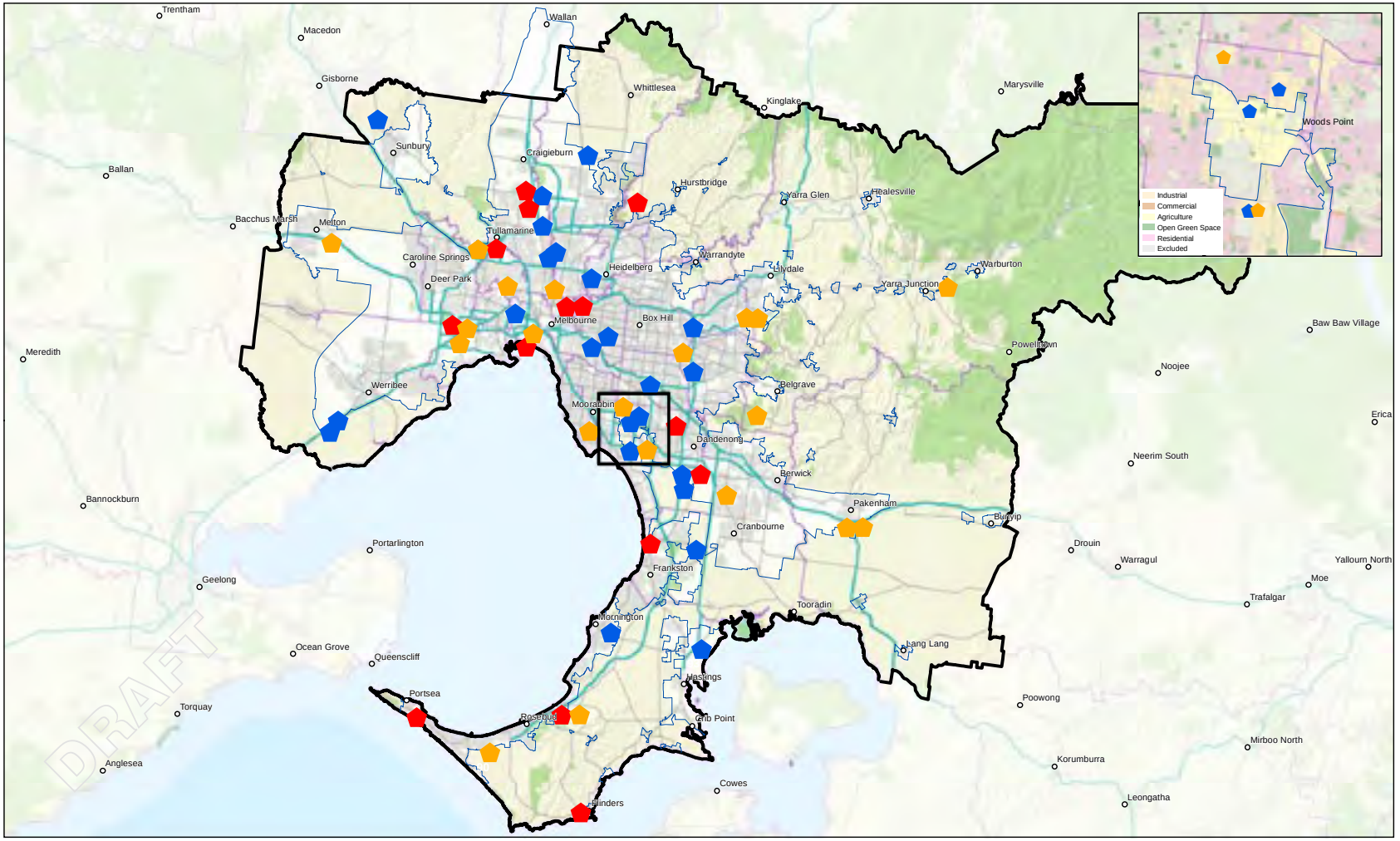
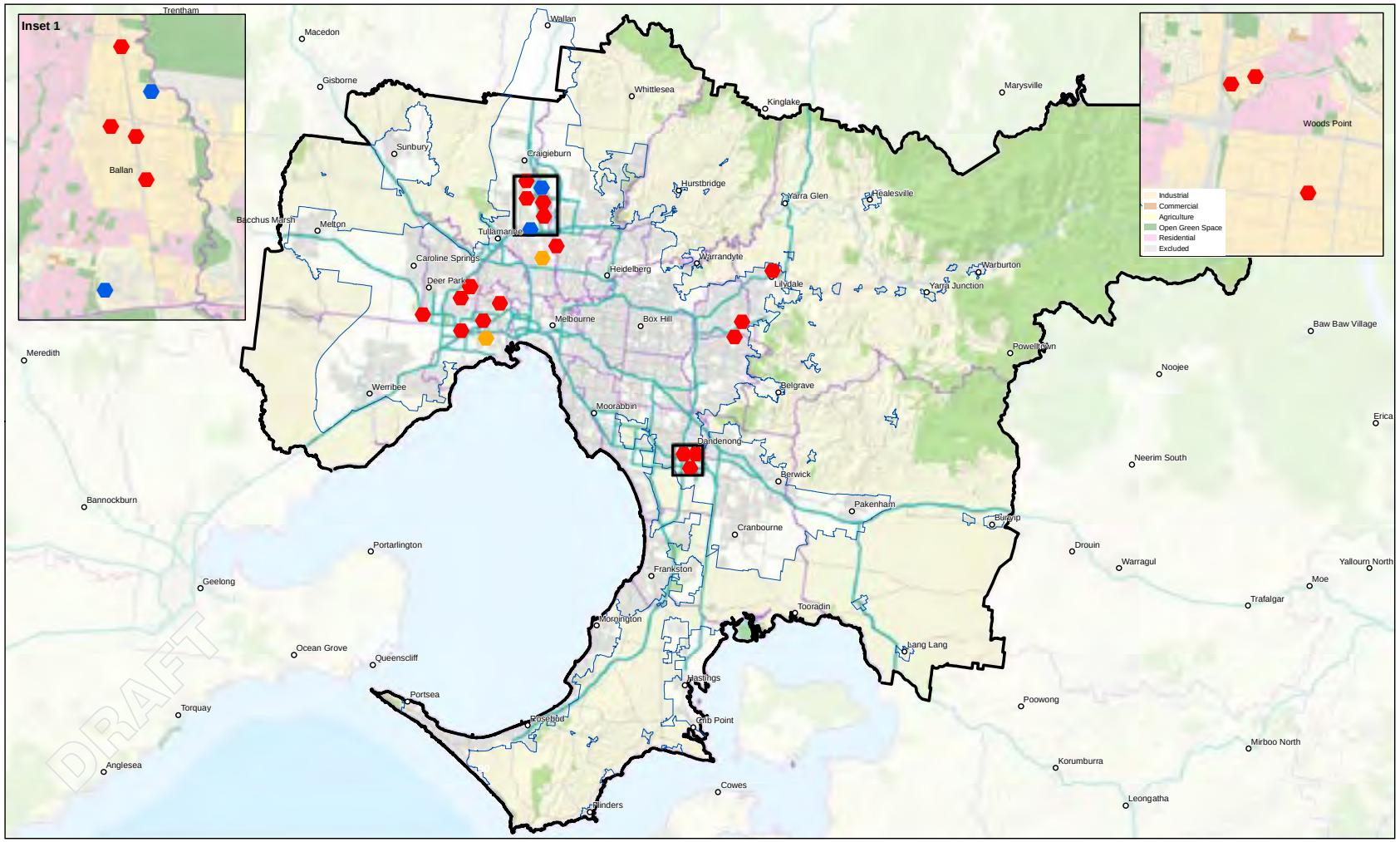
Data source: Vicmap, DELWP, 05/2015. Waste Sites, MWMG, 2015. Created by:mjahanshahi

Metropolitan RRC/TS infrastructure



Metropolitan plastics, rubber/tyres and textiles reprocessors



Paper Size A3

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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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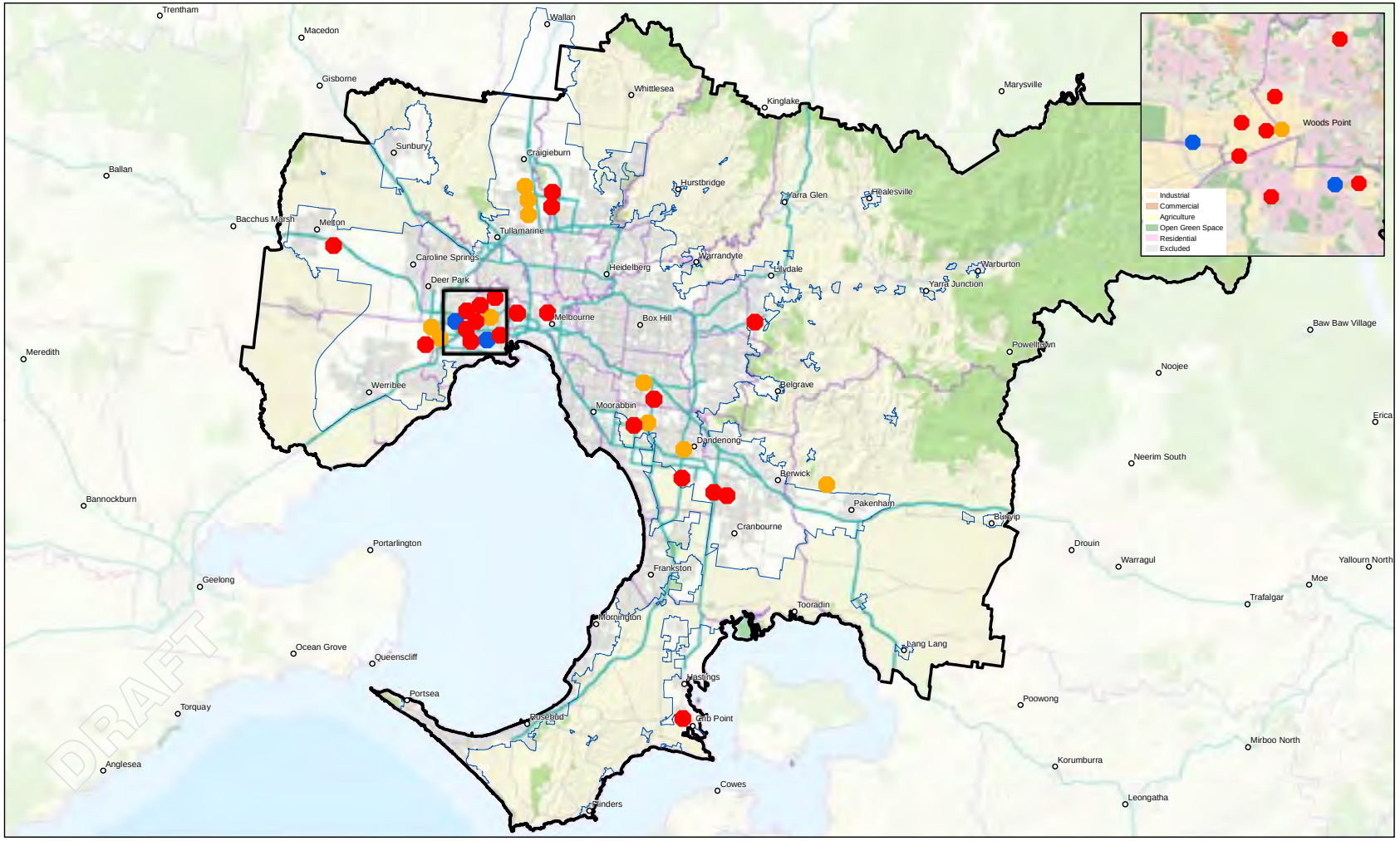
LEGEND

- Plastics
- Rubber & tyres
- Textiles
- Study Area Boundary
- Principal Freight Network
- Urban Growth Boundary (UGB)
- Major Roads
- Major Watercourses
- LGA Boundaries
- Major Water Areas
- Residential Areas
- Parks and Reserves

Glass, metals & aggregates, masonry and soil reprocessing



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Kilometres

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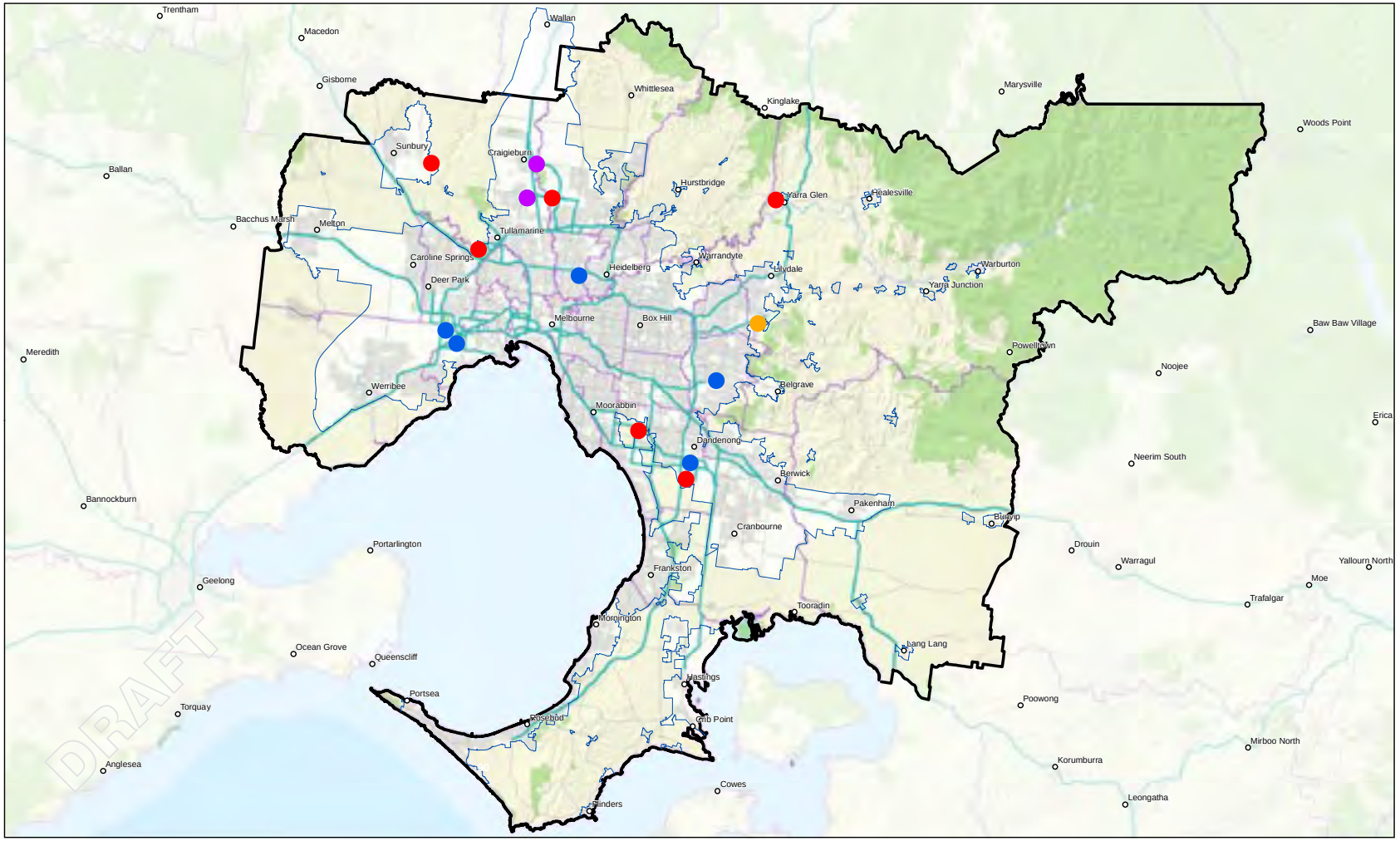
LEGEND

- Aggregates, masonry and soil
- Glass
- Metals
- Study Area Boundary
- Principal Freight Network
- Urban Growth Boundary (UGB)
- Major Roads
- Major Watercourses
- LGA Boundaries
- Major Water Areas
- Residential Areas
- Parks and Reserves

Metropolitan paper/cardboard, garden waste, wood/timber, and energy from waste infrastructure



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Kilometres

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LEGEND

Garden Waste
Wood / timber
Paper/cardboard
Energy from Waste
Study Area Boundary
Principal Freight Network
Urban Growth Boundary (UGB)
Major Roads
Major Watercourses
LGA Boundaries
Major Water Areas
Residential Areas
Parks and Reserves

Appendix E: Main data sources and major data assumptions and definitions

Main data sources

Data source	Description
Victorian Local Government Annual Survey (VLGAS)	Annual data on materials collected through local government kerbside collection systems and published by SV. All local governments in Victoria participate. The survey provides trending data on recyclables, organics, residual waste, hard waste and litter. The State Infrastructure Plan uses survey data from the financial year 2011-12, which is available on the SV website at www.sustainability.vic.gov.au
Victorian Recycling Industries Annual Survey (VRIAS)	Annual data collection measuring tonnages of materials diverted from landfill by major reprocessors in Victoria. This is 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. the VRIAS is available on the SV website at www.sustainability.vic.gov.au
EPAs landfill levy returns	Unpublished information provided by EPA Victoria on a confidential basis.
Australian Bureau of Statistics (ABS) population data	ABS Catalogue Number 3101.0 - Australian Demographic Statistics, Sep 2014
Victorian landfill audits	SV's disposal-based waste survey, 2009. A visual waste audit of eight metropolitan landfills, one regional landfill and one transfer station, covering 2003 separate inbound loads.
Victoria in Future 2015	Victoria in Future 2015 (VIF 2015) is the official state government projection of population and households.
Metropolitan Waste and Resource Recovery Projection Model	MWRRG developed a projection model based on Sustainability Victoria's Waste and Resource Recovery Projection Model for the State, which projects the quantities of waste generated until 2041-42. The first five years of SV's projections are taken from an EPA Victoria model designed to estimate quantities of waste to landfill over that period. The five year EPA Victoria model projects MSW quantities (based on the relationship with population) and C&I and C&D quantities (based on the relationship with economic activity). The longer term SV model projects all waste based on population growth, because credible projections of economic growth are not available over a 30 year timeframe. The primary data underpinning the models are the annual tonnes of waste landfilled and recovered, and government projections of population and economic activity. In summary, the models assess the past relationship between the total waste generated and the other variables, then estimate future waste generation assuming these relationships hold into the future. The models also estimate future recovery rates. For the first five years, based on the EPA Victoria model, recovery rates are estimated using recorded trends and the general outlook for recycling. After five years, it is conservatively assumed that recovery rates will remain constant. While the assumptions underpinning the metropolitan projection model are considered reasonable, waste projections are highly uncertain and the results reflect informed, best estimates. The model projections update when new annual waste data is entered. Government agencies will monitor the projections as new data becomes available. Further information about the models and the data assumptions can be found in the State Infrastructure Plan.

Data source	Description
Metropolitan Waste and Resource Recovery Infrastructure Capacity Assessment project	Existing capacity, annual throughput and future capacity requirements for consolidation and resource recovery infrastructure have been estimated through the Metropolitan Waste and Resource Recovery Infrastructure Capacity Assessment project. This assessment has been informed by engagement with operators and owners and historical data provided by SV. Data collected through this process has been presented in aggregated form in this document to protect commercial-in-confidence information. Data from facility operators has been used in conjunction with outputs of the Metropolitan Waste and Resource Recovery Projection Model to provide an assessment of current capacity and future infrastructure capacity requirements (Infrastructure Capacity Assessment projection model 2016). While the best available data has been used, the analysis presented in this plan should be considered indicative only as it is acknowledged that data and information gaps exist.
Landfill site information	To help develop the Infrastructure Schedule landfill needs assessment, options for future landfill capacity and the sequence for filling available airspace, MWRRG collected and analysed the following data sources: ▶ Existing and historical landfill level data ▶ Modelling of future landfill capacity and drawdown ▶ Existing landfill site operator survey on current and future capacity and operations ▶ Site owner/ operator interviews ▶ Site assessment for all scheduled landfills ▶ Site inspections where necessary ▶ Market assessment submissions for new or expanded landfills ▶ EPA Victoria landfill expert discussions and evaluation of all landfill sites.
EC Sustainable – Metropolitan waste to landfill compositional audit project, 2014	Compositional analysis of municipal kerbside and commercial waste streams entering landfill sites in metropolitan Melbourne. This project was commissioned by MWRRG.

Data assumptions and definitions

Data source	Description
Landfill tonnages	Tonnes landfilled are derived from landfill levy data supplied by EPA Victoria and do not include prescribed industrial waste (PIW).
Existing operating landfill	Landfills that are accepting waste for disposal or have recently ceased to accept waste but are yet to receive their post closure pollution abatement notice (PC PAN) from EPA Victoria.
Closed landfill	Landfill that is no longer accepting waste. If in the case of licenced landfills it should have received its PC PAN from EPA Victoria. If it is exempt from licensing then there should be reassurance that closure processes have commenced or are in place.
Landfill likely closure dates	An estimate of the likely year of closure of the landfill based on consideration of modelled tonnage projections and land available under current EPA Victoria Works Approval, planning and permit requirements and potential airspace that may eventuate at quarry based landfill sites as identified by owners and operators.
Rounding of data	As a general rule, all of the data is rounded to the nearest thousand. This may result in minor discrepancies between totals and line items. Graphs, charts and modelling were generated using non-rounded data. Any exceptions are referenced.

Data source	Description
Current capacity of infrastructure	An estimate of the installed capacity of an existing facility or infrastructure type.

Further information on the methodology and efforts to align data collection, analysis and presentation is provided in Appendix B (Portfolio consultation and integration).

Glossary

Term	Definition
Airspace	The remaining capacity of a landfill.
Anaerobic digestion (AD)	Biological breakdown by microorganisms of organic matter, in the absence of oxygen, into biogas (a mixture of carbon dioxide and methane) and digestate (a nutrient rich residue).
Beneficiation	An optical sorting process used to separate different colours of container glass to produce cullet for reprocessing and mixed fines.
Landfill BPEM: Best practice environmental management	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 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.
Biosolids	Biosolids are considered to be organic solids derived from sewage treatment processes that are in a state that they can be managed to sustainably utilise their nutrient, soil conditioning, energy, or other value (achieve minimum EPA Victoria standards for classification as T3 and C2 biosolids). The solids that do not meet these criteria are defined as sewage sludge.
Buffer zone	Buffer zones, or separation distances, aim to minimise the off site impacts of sensitive land uses arising from unintended, industry generated odour and dust emissions. 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.
Category C contaminated soil	See Prescribed waste and prescribed industrial waste (PIW).
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.

Term	Definition
Composting	The process whereby organic materials are microbiologically transformed under controlled aerobic conditions to create a pasteurised and stabilised organic product for application to land.
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 chemicals or other materials such as concrete rubble. Also called fill material.
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 deposit 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 e.g. laminated glass.
Department of Environment, Land, Water and Planning (DELWP)	A Victorian government department providing policy planning, preparation of legislative amendments, leadership coordination and oversight of the environment portfolio.
Digestate	A nutrient rich residue remaining after the anaerobic digestion of biodegradable feedstock.
Drop-off centre/site	Recovers selected materials and goods mainly dropped off by householders for recycling and reuse.
E-waste	E-waste comprises of electronic equipment with a plug or battery that requires a current to operate and that has reached end of life. It includes televisions, computers, monitors and whitegoods such as fridges and washing machines.
Energy from waste	The terms 'energy recovery' from 'waste', 'waste to energy' or 'energy from waste' can be used interchangeably to describe a number of treatment processes and technologies used to generate a usable form of energy from waste materials. Examples of usable forms of energy include electricity, heat and transport fuels.
Environment Protection Authority Victoria (EPA Victoria)	Established under the auspices of the E*nvironment Protection Act 1970*, EPA Victoria'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.
Fill material	See clean fill.
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.

Term	Definition
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 waste.
Garden organics	Organics derived from garden sources e.g. grass clippings, tree prunings. Also known as green organics.
Gasification	Thermal technology that converts 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 governments e.g. old fridges and mattresses.
Incinerator	For the purpose of this document, 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 waste and prescribed industrial waste (PIW).
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 and unauthorised dumping, tipping or burying of waste on land that is not licensed or fit to accept that waste.
In-vessel composting	Composting technology involving the use of a fully 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. The rate of aeration can be controlled with temperature, oxygen or carbon dioxide feedback signals.
Kerbside waste/ collection	Waste collected by local councils from residential properties, including garbage, commingled recyclables and garden organics, but excluding hard waste.
Landfill	Discharge or deposit of solid waste onto land that cannot be practically removed from the waste stream.
Landfill levy	A levy applied at differential rates to municipal, C&I and prescribed waste 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 WRRGs, SV and EPA 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	Contaminated water that has percolated through or drained from a landfill.

Term	Definition
Litter	Any small, medium or large item placed inappropriately.
Materials recovery facility (MRF)	A centre for the receipt, sorting and transfer of materials recovered from the waste stream. At a 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 MRF) 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.
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	A type of outdoor composting process where organic materials are piled in to windrows and are turned for aeration.
Optical sorting	Technologies used to sort glass by colour type, and plastics by polymer type.
Place based approach	Possible waste management systems or recovery opportunities that can improve efficiencies and resource recovery performance that use the unique characteristics of the place. Places may range in scale from a single building block, to a suburb, or an area or precinct. e.g. Shopping centre employment precincts, hospitals, universities, apartments.
Organic material	Plant or animal matter originating from domestic or industrial sources e.g. grass clippings, tree prunings and food waste.
Prescribed waste and prescribed industrial waste (PIW)	These wastes are defined in the *Environment Protection (Industrial Waste Resource) Regulations 2009*. EPA Victoria closely regulates these wastes because of their potential adverse impacts on human health and the environment. Prescribed waste carry special handling, storage, transport and often licensing requirements, and attract substantially higher disposal levies than non-prescribed solid waste. Also known as hazardous waste.
Process derived fuels	Also called process engineered fuel (PEF) or refuse derived fuel (RDF) is a fuel produced after basic processing in a MRF or MBT to increase the calorific value and remove recyclable materials and contaminants of municipal solid waste, commercial and industrial waste, and construction and demolition waste.
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.
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, including food waste and organic waste from gardens.
Pyrolysis	Thermal breakdown of waste in the absence of air, to produce char, pyrolysis oil and syngas e.g. the conversion of wood into charcoal.
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 e.g. it excludes garden organics.

Term	Definition
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	See Process derived fuels.
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 reuse of good quality, saleable products and materials that were disposed of by their previous owner.
Resource recovery	The process of obtaining matter or energy from discarded materials. Occurs at resource recovery centres.
Resource recovery centre/transfer station (RRC/TS)	Receives, sorts and/or consolidates a range of material streams (depending on the facility) including hard, organic and residual waste and commingled recyclables for transport for materials recovery, processing or disposal to landfill. Accepts materials from all sectors and can be publicly or privately owned and operated. May include a resale centre.
Reuse	Recovering value from a discarded resource without processing or remanufacture e.g. garments sold through opportunity shops are, strictly speaking, a form of reuse, 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 including food retail and food manufacturing, small to medium enterprises.
Shredder floc	Residue directly arising from large scale shredding operations to recover metals. Shredded material includes, but is not limited to, end of life vehicles, white goods, machineries, drums and corrugated material.
Social licence to operate	The concept of a 'social licence to operate' has evolved from broader concepts of 'corporate social responsibility' and is based on the idea that a business not only needs appropriate government or regulatory approval but also a 'social licence' from society. The social licence is the acceptance that is continually granted to industry and facility operators by the local community or other stakeholders to operate.
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 MSW, waste that are prescribed under the *Environment Protection Act 1970* and quarantine waste.
Solid waste	Non-hazardous, non-prescribed, solid waste materials, ranging from municipal garbage to industrial waste.

Term	Definition
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 e.g. 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 under the 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.
Waste	Any discarded, rejected, unwanted, surplus or abandoned matter, including where intended for recycling, reprocessing, recovery, purification or sale. 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 and resource recovery group (WRRG)	Statutory authorities established under the *Environment Protection Act 1970* responsible for preparing the Regional Waste and Resource Recovery Implementation Plan for their region.
Waste and Resource Recovery Planning Framework	The planning framework as defined in the amendments to the *Environment Protection Act 1970* and including: • The Statewide Waste and Resource Recovery Infrastructure Plan (State Infrastructure Plan) • The seven Regional Waste and Resource Recovery Implementation Plans (Regional Implementation Plans) • Relevant Ministerial Guidelines made under section 50CA of the Act • The process for integration of the State Infrastructure Plan and Regional Implementation Plans.
Waste management industry	Applies to those involved in managing waste e.g. 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	See Energy from waste.

Acronyms

Term	Definition
ABS	Australian Bureau of Statistics
BAU	Business as usual
BPEM	Best practice environmental management
C&D	Construction and demolition
C&I	Commercial and industrial
DELWP	Department of Environment Land Water and Planning
EPA Victoria	Environment Protection Authority Victoria
LGA	Local government area
MRF	Materials recovery facility
MSW	Municipal solid waste
MWRRG	Metropolitan Waste and Resource Recovery Group
PIW	Prescribed industrial waste
RRC/TS	Resource recovery centre/Transfer station
RWRRG	Regional Waste Resource Recovery Group
SME	Small to medium enterprises
SV	Sustainability Victoria
VORRS	Victorian Organics Resource Recovery Strategy
WRRG	Waste Resource Recovery Group