

Final

Merri-bek MFA and opportunities assessment

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Contents

Summary	vii
1. Introduction	1
1.1 Project purpose.....	1
1.2 Context.....	1
1.3 Project scope.....	2
1.4 Project method	5
1.5 Data limitations and assumptions.....	8
2. Stakeholder consultation	9
2.1 Stakeholder outcomes	9
2.2 Consultation outcomes.....	12
3. Material flows	14
3.1 Consumption.....	14
3.2 EoL generation	18
3.3 Fates.....	22
3.4 Summary of flows	24
3.5 Materials for focus	26
4. Economic analysis	27
4.1 Economic activity and trends.....	27
4.2 Commercial and industrial waste	30
4.3 Summary	32
5. Construction and demolition waste	33
6. Opportunity analysis.....	34
6.1 MCA outcomes.....	34
6.2 Proposed opportunities	34
6.3 Selection of five opportunities.....	38
6.4 Opportunity plans	39
7. Conclusions and recommendations	52
References.....	53

Appendices

Appendix A MFA framework and scope	55
A1 MFA framework	56
A2 MFA scope.....	57
A3 MCA lists	60

Appendix B Stakeholder consultation	64
B1 Waste contractor consultation summary	65
B2 Local business consultation summary	66
B3 Nearby councils consultation summary.....	72

Appendix C MCA outcomes	75
MCA outcomes	76

Appendix D C&D waste recycling facilities	83
D1 C&D waste recycling facilities	84

Figures

Figure 1 Waste flows in Merri-bek, 2021–22	viii
Figure 2 Map showing City of Merri-bek	3
Figure 3 Estimated consumption by material category, 2021–22 (kt)	14
Figure 4 Estimated consumption by material category and application area, excluding building and demolition materials, in Merri-bek, 2021–22 (kt)	15
Figure 5 Projected consumption by material category in Merri-bek, 2000–01 to 2029–30 (kt).....	17
Figure 6 Estimated generation by material category, 2021–22 (kt).....	18
Figure 7 Estimated EoL by material category and application area, in Merri-bek, 2021–22 (kt).....	18
Figure 8 Projected EoL generation by material category, 2000–01 to 2029–30 (kt)	20
Figure 9 Estimated EoL generation by material category by source stream, 2021–22 (kt)	21
Figure 10 Estimated fates by material category in Merri-bek, 2021–22 (kt) and estimated recycling rates.....	22
Figure 11 Estimated fates by waste source stream in Merri-bek, 2021–22 (kt) and recycling rates	24
Figure 12 Estimated waste flows in Merri-bek, 2021–22	25
Figure 13 Proportion of employment by industry sector in Merri-bek, 2021–22	28
Figure 14 Employment by industry sector in Merri-bek, 2000–01 to 2021–22	29
Figure 15 Proportion of economic output by industry sector in Merri-bek, 2021–22	29
Figure 16 Economic output by industry sector in Merri-bek, 2000–01 to 2021–22	30

Tables

Table 1 Materials in scope.....	3
Table 2 MCA criteria screening materials	7
Table 3 Estimated consumption by material category and application area in Merri-bek, 2021–22 (kt).....	16
Table 4 Projected consumption by material category, 2020–21 to 2029–30 (kt)	17
Table 5 Estimated EoL generation by material category and application area in Merri-bek, 2021–22 (kt).....	19
Table 6 Projected EoL generation by material category 2021–22 to 2029–30 (kt)	20
Table 7 Estimated EoL generation by material category by waste source stream, 2021–22 (kt).....	21

Table 8	Estimated fates and recycling rates by material category in Merri-bek, 2021–22 (kt).....	23
Table 9	Estimated fates by waste source stream in Merri-bek, 2021–22 (kt)	24
Table 10	Top 10 material types	26
Table 11	Top opportunities for Merri-bek	35
Table 12	Council assessment of opportunities in rank order.....	38
Table 13	Key for costs and timeframe.....	39
Table 14	Opportunity #1: organics from commercial sources	40
Table 15	Opportunity #3: reduction of contamination in food organics	42
Table 16	Opportunity #8a: C&D materials - C&D recycling facilities in the region	44
Table 17	Opportunity #8b: C&D materials - end markets for recovering C&D materials.....	45
Table 18	Opportunity #8c: C&D materials – recovery of plastics	46
Table 19	Opportunity #10: circular business council officer.....	48
Table 20	Opportunity #11: Council procurement for roads and infrastructure using recycled material	50

Abbreviations and glossary

Application area	The area in which the material is used. Each area is made up of product grouping types. Application areas are applied for modelling to account for different lifespans of materials in different uses. This is described further in Appendix 2.2.
B2B	business to business
C&I	commercial and industrial
C&D	construction and demolition
EoL	End-of-life generation is the term for when a product or material reaches the end of its intended purpose (life cycle) and is disposed to waste streams. EoL generation has the same meaning as ‘waste generation’.
Estimated consumption	Consumption at the Council level (which is not known) is estimated based on known waste generation, using material specific ratios of consumption to waste generation derived from the National Waste Report (NWR). The NWR contains both consumption and waste generation estimates, allowing the required ratios to be calculated, which then allows for the calculation of approximations of materials consumption at the council level.
Fate	The ultimate destination of a material. The fates used for this MFA are recovery, landfill and other.
FOGO	Food organics garden organics
HDPE	high density polyethylene
LGA	local government area
LDPE	low density polyethylene
MCA	Multi-criteria analysis
MFA	material flow analysis
MRF	materials recovery facility
MSW	municipal solid waste
PET	polyethylene terephthalate
PP	polypropylene
PS	polystyrene
SV	Sustainability Victoria
RV	Recycling Victoria

Summary

Merri-bek City Council (Council) commissioned Blue Environment to develop a Merri-bek centric material flow analysis and identify and assess local circular economy opportunities. Council plans to use the project findings to inform the evidence-based development of a circular economy strategy, with consideration of viability of options, barriers, relevant stakeholders and potential partners for identified opportunities.

For local governments to devise effective circular economy strategies it is important for them to understand the materials and resources in use across the local economy, the markets and policy context, and the feasible opportunities that they can support and promote.

This report presents the outcomes of consultation with local businesses in Merri-bek (Section 2), results of the MFA (Section 3) and economic analysis of Merri-bek (Section 4) to inform a range of opportunities which were then analysed using multi-criteria analysis (MCA) (Section 6.1) to identify a short-list of potential opportunities available to the Council. The report finally outlines detailed action plans for five opportunities selected by Council for further assessment (Sections 6.3 and 6.4) with the end goal of informing the circular economy strategy.

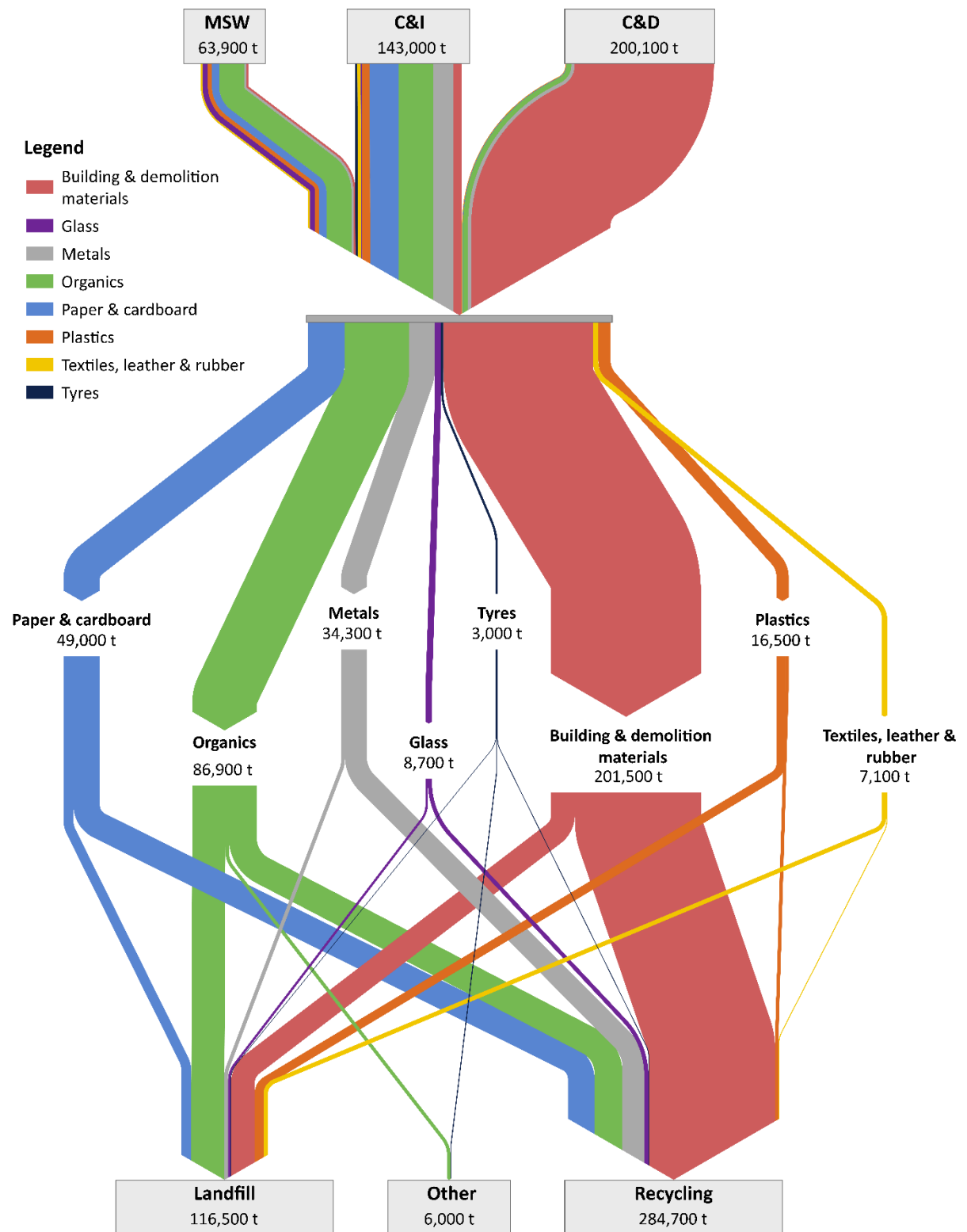
The stakeholder consultation included discussion with Council's recycling and food organics and garden organics (FOGO) contractors and relevant councils including the Cities of Hume, Whittlesea, Darebin, Brimbank and Greater Bendigo. Blue Environment also contacted 25 businesses operating in the Merri-bek area to develop an understanding of the local material flow context, existing circular economy initiatives and appetite for Council-supported circular economy programs and opportunities. We found Merri-bek businesses were highly engaged and we achieved a strong response rate with 84% completing surveys (21 businesses).

A Sankey diagram (overleaf) summarising the estimated end-of-life (EoL) or waste generation in Merri-bek in 2021–22 shows the C&D waste source stream had the largest share of material flows at approximately 200 kt, followed by the C&I source stream at about 143 kt and then MSW at about 64 kt. Approximately 285 kt of material was sent for recycling while 116 kt were sent to landfill. About 6 kt had other fates which included stockpiling of biosolids, and tyres sent for alternative disposal.

The initial MCA included three criteria which were scored against each the material types. Based on the application of these criteria the materials shortlisted for focus were organics, plastics, textiles and paper and cardboard.

The building and demolition waste stream was also suggested as a focus because the EoL generation of material in the category is comparatively large to other material categories, accounting for nearly half of all material estimated to be generated in Merri-bek in 2021–22.

Figure 1 Waste flows in Merri-bek, 2021–22



Blue Environment assessed a range of potential options for improved materials management across the source streams and material types. The assessment considered:

- the findings of the MFA, especially the apparent availability of material and existing management arrangements
- the filter provided by the MCA of material and opportunity types
- the potential for significant improvement based on experience elsewhere, regional industry profiles and feedback from stakeholders
- the potential for improved regional circularity through local processing and use of recovered material
- the findings from the stakeholder consultation.

Having regard to the potential costs and benefits of each opportunity, Council selected five from a short-list of eleven opportunities for further assessment. The five opportunities were assessed in detail to provide plans for actions to address:

- a program to increase recovery of food organics targeting businesses
- a campaign to reduce contamination of the FOGO waste stream targeted at residents and commercial users of the Council service
- a new circular economy council officer with the role to include facilitating circular economy business networks like Hume City Council or Whittlesea City Council
- options for Council to support recovery of C&D materials
- a Council investigation of use of recycled materials in roads

Blue environment recommends that the Council consider the detailed opportunity plans (Section 6.4) for integration into the circular economy strategy.

1. Introduction

1.1 Project purpose

The overall aim of this project is to develop a Merri-bek centric material flow analysis, and identify and assess local circular economy opportunities to inform the development of the future Merri-bek City Council (Council) circular economy strategy.

Materials handling, use and disposal to landfill are well documented as major contributors to greenhouse gas emissions, with circular economy activity gaining momentum as the need to decouple economic activity from the consumption of finite resources steadily becomes more apparent. For local governments to devise effective circular economy strategies it is important for them to understand the materials and resources in use across the local economy, the markets and policy context, and the feasible opportunities that they can support and promote.

Through this project the Council seeks to:

- understand the materials and resources in use across the local economy, including where they are sourced, what they are used for, where they are consumed and how businesses and builders/property developers manage and dispose of their waste
- identify opportunities for new and increased use of recovered resources in local and regional manufacturing.

The Council plans to use the project findings to inform the evidence-based development of a circular economy strategy, with consideration of viability of options, barriers, relevant stakeholders and potential partners for identified opportunities.

1.2 Context

The Merri-bek municipality is made up of three wards with an estimated resident population of 174,502¹. In terms of industry sector economic activity market share, ten years ago (in 2012–13) the area was dominated by manufacturing (18.8%), construction (17.7%) and office-based industries² (16.8%). By 2021–22 construction and office-based industries had grown (21.1% and 17.8% respectively). However, manufacturing had sharply decreased to 12.6%.

These three industries are still the largest shares of economic output³ but in 2021–22 health care and social assistance was the largest employing industry sector (and now closely follows manufacturing in terms of economic output) at 17.7% of employment, followed by office-based industries (12.4%) and education and training (11.9%).

Council is implementing an extensive kerbside waste reform program with intent to transition to the higher performing four bin service. Council currently offers kerbside landfill, recycling, combined food organics and garden organics (FOGO) and recently, from July 2023, a separate glass collection services for residential and eligible commercial properties. Council also offers a Commercial Plus fee-for-service to pay for more bins.

¹ Source: <https://profile.id.com.au/merri-bek> based on ABS 2022 population figures.

² 'Office-based industries' include ANZSIC industry sectors that are largely or entirely office based, and so typically have similar material use and waste generation profiles.

³ Output by industry sector is a gross measure of the total sales of each industry sector in the City of Merri-bek

Key Council policies and plans include:

- Moreland City Council: Council Plan 2021-2025
- Moreland Zero Carbon – 2040 Framework, 2018
- Procurement policy, 1 July 2021–30 June 2025

Council's previous Waste and Litter Strategy and four-year action plan expired in June 2022. It included a target of sending zero waste to landfill by 2030 and to considerably reduce the amount of food waste going to landfill.

This project will contribute to the next strategy, which will build on the work delivered through the last strategy and seek to provide a pathway to transition to the circular economy locally through activities and initiatives under five key pillars:

- Advocacy
- Community behaviour change
- Best practice kerbside services
- Businesses, charities, social enterprises
- Council as role model (procurement, capital works, operations).

1.3 Project scope

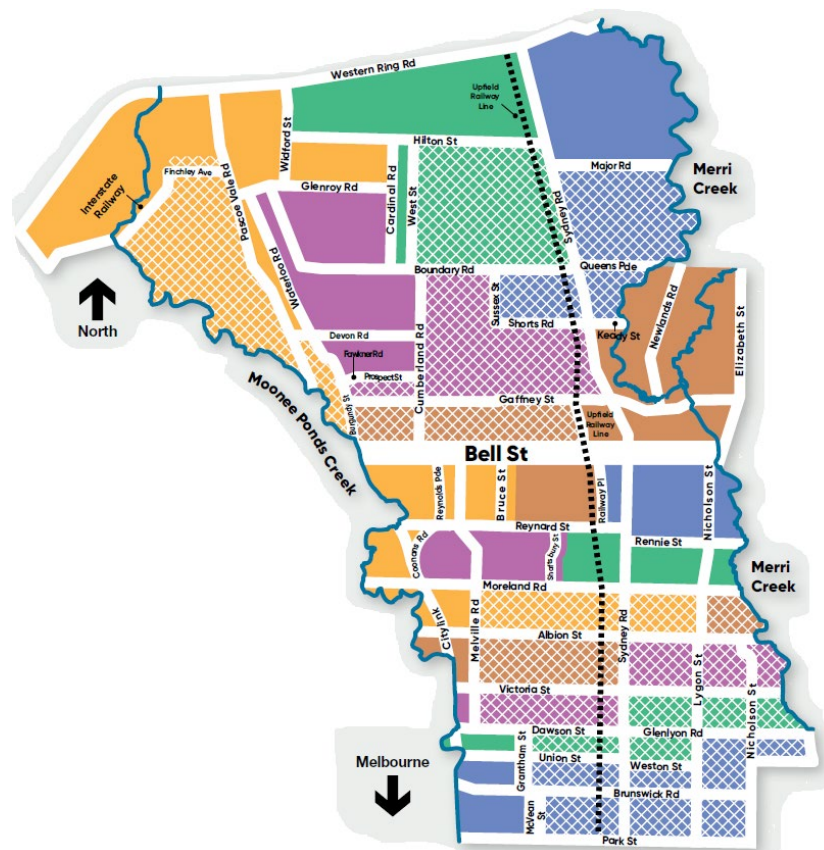
The project scope included:

1. An MFA to provide detailed analysis on the materials and resources in use across the local economy with identification of:
 - a) where materials are sourced
 - b) what they are used for
 - c) where they are consumed and how businesses manage and dispose of their waste across MSW, C&I and C&D waste streams.
2. Identification of up to ten, with assessment of five opportunities, for new and increased use of recovered resources in local and regional manufacturing with consideration of:
 - a) programs and services that Council could implement to support local businesses and other not for profit organisations to transition to the circular economy
 - b) where advocacy for high priority policy or legislative measures at state or federal level may be required to help drive circular economy outcomes.
3. Identification of the likely position of Merri-bek businesses and not for profit organisations within the wider regional recovered resource use process e.g. as suppliers, designers, manufacturers etc.
4. Identification of facilities available to recycle construction and demolition waste, along with barriers to recycling.
5. Identification of opportunities for the Councils' healthcare and social assistance sector.

Thermal Waste to Energy options were excluded from the scope.

The geographic scope was the City of Merri-bek, shown in Figure 1, including the suburbs of Brunswick, Brunswick East, Brunswick West, Coburg, Coburg North, Pascoe Vale, Pascoe Vale South, Oak Park, Fawkner, Glenroy, Gowanbrae as well as areas of Fitzroy and Tullamarine.

Figure 2 Map showing City of Merri-bek



Source: Merri-bek City Council

The MFA scope is provided in the following sub-sections.

Materials in scope

Presented in Table 1 are the material types within each of the material categories that were considered in the flow analysis. These material types are based on the Australian standard for waste and resource recovery data and reporting (Blue Environment, 2021, p. 13).

Table 1 Materials in scope

Category	Type
Organics	Food organics
	Garden organics
	Timber
	Sawdust
	Biosolids (non-contaminated)
	Other organics
	Mixed organics
Paper & cardboard	Cardboard
	Polymer coated paperboard

Category	Type
	Office paper
	Newsprint & magazines
Plastics	Polyethylene terephthalate (PET) (1)
	High density polyethylene (HDPE) (2)
	Polyvinyl chloride (PVC) (3)
	Low density polyethylene (LDPE) (4)
	Polypropylene (PP) (5)
	Polystyrene (PS) (6) and expanded polystyrene (EPS) (6)
	Other plastics (7)
Textiles, leather & rubber (excl. tyres)	Textiles
	Leather & rubber (excl. tyres)
Glass	Glass from food and beverage containers
	Other glass
Building and demolition materials	Asphalt
	Bricks, concrete and pavers
	Ceramics, tiles and pottery
	Plasterboard & cement sheeting
	Soil, sand and rock
	Rubble
Metals	Iron and steel
	Aluminium
	Non-ferrous metals (ex. Aluminium)
Tyres	Tyres (T140)

Excluded from the MFA scope were gaseous, liquid and hazardous waste.

It is worth noting the difference between products and materials. Products such as cars, batteries, mattresses and furniture are comprised of multiple materials (e.g. metals, plastics, textiles, timber etc.) and hence are not modelled in the MFA. Products may be relevant however when considering specific key materials as this can inform the focus of potential actions.

Data exists to model e-waste, which is a product, but the related products (i.e. televisions and computers) are covered by national programs, and for this reason e-waste is not included as an explicit 'material type' in the quantitative MFA modelling scope. However, e-waste related material flows will be covered as an 'application area' in the contributing material flows and will be considered in the options assessment.

Waste streams in scope

The waste streams included in the MFA were municipal solid waste (MSW), commercial and industrial (C&I) and construction and demolition (C&D) materials.

Further scope detail

A graphical summary of the overall MFA modelling and opportunity development is provided in Appendix A, along with further detail on the MFA scope and MCA.

1.4 Project method

The method included the following tasks:

- Task 1 Inception meeting
- Task 2 Project plan
- Task 3 Data collection and review
- Task 4 Draft MFA model and data analysis
- Task 5 Local business survey
- Task 6 Research and development of options
- Task 7 Draft report
- Task 8 Final report
- Task 9 Project completion.

Information collection and other data

Data collection involved a literature review of existing waste and material flows data, national, state and local regulations, policies and plans and circular economy best practices.

Waste data from local, state and national sources was used to inform the MFA and opportunity analysis. The waste data is used to calculate end-of-life (EoL) generation and fates, and estimate consumption in the municipality. Waste contractors were also consulted to develop a firm understanding of the scope and context.

Economic data from the Australian Bureau of Statistics was used to inform primary business types in the municipality. Division level employment data by council identified the business types with highest number of employees in the municipality. This data was organised by the Australian and New Zealand Standard Industry Classification (ANZSIC).

The economic data enabled identification of businesses contributing more to employment or economic output. Information on commercial waste composition, hospitality and retail (First Person Consulting, 2021) and by ANZSIC classification (Encycle and SRU, 2013) was used for insight about potential waste materials generated by the primary business types in the municipality. This data was integrated into development of potential opportunities.

Local businesses were consulted to better understand resource use in Merri-bek. Businesses were selected based on the prevalence of industry type in consultation with the Council. Businesses were asked about their waste management practices including waste streams, circular economy initiatives in place and any opportunities they saw for Council to support circular economy in the region.

The economic development teams of other councils were consulted including Hume City Council, Whittlesea City Council, Darebin City Council, Brimbank City Council and Greater Bendigo City Council. These consultations provided context for the nearby region and identified opportunities for Council initiated circular economy programs.

MFA method

The flows analysis was based on a material flow analysis (MFA) for in scope materials, along with collation of other data in relation to policies, plans and the environment impacts of materials.

The MFA estimated consumption, EoL generation and fates (recycling / landfill / other) of the materials in the 2021–22 financial year. In addition, the MFA estimated consumption, stocks and EoL generation across the period of 2000–01 to 2029–30.

There were two main uses of the MFA outputs. The first was to provide the quantitative data that gives context on the relative scales of material flows and fates (reported in Section 3). The second use was to inform the MCA criteria scoring for the climate change and waste to landfill criteria. See Table 2 for more on the proposed MCA criteria. The MFA and MCA are in a Microsoft Excel model to accompany the final report.

Opportunity analysis method

An MCA compares quantitative and qualitative impacts across opportunities for action by assigning scores to criteria linked to the likely impacts of the intervention. Infrastructure Australia (Infrastructure Australia, 2021, p. 6) defines MCA as follows:

Multi-criteria analysis (MCA) is a tool that can be used to compare reform and investment proposals. When applied consistently and transparently, it is a suitable approach for filtering options before applying more detailed quantitative analysis, or to compare options where impacts are not easily quantifiable. MCA uses objectives, criteria, measures, weightings and scoring approaches to rank and compare options.

Although a degree of subjectivity is inherent in the MCA approach, when applied appropriately, MCA can provide a structured, systematic and transparent framework for comparing options with some non-quantified costs and/or benefits.

There were five criteria for this project which are summarised in Table 2 (overleaf).

Table 2 *MCA criteria screening materials*

Criterion	Criterion group	Description	Scoring method	Source
Waste to landfill	Environmental performance	Anticipated quantities of waste to landfill with the associated legacy issues of waste management and potential future releases to the environment.	Quantitative – 1–5 score based on the quantity to landfill quintile.	Based on MFA outputs.
Climate change	Environmental performance	Emissions of greenhouse gases known to contribute to climate change. The potential GHG avoided by recovery.	Quantitative – 1–5 score based on the 'avoidable emissions if recycled' quintile.	Based on MFA outputs.
Priority (State)	Environmental, social and economic performance	This criterion considers whether the material is a SV priority, the existing level and success of interventions and future priority potential.	Qualitative – 1–5 score based on qualitative descriptors to convert to a numerical scale so that numerical operations can be performed.	Score manually by consultant
Ability to influence end market	Social and economic performance	This criterion considers the councils' ability to build, create or enhance the depth of the end market based on maturity of the market and available opportunities.	Qualitative – 1–5 score based on qualitative descriptors to convert to a numerical scale so that numerical operations can be performed.	Score manually by consultant.
Delivery ease	Technical performance	This criterion considers how hard an opportunity is to deliver.	Qualitative – 1–5 score based on qualitative descriptors to convert to a numerical scale so that numerical operations can be performed.	Score manually by consultant.

Discussions with the Council informed scoring of criteria which considered the different types of opportunities, which are ability to influence the end market and delivery ease.

It is important to note that the MCA should be seen as a filter only, and not as a tool for definitively selecting specific projects or programs. Specific projects/programs, whether based on the guidance provided by this project or not, should be subject to their own detailed evaluation.

1.5 Data limitations and assumptions

This section provides the limitations for data used in the MFA modelling as well as the key assumptions used.

Consumption of all materials was estimated based on per capita allocations, as there was no other good quality data available to break down consumption by local government area (LGA). As such, estimates for consumption are approximations only, and do not account for any other variations across the geographic areas within the scope.

Waste data from local, state and national sources was used to inform the MFA and opportunity analysis. We relied on the council-provided MSW tonnage data for landfill and recycling collection and used the Councils' waste audits to estimate the splits of MSW across material types.

Limitations exist for the data used in the MFA, especially in relation to C&I and C&D because council-level data was not available for these streams, and C&D waste is inherently difficult to predict. For these reasons best estimates were used for C&I and C&D waste tonnage data based on average state values, which were the most comprehensive dataset available and were assumed representative of the municipality. Merri-bek's proportional split of industrial waste to landfill into C&I and C&D streams is identical to the state average. The rate of generation and recycling of C&I and C&D waste per capita is assumed to be identical to the state average.

In the tables presented in this report, minor discrepancies may occur between the stated summed totals and the apparent sums of the contributing values, as summed totals and percentage values were calculated using contributing values prior to rounding.

We were unable to confidently present error ranges for the data because there was not enough data to allow those to be estimated. Council should interpret the data in this report with consideration of these limitations.

2. Stakeholder consultation

The project engaged extensively with stakeholders to further our understanding of the project context and opportunities, and gather views on what could be done to improve the circularity of materials.

2.1 Stakeholder outcomes

The following stakeholder groups were surveyed to validate data on material markets, processes and capacity, recovery and identify opportunities to improve plastics recovery and circularity:

- waste contractors
- local businesses
- nearby councils.

A summary of key findings is provided in the following sections, with further detail provided in Appendix B.

Waste managers

Blue Environment consulted Merri-bek's waste service providers to understand local waste management, facility capacities, challenges with managing materials and opportunities for increasing recovery. We conducted half-hour, discussion-style interviews in April via videocall.

Food organics and garden organics (FOGO) collected in Merri-bek are taken to the Bulla organics facility run by Veolia. The representative indicated this facility has the capacity to take more organics and that Veolia would like to increase the amount of FOGO they accept as a proportion of their total intake to increase the nutrients in and value of their product.

Merri-bek organics are processed to become a soil conditioner product used mostly for agriculture or sold to garden centres and nurseries. Veolia makes donations of soil conditioner products to community gardens. The rate of contamination is approximately 2.5%-3.0%, with bagged materials the main contaminant, and Veolia noted that Merri-bek sourced material has lower contamination rates than other councils.

VISY collects Merri-bek's recycling bins. All material collected is processed in Australia at various VISY sites and made into recycled and subsequently recyclable packaging products. VISY reports that some areas of Merri-bek have very low levels of contamination while others have very high contamination.

Local businesses

Blue Environment contacted 25 businesses operating in the Merri-bek area to develop an understanding of the local material flow context, existing circular economy initiatives and appetite for Council-supported circular economy programs and opportunities. The types of businesses selected for consultation was proportional to the representation of industry types in the area. We received a strong response rate with 84% completing surveys (21 businesses). A summary of the outcomes of each consultation is provided in Appendix B.

Healthcare

Blue Environment contacted four businesses in this sector including two hospitals, an aged care facility and a child care service. The aged care provider indicated that a major waste source was incontinence pads, paper towels and personal protective equipment (PPE). A healthcare provider indicated that while PPE volumes have reduced from the height of the COVID pandemic, N95 masks remain a major unrecyclable waste source. A representative from a childcare service indicated that major wastes were cardboard, paper and food, with food mostly managed with on-site composting systems.

Some waste avoidance measures in medical settings have been reported, with initiatives such as introducing semi-automatic chemical dispensers rather than manual dispensers and plans to introduce automatic paper towel dispensers to patient accommodations to reduce paper towel wastage. In aged care settings, soft plastic packaging from kitchen products is a major waste stream for which respondents would like to see a recycling stream. Childcare centres generate hard rubbish items and the representative indicated they would like to have a more frequent collection service.

Construction

The Master Builders Association shared views and insights into construction waste management and barriers to recycling. Further detail is provided in section 5 which addresses C&D waste.

One developer operating in Merri-bek indicated that their priority is to reduce embodied carbon in their buildings followed by use of materials with recycled content. They do an initial environmental assessment of how to manage waste materials onsite, with recovered bricks often cleaned and reused. They design residential apartment buildings to have multiple waste streams to encourage waste accountability.

Manufacturing

Based on consultation with one manufacturer in Merri-bek and previous work undertaken by the consulting team, it is understood that large manufacturing businesses operating in Merri-bek tend to use commercial waste contractors for their specialised waste.

One polymer manufacturer operating in Merri-bek reported producing large volumes of plastic waste for which they are exploring alternative chemical recycling processes and are working towards including a significant proportion of recycled materials in their products.

Retail and food services

Packaging waste was identified as a challenging material for businesses in this sector. Retailer representatives identified challenges with the large volumes of cardboard especially during high turnover periods such as Christmas. A separate cardboard collection service was identified as important for businesses that sometimes had too much cardboard for their council-supplied commingled recycling bins. Businesses in central Coburg and Glenroy have a private commercial cardboard collection service that does not charge the businesses to pick up their cardboard.

Packaging waste, including glass and cardboard was also an issue for food service businesses. A representative from the restaurant industry suggested that separated recycling waste streams would be welcomed at their business but they noted that commingled recycling services were more affordable for small businesses. Part of the issue for food service businesses is excessive packaging of stock passed on from suppliers.

Food waste from food preparation, that goes to landfill, was also raised by these stakeholders, although noted as a lesser quantity than packaging.

Trading associations

Blue Environment consulted two trader associations. Both representatives identified the local communities as being sustainably minded customers and both associations had circular economy initiatives in place. These included the publication of an annual second hand and vintage guide to promote second hand businesses and participation in trials initiated by Council.

The representatives suggested that small businesses do not have time to research sustainable alternatives to single-use plastic items and benefitted from guidance on budget-effective, sustainable alternatives for items like takeaway coffee cups and containers. The trader association representatives noted that businesses tended to participate minimally in reducing these wastes and only as needed to comply with single-use plastic bans.

Office-based

The four office-based businesses consulted tend to produce little waste. Packaging such as cardboard and plastic for hardware was identified as the main waste stream. Some representatives noted soft plastic packaging was challenging to recycle as although businesses wanted to recycle the material they did not generate the volumes required for commercial pick-up services. Most of the office-based businesses that were surveyed encouraged staff to use reusable items and make sustainable choices where possible. Examples included ceramic mugs provided for takeaway coffee and printing on paper with recycled content.

Reuse and repair services

Local businesses and not for profits that are actively facilitating circular economy in the area were consulted as part of the local business survey. Blue Environment spoke to the Brunswick Tool Library and Upshop Industries. Both representatives identified space as the major constraint and pointed to similar programs or services in Melbourne that had greater impact due to larger workspaces.

The Brunswick Tool Library identified small appliances and bicycles as the most common items for repair. Items that cannot be reused or repaired are sent to a transfer station. The Brunswick Tool Library representatives suggested ideal support would be funding for a larger space or a full-time employee such as in Yarra City Council.

Upshop Industries identifies problematic non-recyclable wastes and upcycles these depreciated products. They currently take waste promotional banners made from currently unrecyclable PVC vinyl to make bags which are sold back to the clients for promotional use.

Other stakeholders

Blue Environment also consulted stakeholders from other industry divisions, which are briefly discussed in this section. Blue Environment consulted RMIT University as a representative of the Education and Training sector. The university has a campus in Brunswick that is focused on fashion and textiles. The representative discussed the University's circular economy plan and indicated that they would be interested in liaising with Council and food services businesses in the area to manage food waste on site, referencing the City of Melbourne laneways food waste management arrangement.

A studio space in Brunswick East was consulted as a representative of the Arts and Recreation services sector. They indicated they would like to recycle more but that a lot of the wastes generated by tenants were from renovations and broken furniture and they did not know where to find resources on how to recycle some of these materials.

A representative from the Trust that manages the Fawkner Cemetery indicated that they had sustainability initiatives in place. Most of their waste is garden organics and is managed on-site.

Local council benchmarking

Blue Environment consulted five city councils to identify circular economy initiatives that comparable councils support, potential opportunities for the wider region and to understand how other councils support businesses to be part of the circular economy.

Blue Environment discussed with each council consulted their views on the Aspire Program. City of Greater Bendigo pays for the service and noted that while it still was underdeveloped in regional areas, the program was useful for businesses. Other councils, opinions ranged from firmly against (Hume) to considering engaging (Whittlesea). Some consultees noted that the fee was high for the service.

Initiatives in place by councils included:

- soft plastics recycling
- a commercial organics collection trial
- business capability building
- reusable goods drop off days organised with charity partners
- reusable party kits available for loan through neighbourhood houses and repair cafes.

Darebin City Council noted that they supported community-led circular economy initiatives operating in the area such as the Darebin Hard Rubbish Heroes, and Darebin publishes a Plastics Business Guide for local use.

Whittlesea City Council have found that acknowledging businesses that are already advocating for circular economy initiatives and rewarding “Circular Economy Champions” helps when building relationships and engaging across the community.

Hume and Whittlesea councils have a dedicated circular economy officer that is focussed on facilitating business to business (B2B) networks for circular economy initiatives. Both councils indicated that this officer position was valuable to connecting businesses and providing information to businesses. The officer also facilitates connections with tertiary institutions, schools and research. They would like to see networking across the northern region between councils.

2.2 Consultation outcomes

While each consultation was specific to the type of stakeholder and organisation, there emerged common challenges and opportunities for circular economy in a local context. These are listed below, and where possible are related to specific materials.

Challenges

- Lack of access to knowledge on the sustainable or better choice products that cost the same as non-sustainable options. This was noted by representatives from the food and beverage services, retail and construction sectors.

- The quantity of packaging materials, especially cardboard and soft plastics, are major components of businesses waste streams. Challenges include difficulty avoiding packaging, and lack of sufficient and accessible recycling options for businesses.
- Based on consultation with businesses in Merri-bek there seems to be some sense of isolation between businesses wanting to pursue sustainable options, with the main connection being business-to-council rather than connections between businesses. This is a theme noted in consultations with other councils too.

Opportunities

Based on their diverse experiences, interviewed stakeholders provided many suggestions on how to increase circular economy within the region. Providing information and assisting businesses to build capability were strong themes during consultation. Significant opportunities were:

- a separate cardboard and soft plastic packaging collection service.
- accessible directory or database resource comparing materials or products based on sustainability and cost for items such as takeaway coffee cups and containers.
- businesses would like to see networking and workshop opportunities based on managing wastes, learning about sustainable business practices.
- research and development opportunities for small businesses through partnerships.
- transfer station or hub for businesses to take their recyclable or repairable materials that could be used by repairers such as the Brunswick Tool Library.
- creating space for circular economy active businesses to increase volume repaired, recycled or upcycled.
- support and resources for businesses to advocate for reduced excess packaging passed on to them by suppliers.
- other councils have had success with a specific officer role for circular economy and sustainable business to facilitate networking with business and other stakeholders.

All businesses consulted were interested in working with Council and participating in circular economy trials and initiatives. Several businesses expressed that previous engagement from Council had been valuable to their business.

3. Material flows

Provided in this section is contextual information on consumption (new products and materials in use), stocks (materials in use), End of Life (EoL) generation, and fates (landfill, recycling, other) presented by material category. The flows data is presented by material category in this report. Further detail, including estimated flows by material type are provided in the accompanying flows model.

3.1 Consumption

As local consumption data is not available consumption to waste generation ratios derived from national waste data were used in the MFA. The consumption level data has relatively high uncertainties but is useful to provide an indication of the relative quantities of each material consumed.

As shown in Figure 3, building and demolition materials are more than double the quantity of the next largest material category which is organics. Table 3 provides the consumption across material categories as well as by application area.

Figure 3 Estimated consumption by material category, 2021–22 (kt)

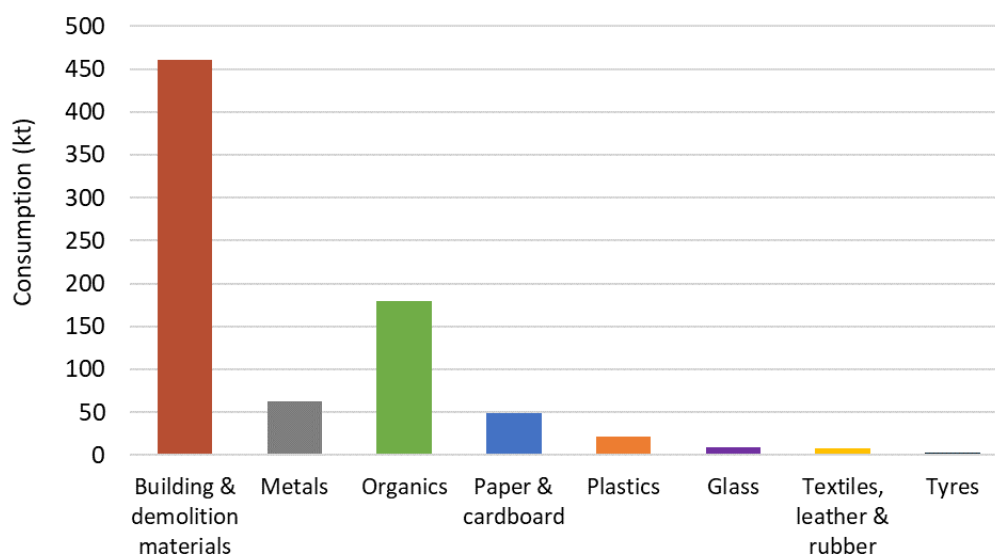


Figure 4 presents consumption by material type and application area. Building and demolition materials, which relate to the built environment area, are excluded to improve visibility of material types with smaller quantities. The next largest quantity, organics, is mostly from households (included in the 'other application area').

Figure 4 Estimated consumption by material category and application area, excluding building and demolition materials, in Merri-bek, 2021–22 (kt)

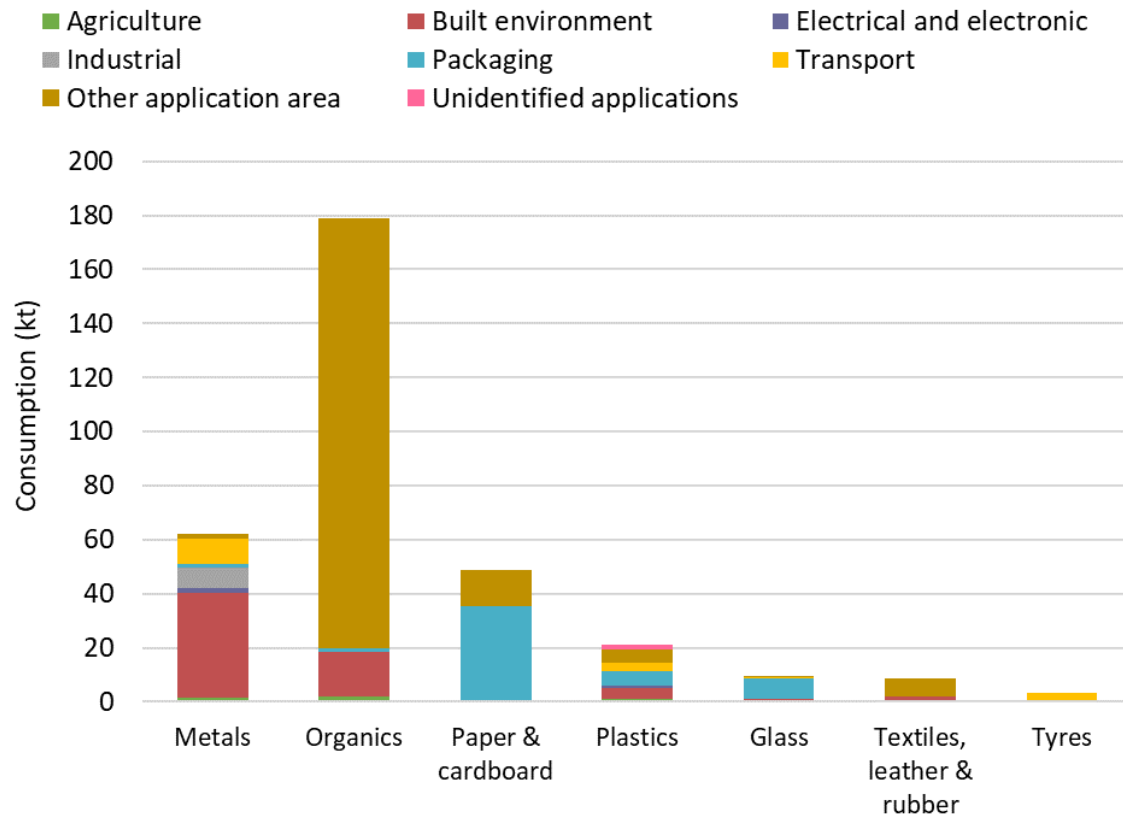
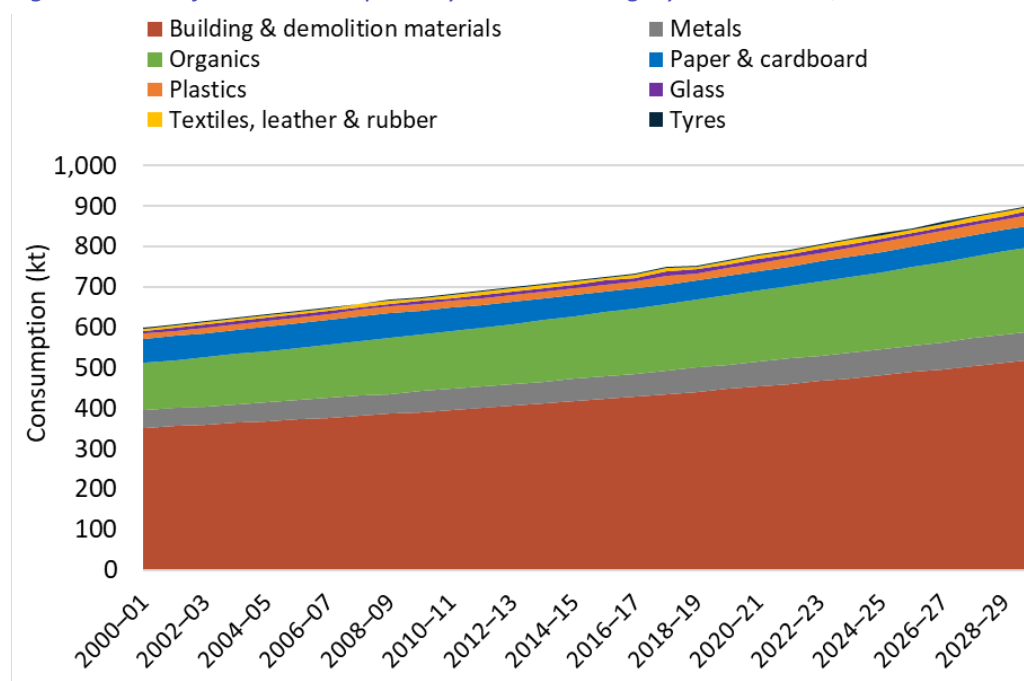


Table 3 *Estimated consumption by material category and application area in Merri-bek, 2021–22 (kt)*

Material category	Agriculture	Built environment	Electrical and electronic	Industrial	Packaging	Transport	Other application area	Unidentified applications	Total Consumption
Building & demolition materials	0	461	0	0	0	0	0	0	461
Metals	2	39	2	8	2	9	2	0	62
Organics	2	17	0	0	1	0	159	0	179
Paper & cardboard	0	0	0	0	35	0	14	0	49
Plastics	1	4	1	0	5	3	5	2	21
Glass	<1	1	<1	<1	7	1	<1	0	9
Textiles, leather & rubber	<1	2	<1	<1	0	<1	6	0	9
Tyres	0	0	0	0	0	3	0	0	3
Total	4	523	3	8	51	17	186	2	793

Projected consumption from 2020–21 to 2029–30 is shown in Figure 5 and Table 4. As regionally specific forecasts in consumption of each material are not available, projected consumption was calculated using consumption ratios generated from the available national and state level MFA data (Blue Environment, 2022).

Figure 5 Projected consumption by material category in Merri-bek, 2000–01 to 2029–30 (kt)



The underlying rates of increase in consumption as calculated in the national and state level datasets (Blue Environment, 2022) are mostly based on either per capita or CPI annual projected growth rates due to the lack of other more material specific information on future growth rates with the exceptions of glass and 'textiles, leather & rubber'. It is important to note that this gives the appearance of organics growing faster than most other material types, due to the higher starting (baseline) value. Therefore, the relatively strong increase in organics consumption should be interpreted with caution.

The growth in consumption of glass and 'textiles, leather & rubber' is based on more material specific growth rates in the underlying MFA modelling, which are generally higher than either per capita or CPI growth projections.

Table 4 Projected consumption by material category, 2020–21 to 2029–30 (kt)

Year	2021–22	2022–23	2023–24	2024–25	2025–26	2026–27	2027–28	2028–29	2029–30
Building & demolition materials	461	467	474	482	489	497	505	513	521
Metals	62	63	64	65	66	67	69	70	71
Organics	179	183	186	190	194	198	202	206	210
Paper & cardboard	49	49	50	50	51	51	52	52	53
Plastics	21	22	23	23	24	25	26	26	27
Glass	9	9	10	10	10	10	10	10	10
Textiles, leather & rubber	9	9	9	9	9	9	9	10	10
Tyres	3	3	3	3	3	3	3	3	3
Total	793	806	819	832	846	860	875	890	905

3.2 EoL generation

EoL generation data is important to inform required reprocessing capacity. Presented in Figure 6 is the estimated generation by in scope material for Merri-bek. Building and demolition materials are generated in the highest quantities, followed by organics, then paper and cardboard.

Figure 6 Estimated generation by material category, 2021–22 (kt)

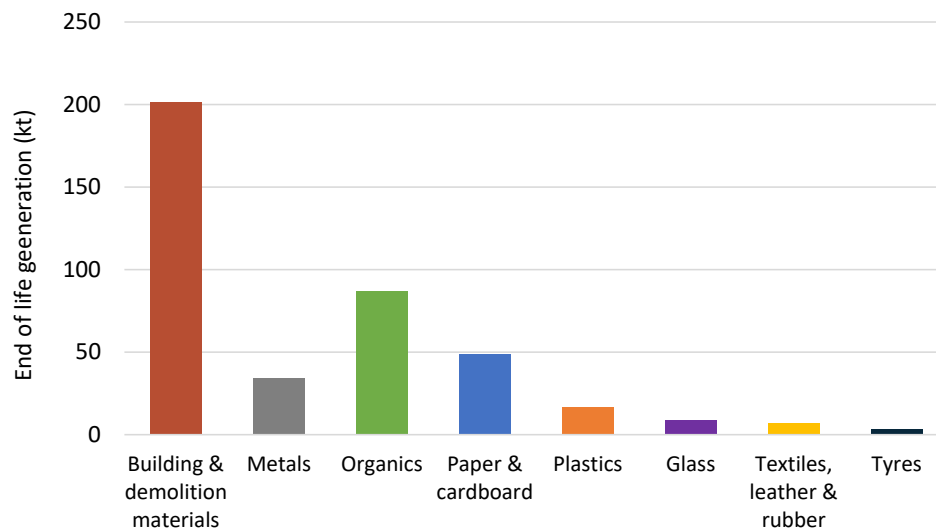


Figure 7 and Table 5 present EoL by material type and application area. Building and demolition materials, which are consumed in the built environment area, are excluded from Figure 7 to improve visibility of material types with smaller quantities. The next largest quantity, organics, is mostly from households, followed by the built environment.

Figure 7 Estimated EoL by material category and application area, in Merri-bek, 2021–22 (kt)

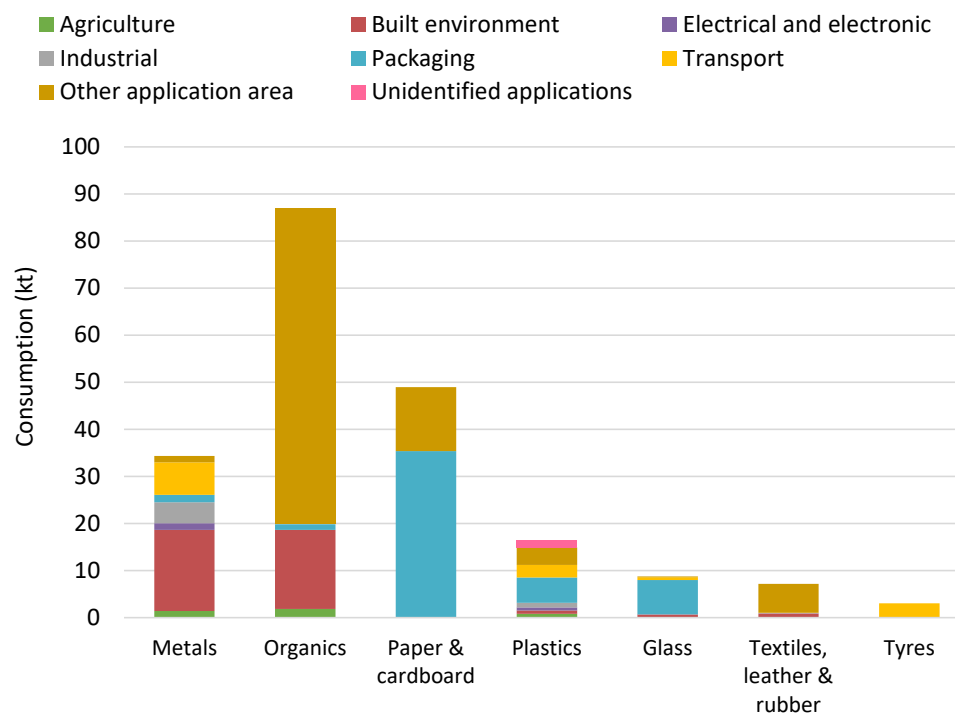


Table 5 *Estimated EoL generation by material category and application area in Merri-bek, 2021–22 (kt)*

Material category	Agriculture	Built environment	Electrical and electronic	Industrial	Packaging	Transport	Other application area	Unidentified applications	Total EoL generation
Building & demolition materials	0	201	0	0	0	0	0	0	201
Metals	1	17	1	4	2	7	1	0	34
Organics	2	17	0	0	1	0	67	0	87
Paper & cardboard	0	0	0	0	35	0	14	0	49
Plastics	1	1	1	1	5	3	4	2	17
Glass	<1	1	<1	<1	7	1	<1	0	9
Textiles, leather & rubber	<1	1	<1	<1	0	<1	6	0	7
Tyres	0	0	0	0	0	3	0	0	3
Total	4	238	2	6	51	13	92	2	407

Projected EoL generation is shown in Figure 8 and Table 6.

Figure 8 Projected EoL generation by material category, 2000–01 to 2029–30 (kt)

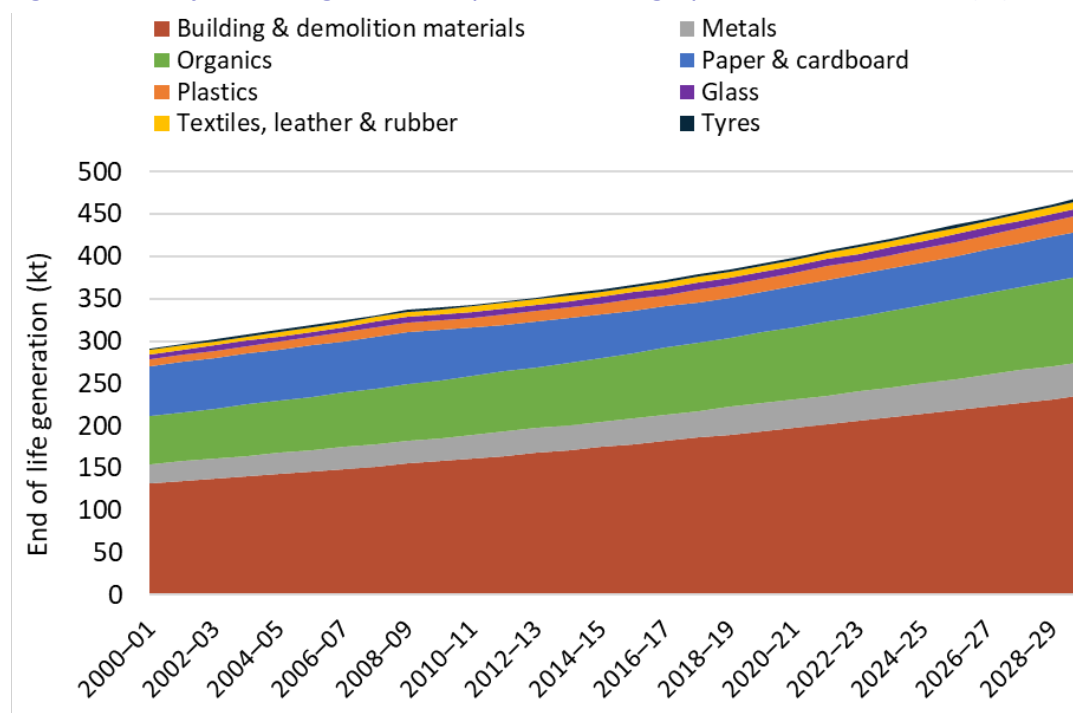


Table 6 Projected EoL generation by material category 2021–22 to 2029–30 (kt)

Year	2021–22	2022–23	2023–24	2024–25	2025–26	2026–27	2027–28	2028–29	2029–30
Building & demolition materials	201	205	210	214	218	222	227	231	236
Metals	34	35	36	36	37	38	39	39	40
Organics	87	89	90	92	94	96	98	100	102
Paper & cardboard	49	49	50	50	51	51	52	52	53
Plastics	17	16	16	17	17	18	18	18	19
Glass	9	9	9	9	9	9	9	9	9
Textiles, leather & rubber	7	7	7	8	8	8	8	8	8
Tyres	3	3	3	3	3	3	3	3	3
Total	407	414	421	429	437	445	454	462	471

Figure 9 and Table 7 present estimated EoL generation by material category and source stream. Building and demolition materials are generated in the highest quantity, which is mostly from the C&D source stream. The next largest quantity generated was organics with 54% from the C&I source stream.

Figure 9 Estimated EoL generation by material category by source stream, 2021–22 (kt)

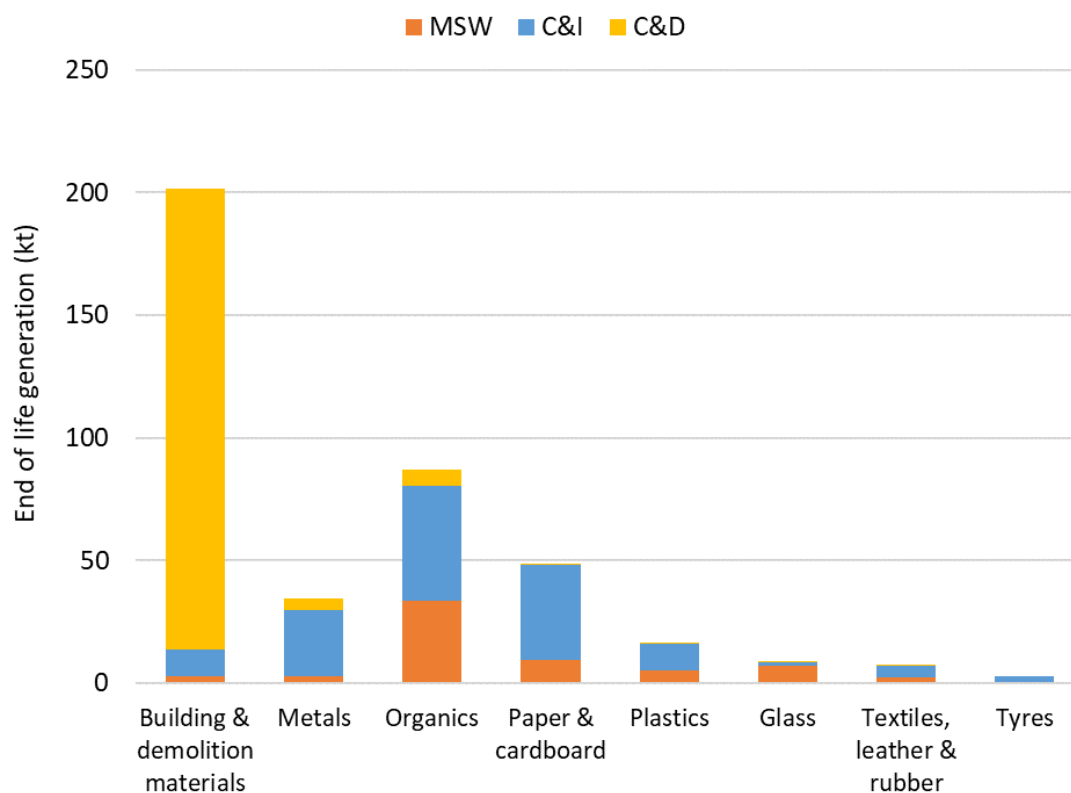


Table 7 Estimated EoL generation by material category by waste source stream, 2021–22 (kt)

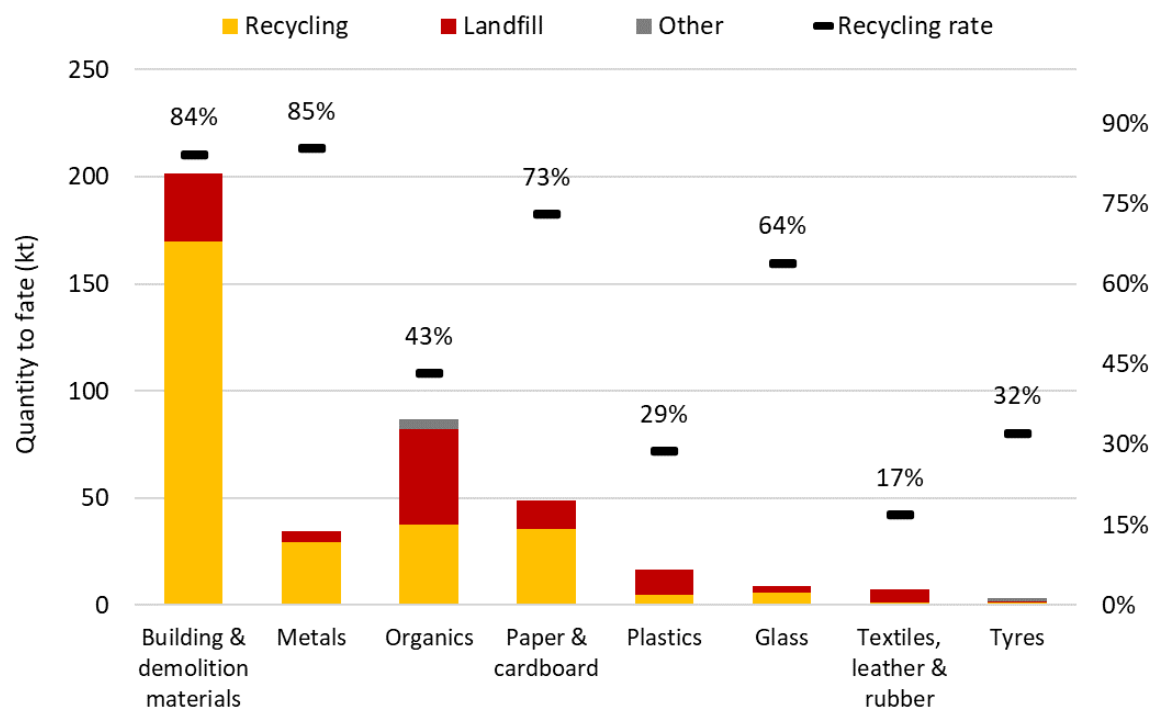
Material category	MSW	C&I	C&D	Total
Building & demolition materials	3	11	188	201
Metals	3	27	4	34
Organics	34	47	7	87
Paper & cardboard	10	39	1	49
Plastics	5	11	1	17
Glass	7	1	0	9
Textiles, leather & rubber	2	5	0	7
Tyres	0	3	-	3
Total	64	143	200	407

3.3 Fates

Fate data shows where materials end up. In this project, the data is sufficient to estimate fates of landfill and recycling plus an 'other' fate to account for some stockpiled biosolid (part of C&I organics). Fates data is important to understand the type and quantity of materials that end up in landfill as compared to materials estimated to be recycled.

The estimated fates and recycling rates⁴ by material category are provided in Figure 10 and Table 8. Although the data available for this project had high uncertainty the results show the relative difference in quantity of materials. Metals and building and demolition materials are estimated to have recycling rates above 80%, paper and cardboard at 73% and glass at around 64%.

Figure 10 Estimated fates by material category in Merri-bek, 2021–22 (kt) and estimated recycling rates



⁴ The recycling rate was calculated as estimated quantity of material recycled divided by estimated quantity of material generated.

Table 8 *Estimated fates and recycling rates by material category in Merri-bek, 2021–22 (kt)*

Material category	Generated	Recycling	Landfill	Other	Recycling rate
Building & demolition materials	201	170	32	0	84%
Metals	34	29	5	0	85%
Organics	87	38	45	5	43%
Paper & cardboard	49	36	13	0	73%
Plastics	17	5	12	0	29%
Glass	9	6	3	0	64%
Textiles, leather & rubber	7	1	6	0	17%
Tyres	3	1	1	1	32%
Total	407	285	116	6	70%

Provided in Figure 11 and Table 9 is the estimated fates by source stream.

Figure 11 Estimated fates by waste source stream in Merri-bek, 2021–22 (kt) and recycling rates

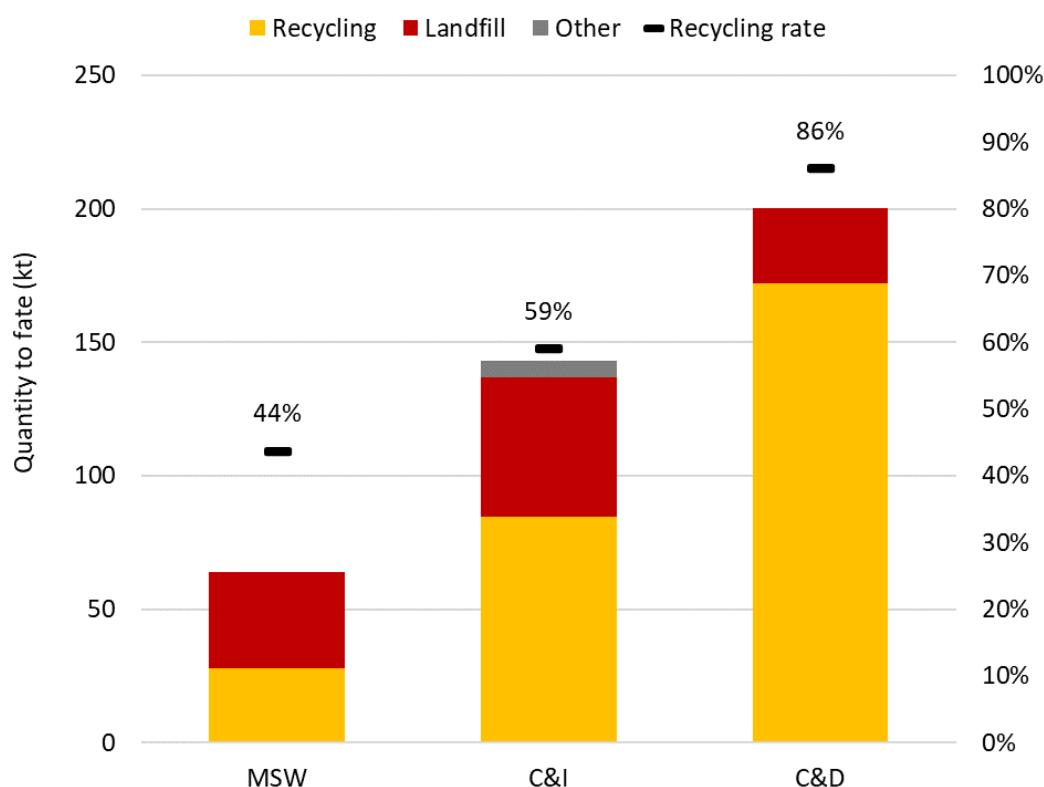


Table 9 Estimated fates by waste source stream in Merri-bek, 2021–22 (kt)

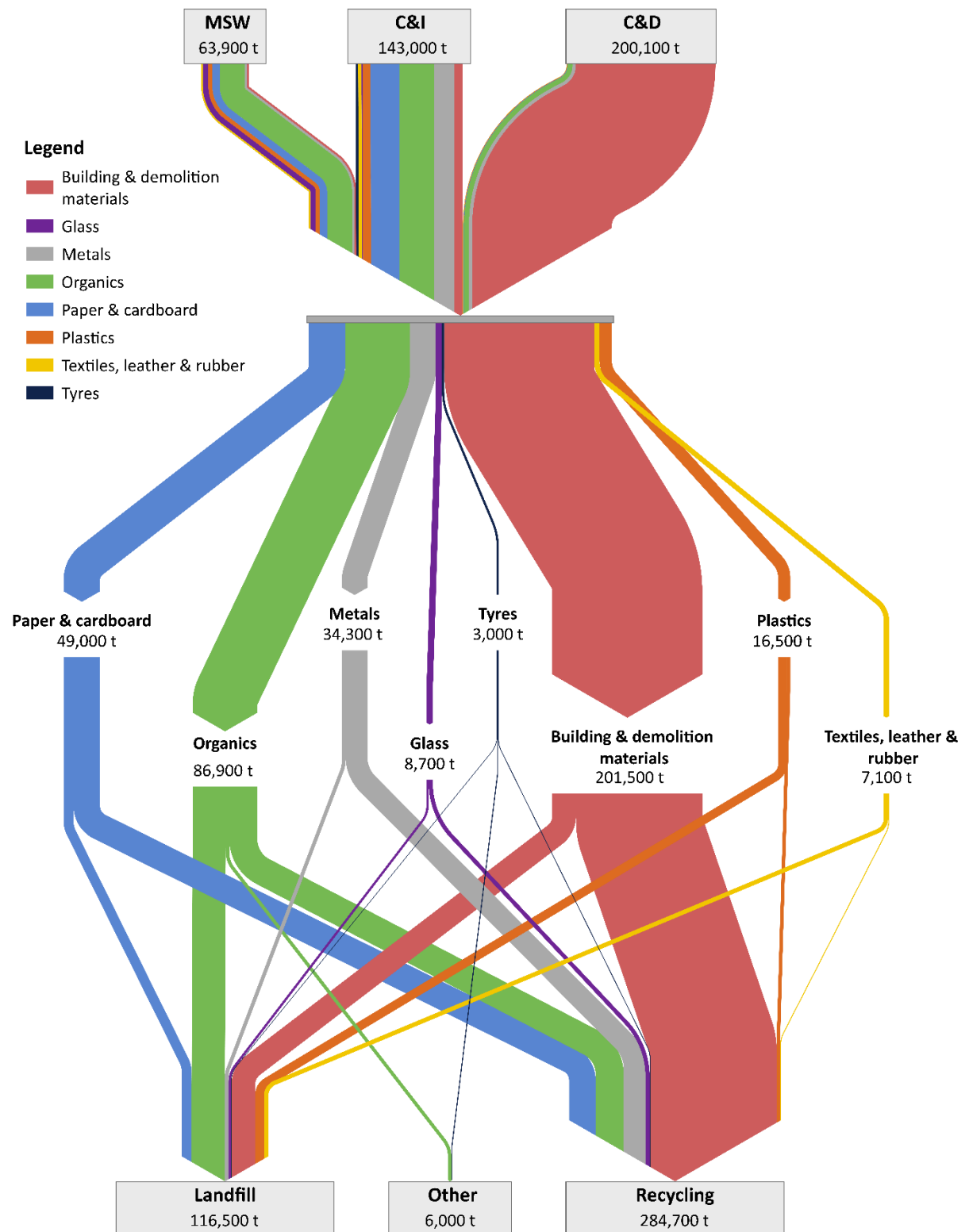
Source stream	Generated	Recycling	Landfill	Other	Recycling rate
MSW	64	28	36	0	44%
C&I	143	84	53	6	59%
C&D	200	172	28	0	86%
Total	407	285	116	6	70%

It is important to note the potential influence of the state-based C&I and C&D data on these estimated results. Although we found no quantitative data to provide a basis for adjusting the Merri-bek flows model, the estimated recycling rates may not be fully representative of the local council area and practices. In particular, the C&D recycling rate may be skewed by high levels of recovery from major construction and demolition projects, and so overstate recovery rates from residential and smaller commercial scale building projects.

3.4 Summary of flows

A Sankey diagram summarising the waste generation related material flows through Merri-bek in 2021–22 is presented in Figure 12 (overleaf). The C&D waste source stream had the largest share of material flows at approximately 200 kt, followed by the C&I source stream at about 143 kt and then MSW at about 64 kt. Approximately 285 kt of material was sent for recycling while 116 kt were sent to landfill. About 6 kt were sent other fates which included stockpiling of biosolids, and tyres sent for alternative disposal.

Figure 12 Estimated waste flows in Merri-bek, 2021–22



3.5 Materials for focus

The multi-criteria assessment (MCA) undertaken for this study included three criteria which related to the material types. Of these the 'waste to landfill' and 'Climate change' criteria were informed by the MFA outputs and the State priority criterion was manually scored. Based on these criteria the top 10 ranked material types are shown in Table 10⁵.

Table 10 Top 10 material types

Material type	Material category	Waste to landfill	Climate change	State priority	Ranking
Food organics	Organics	5	5	4	1
Low density polyethylene (LDPE) (4)	Plastics	4	5	5	1
Garden organics	Organics	4	5	4	3
Textiles	Textiles, leather & rubber	5	4	4	3
Office paper	Paper & cardboard	4	5	3	5
Cardboard	Paper & cardboard	5	4	3	5
Timber	Organics	5	5	2	7
High density polyethylene (HDPE) (2)	Plastics	3	4	5	7
Polyethylene terephthalate (PET) (1)	Plastics	3	4	5	7
Polypropylene (PP) (5)	Plastics	3	3	5	11

Based on the table above, suggested materials, by material category, to consider for opportunities are:

- Organics – the main application areas are 'other application' areas, followed by built environment. Organics waste originates from the C&I stream (54%) and the MSW stream (39%).
- Plastics – mainly packaging (33%), other application areas (22%) and transport (16%). Plastic waste is generated from C&I (64%) and municipal sources (29%).
- Textiles – the main application area is other application areas (86%) which dominated by household textiles and clothing. Textile waste is mostly generated from the C&I source stream (65%) and MSW source stream (31%).
- Paper and cardboard – the main application area is packaging (72%), and paper and cardboard waste mostly originates from the C&I source stream (80%).

The building and demolition material category is also suggested as a focus because the volume of material in the category is comparatively large to other material categories, accounting for more than half of all material estimated to be consumed in Merri-bek in 2021–22. Although the estimated recycling rate for building and demolition material is relatively high, we note this may be influenced by state-based activity such as the 'big build' which is not relevant to the local material flows in Merri-bek. Council has also identified some concern with the management of construction and demolition wastes in Merri-bek, of which the major component is building and demolition materials.

⁵ Under the criteria waste to landfill, climate change and state priority, other organics is also ranked in the top 10 material types. Other organics is excluded from this table as the wastes and products within this material type are varying with possibly many different EoL requirements, making the material type unsuitable for preparing opportunities.

4. Economic analysis

This section provides a brief overview of the economic profile in Merri-bek with consideration of employment and economic output, meaning the gross measure of the total sales of each industry sector. The purpose of this analysis is to identify potential industry sectors of interest and provide insight into potential waste types generated.

4.1 Economic activity and trends

Health care and social assistance, retail and food services, education and training, and construction, which are large and growing, have been identified as key drivers of growth in Merri-bek (Economy.id, 2021a). Formerly a manufacturing heavy area, Merri-bek is transitioning towards services with professional, scientific and technical services emerging alongside specialised industry sectors of creative, culture and manufacturing. Collectively these are identified as Merri-bek strategic sectors.

The biggest job growth forecast to 2023–24 is education and training followed by health care and social assistance, other services and professional, scientific and technical services. Retail trade is forecast to decline between 2020–21 and 2023–24 as retail trade jobs have decreased over the last 5 years to 2022 due to the shortage of workers and the movement to online retail (Economy.id, 2023a).

Within the health care and social assistance sector the growth is driven by social assistance services such as child care, aged care and disability assistance services. Repair and maintenance (e.g. automotive and machinery repairs) is driving the other services sector.

In 2021–22, the health care and social assistance, education and training and retail trade sectors were the top three providers of jobs in Merri-bek, collectively providing approximately 42% of all jobs (REMPPLAN Economy, 2023) as shown below.

Figure 13 Proportion of employment by industry sector in Merri-bek, 2021–22

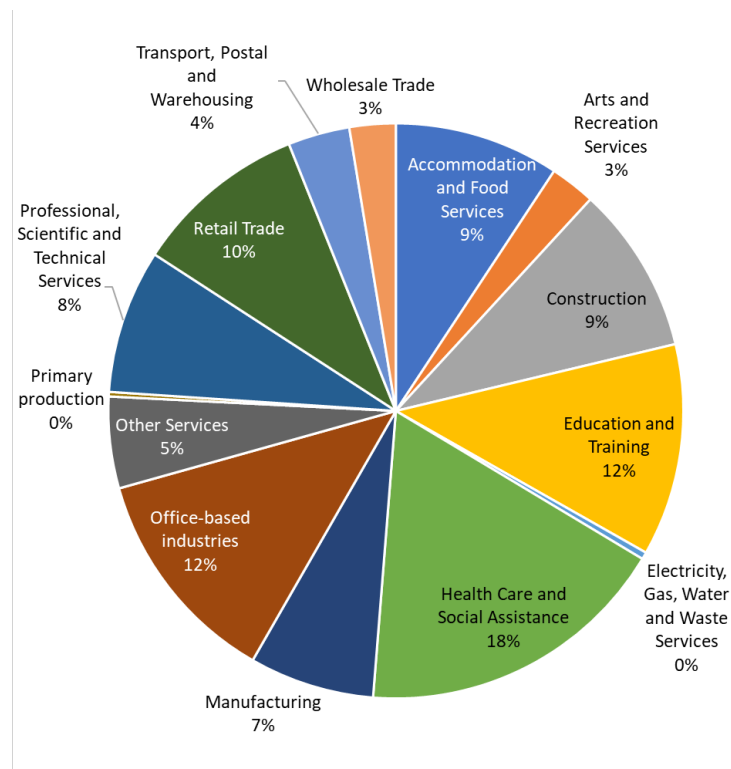
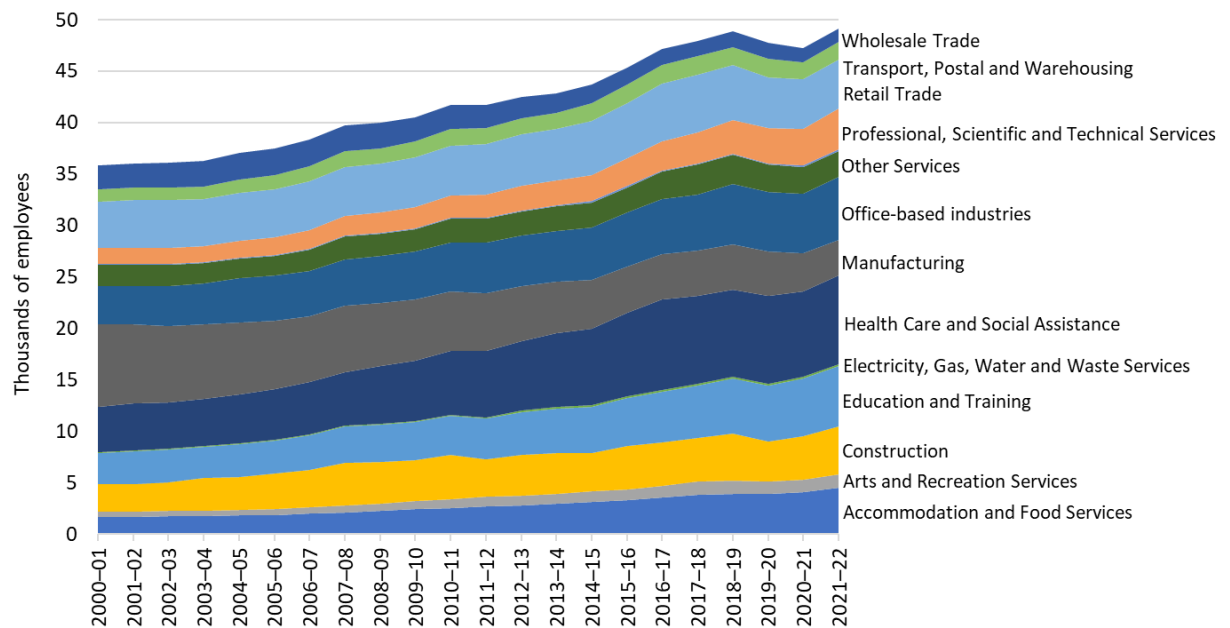


Figure 14 presents trends in employment by industry sector. Professional, scientific and technical services; education and training; and accommodation and food services sectors grew particularly strongly between 2016–17 and 2021–22, adding just over 3,000 jobs between them.

The manufacturing sector has been in decline for since the 2000s. Between 2016–17 and 2021–22, sector lost about 1,000 FTEs of which the food product manufacturing area accounted for 21% of losses, the textile, leather, clothing and footwear manufacturing area accounted for 23% and the polymer product and rubber product manufacturing area accounted for 29%. The sector was one of only three sectors to shed jobs between 2016 and 2021, falling from the fourth largest to the sixth largest provider of jobs in Merri-bek.

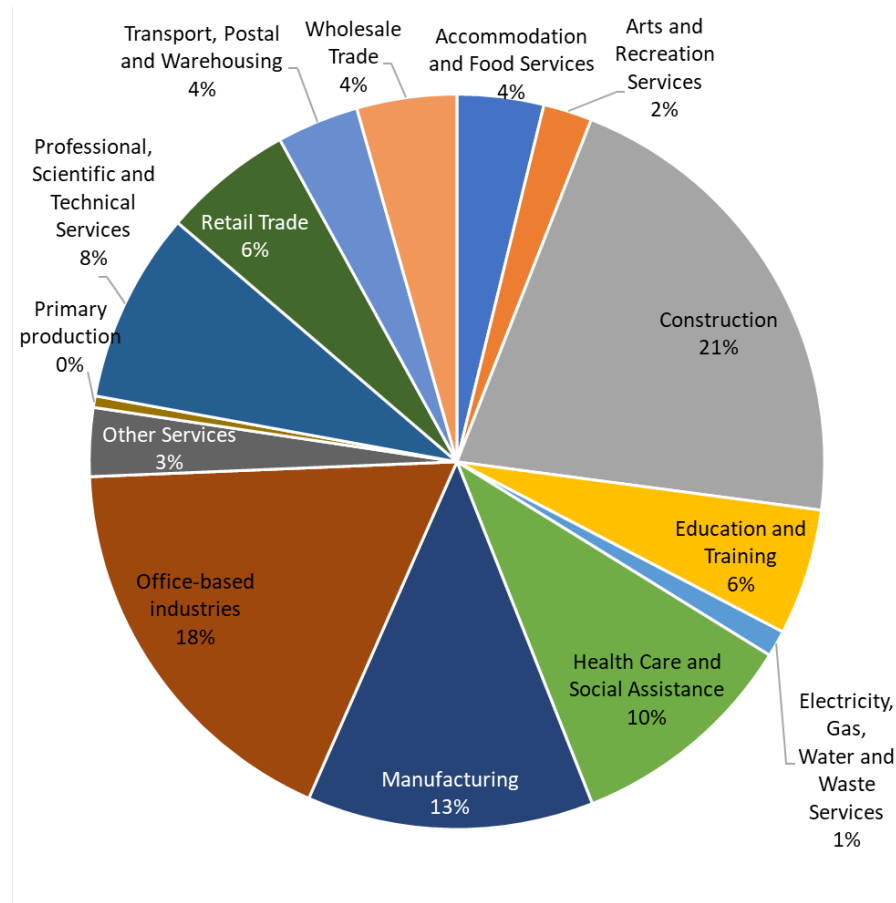
Recent plateauing in manufacturing (2015–16 to 2018–19), represents a reversal of a long-term downward trend was driven by specialised polymer product and rubber product manufacturing and furniture and other manufacturing. Since 2018–19 the industry has begun to decline again.

Figure 14 Employment by industry sector in Merri-bek, 2000–01 to 2021–22



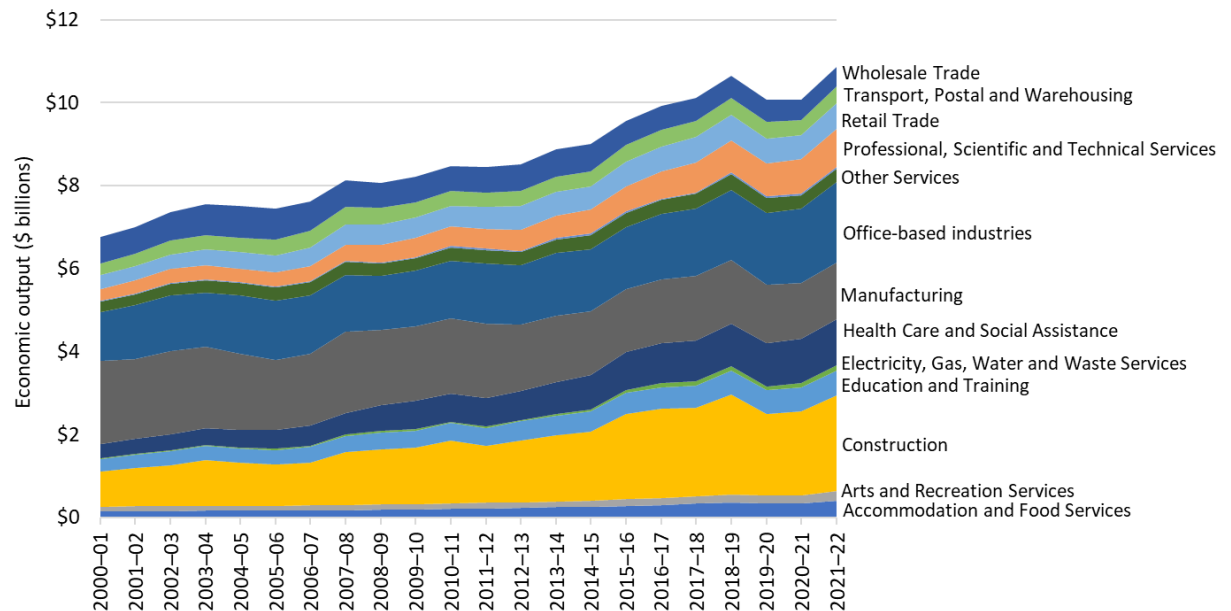
Economic output, meaning the gross measure of the total sales of each industry sector in the City of Merri-bek, in 2021–22 was topped by manufacturing, construction and rental, hiring and real estate services (Economy.id, 2023b). This is presented in Figure 15 where office-based industries are grouped as they consume similar materials.

Figure 15 Proportion of economic output by industry sector in Merri-bek, 2021–22



Building approval activity, identified as strong in a recent economy health check, (Economy.id, 2022) continues to be strong as evidenced by building approvals (Economy .id, 2021b) and high value of building approvals at \$1.179 billion in 2021-22 (Economy.id, 2021a). In the health check report this was due to residential apartment construction and elevated non-residential approvals. Figure 16 shows the trends in economic output by industry sector in Merri-bek since 2000–01.

Figure 16 Economic output by industry sector in Merri-bek, 2000–01 to 2021–22



4.2 Commercial and industrial waste

To support the MFA, Blue Environment reviewed literature on typical C&I wastes, including a study prepared for Sustainability Victoria (SV) (SV, 2013) into the commercial waste flows by industry sector, which provides some insight into the types and composition of waste that may be expected from each sector. The study is considered one of the largest and most detailed surveys of Australian businesses undertaken via 132 site surveys of businesses generating C&I waste. It found that overall, the main materials recovered from the C&I source stream were paper and cardboard, food organics, plastics, glass, metals and timber. A breakdown of waste composition by industry division is provided in the accompanying model developed for this project.

The health care and social assistance industry has been identified as a sector of interest to Merri-bek City Council as the largest employer in the area. The major wastes generated in this industry listed by SV (2013) is paper and cardboard at around 80% of waste generation. Given the time elapsed since the publication of this data and advances in digitising patient records this may not be representative of the healthcare space in 2021–22. COVID-19 has caused increases in the volume of personal protective equipment (PPE) used in health care settings, with the generally unrecyclable waste stream forming a large component of waste from the industry.

There may be opportunity to divert potentially recyclable waste from clinical waste streams with one study in NSW (NSW Circular, 2021) suggesting that 40-60% of materials going into the clinical waste stream were non-clinical and included potentially recyclable PP and PE. The more easily recyclable items were ampoules and needle caps used in the hospital at which the study was conducted.

Another study commissioned by SV and the former Metropolitan Waste and Resource Recovery Group (MWRRG) involved an audit of the hospitality and retail sector which found organic materials,

mostly food waste, tended to be the most substantial component of businesses' waste streams (First Person Consulting, 2021). Unavoidable food waste typically accounted for about half (48%) of the organics stream with the remaining quantity split between avoidable food waste (30%) and possibly avoidable food waste (20%). Only a small proportion of waste generated by these businesses is classified as green waste (1%). The study found that food waste was particularly prevalent in the waste streams from bakeries (65%), fruit and vegetable stores (52%), cafés and restaurants (60%) and takeaway stores (57%). Retail trade and healthcare are well represented in the municipality, which presents an opportunity for Council to drive avoidance of food waste in the commercial sector.

4.3 Summary

The economic activity and trends can provide an indication of which industry sectors have potential for circular economy initiatives. Key observations for Merri-bek, drawing on the above analysis and on the previously discussed stakeholder consultation, include:

- With manufacturing in decline this is likely to reduce opportunities associated with circular hubs or significant B2B resource sharing within the Merri-bek area. It is worth noting the strong interest from neighbouring councils to collaborate, which provides a potential avenue for linking businesses within the broader region.
- Larger manufacturers tend to already have sustainability programs in place and can be working in a global framework which can result in limited interest in local government programs.
- Health care and social assistance, retail and food services, education and training, and construction, which are large and growing, are good target industry sectors for Merri-bek due to the size and types of material generated.
- Across other sectors, Merri-bek has an active and engaged cohort of businesses and not for profit operating in the circular economy space including repair, tool library and creative businesses repurposing waste. There are also several engaged niche businesses operating higher up the material value chain involved in product design and research and development.

5. Construction and demolition waste

This section fulfils the scope element to identify facilities available to recycle construction and demolition waste, along with barriers to recycling.

Based on consultation with the Master Builders Association, we understand that the main waste materials from the sector tend to be:

- soil
- timber
- bricks
- plaster
- steel
- concrete.

These wastes appear sequentially throughout each construction project. Wastes tend to be sorted for recycling offsite in areas like Merri-bek where space is limited. While some materials such as bricks or floorboards can be reused rather than recycled, businesses are less likely to reuse materials because storage of the material between projects and dismantling a site is not cost effective compared to purchasing new materials and demolishing a site.

The Department of Climate Change, Energy, the Environment and Water published a list of waste and resource recovery infrastructure in 2022 (Blue Environment, 2022). An extract of this resource which lists C&D waste recycling facilities near Merri-bek City Council is provided in Appendix D.

Barriers to circular economy for C&D materials include:

- having sufficient space on sites for waste sorting to ensure that materials are sent for recycling properly
- builders tend to be apprehensive to using new materials with recycled content due to risk accountability
- small businesses are also less likely to spend time researching new materials with recycled content.

These barriers, in particular those identified in the second and third points, inform the opportunity for government to lead by example, and procure products with recycled content, to demonstrate and de-risk new technologies, provide markets and drive uptake in the wider construction sector.

6. Opportunity analysis

To develop proposed opportunities, Blue Environment considered the outcomes of the MFA, including the focus materials; the MCA screening; the economic makeup of Merri-bek; and outcomes from the stakeholder consultation with local businesses, nearby councils and waste contractors. It is worth noting that opportunities can impact multiple material types.

Twelve opportunity types were considered in this project, falling into seven opportunity streams. They were developed in conjunction with Council based on general options available and the research findings during this project. The summary list of opportunity streams is:

- Council policy and regulation
- Council procurement
- Council support
- diversion of materials
- knowledge and capability building
- innovation, research and pilots.

The full list of opportunity streams and related opportunity types is provided in Appendix A3.

6.1 MCA outcomes

All materials were scored for each of the identified opportunity types which generated an overall list of opportunities. These are provided in the accompanying MFA model. Unsurprisingly, this list ranked multiple opportunities for the highest-ranking materials, in particular organics. To provide a broader spread of opportunities we assessed the MCA outcomes for each of the focus materials suggested in section 3.4. A list of the top five opportunities for each of the top ten ranked material types and building and demolition wastes is shown in Appendix C.

6.2 Proposed opportunities

Blue Environment assessed a range of potential options for improved materials management across source streams and material categories. The assessment considered:

- the findings of the MFA, especially the apparent availability of material and existing management arrangements
- the filter provided by the MCA of material and opportunity types
- the potential for significant improvement based on experience elsewhere, regional industry profiles and feedback from stakeholders
- the potential for improved regional circularity through local processing and use of recovered material
- the findings from the stakeholder consultation.

Table 11 outlines the top opportunities and potential actions identified for circularity in Merri-bek.

Table 11 *Top opportunities for Merri-bek*

#	Material type or category	Opportunity type/s	Potential partners, stakeholders, or industry sector	Rationale	Potential actions
1	Food organics	Communication Increase recovery Incentives	Accommodation and food services sector Retail trade sector RMIT	- Focus material type (ranks 1) from MFA - Focussed on C&I wastes which have relatively significant generation but little recovery. - Businesses in these industry divisions are prevalent in Merri-bek. - Expressed as concern in stakeholder consultation (waste manager).	- Develop business capability building program – investigate grant opportunities to support this (e.g. Boroondara Go Full Circle program). - Establish B2B networking opportunities. - Information campaign with retailers on compostable bags. - Campaign to increase commercial use of organics service.
2	Organics and plastics	Procurement Communications Provide incentives/support Increase recovery	Healthcare and social assistance sector such as hospitals, childcare, aged care	- Focus materials from MFA. - Healthcare and social assistance sector has high proportion of FTEs in Merri-bek. - Focuses on C&I wastes which have relatively significant generation but little recovery. - Plastics in healthcare are on Minister product stewardship priority list - Expressed as concern in stakeholder consultation.	- Investigate recycling opportunities for absorbent hygiene products. - Investigate working with hospitals (potential range of focus materials including organics, plastics, textiles, packaging). - Investigate nappy recycling trials or product stewardship schemes.
3	Food organics	Communications Increase recovery	Commercial and residents	Focus material type (ranks 1) from MFA.	Campaign with residents and commercial users of Council service aimed to reduce contamination.
4	Plastics – soft plastics (LDPE, HDPE, PP)	Communications Increase recovery	Commercial and residents	- Focus materials from MFA. - National priority materials. - Benchmarking other councils identified potential opportunities.	Investigate collection service or drop off points in preparation for future planned reprocessing options.
5	Plastics – single use plastic	Communications multiple	Commercial and residents	- Focus materials from MFA. - Benchmarking other councils identified potential opportunities.	Potential solutions highlighted in consultations and leverage resources on reducing single use plastics (Darebin Council).

#	Material type or category	Opportunity type/s	Potential partners, stakeholders, or industry sector	Rationale	Potential actions
6	Textiles (plastics in apparel)	Communications Create incentives/support Increase recovery Procurement	Residents Health care and social assistance sector	- Focus materials from MFA. - Healthcare and social assistance sector has high proportion of FTEs in Merri-bek. - Mattresses are on Minister product stewardship priority list.	- Engagement with product stewardship schemes (e.g. for mattresses, new Australian Fashion Council (AFC) textiles scheme). - Promote leading businesses or programs / investigate possible incentives (e.g. support to charity sector etc.) - Investigate procurement or product as service (Council uniforms).
7	Cardboard	Communications Provide incentives/support	Businesses varied sectors	- Focus material from MFA. - Focus on C&I which generates a high amount of waste; recycling is available. - Stakeholder engagement identified opportunities and potential concerns with current practice.	Investigate C&I cardboard recycling in use and seek to support increasing diversion (e.g. potential to facilitate connection with local cardboard baling facility).
8	Building and demolition materials	Communications Provide incentives/support Increase recovery	Construction sector	- Focus materials from MFA. - Expressed in stakeholder consultation. - Focus on C&I and/or B&D wastes; both generate plastic waste with little recovery.	- Communication of available facilities for recyclable materials. - Develop resource on products containing recycled materials. - Investigate how Council can support recovery options for C&D plastic products (e.g. PVC pipe etc.). - Investigate use of Council regulation/planning etc.
9	Multiple	Communications Provide incentives/support Increase recovery	Councils Existing CE businesses Darebin Council	- Stakeholder consultation - Focus materials from MFA and problematic product wastes. - Benchmarking other councils identified potential opportunities.	Exploring options to provide more space for repair hub activities / transfer station access (Darebin) or shared circular economy hub.

#	Material type or category	Opportunity type/s	Potential partners, stakeholders, or industry sector	Rationale	Potential actions
10	Multiple	Communications and multiple others	Economic development team Industry Nearby councils	- Focus materials from MFA. - Stakeholder consultation identified collaboration opportunities (Hume, Darebin and Whittlesea). - Benchmarking other councils identified potential opportunities	- Facilitating B2B networks. - Internal capability building - Circular Economy business network support officer like Hume City Council or Whittlesea City Council (0.8 position). - Establish network across northern metropolitan region including Hume City Council and Whittlesea City Council – leveraging Northlink. - Circular economy champions (recognise businesses, awards, speakers at events – Hume, Darebin, Whittlesea).
Others considered for top 10					
11	Plastics, glass	Procurement	Council	Benchmark from other councils (Hume, Bendigo).	- Investigate use of recycled materials in roads – engagement with other departments. - Investigate purchase of bollard, infrastructure, building products using recycled materials.

6.3 Selection of five opportunities

A preliminary draft of this report was submitted to Council including the information in Table 11 on potential opportunities. Using Council-led criteria and scoring, five opportunities were selected for further assessment. Council input at this point ensured that the opportunities assessed are aligned with Council's five pillars for activities to transition to a circular economy strategy. The top five opportunities for assessment and Council's selection criteria are shown in Table 12.

Table 12 Council assessment of opportunities in rank order

Assessment of opportunities for MCA	Reduces waste / emissions	Supports circular economy	Cost effective	Fair and equitable	Social license	Total Score	Ranking
Option 1: Food organics (commercial) – programs to increase capability/use of commercial services	16	14	11.5	15	14	70.5	1
Option 3: Food organics (commercial + residential) - campaign with residents + commercial users of Council service to reduce contamination	16	12	15	14	11	68	2
Option 10: Multiple (businesses) - Circular Economy business network support officer like Hume City Council or Whittlesea City Council (0.8 position)	12	14	6	8.5	14	54.5	3
Option 8: C&D materials (construction sector) - communicate facilities for recyclable materials + develop resource on products containing recycled materials + investigate how Council can support recovery options for C&D plastic products + investigate use of Council regulation/planning etc.	14	15	0	9.5	13	51.5	4
Option 11: Plastics, glass (internal – procurement) – investigate use of recycled materials in roads – engagement with other departments + investigate purchase of infrastructure / building products using recycled materials.	10	14	4.5	7	15	50.5	5

6.4 Opportunity plans

This section provides a detailed assessment of the five selected opportunities. The opportunity plans include identification of the targeted material types and source stream, a description of the activity and outline of the proposed approach, timeframes, costs and a case study. The costs and timeframes are indicative, with the approximate ranges outlined in Table 13.

Table 13 Key for costs and timeframe

Cost indication	Approximate value	Time indication	Approximate time for implementation
Low	<\$10,000	Short	1 years
Medium	\$10,000–\$100,000	Medium	2–4 years
High	>\$100,000	Long	>5 years

Opportunity 1 – Organic materials targeting commercial sources

Food waste generation occurs mainly in households (34%) followed by primary production (31%) and manufacturing (24%) sectors, then hospitality and food services sector (4%) and retail and institution sectors (3% each) (Arcadis, 2019, p. 4).

Discussed earlier (see Section 4.2) the SV and the former MWRRG audit of the hospitality and retail sector found organic materials, mostly food waste, tended to be the most substantial component of businesses' waste streams (First Person Consulting, 2021).

Analysis of benefit-cost ratios associated with food loss and waste reduction efforts of businesses across 17 countries, including Australia, found that 99% of businesses had a net positive financial return, with a median return of \$14 for each \$1 invested in waste management (Champions 12.3, 2017). This study covered the food service, food production and manufacturing, food retail, hotel, restaurant, and hospitality sectors.

Currently, Council offers two types of organics services to businesses: the standard commercial service and the bespoke Commercial Plus service. Private waste contractors operating in the area also offer organics services. We understand there is opportunity for increased uptake of the Council organics services and stakeholder consultation suggests food organics from commercial businesses are commonly disposed to landfill in Merri-bek.

Improved practices to reduce food waste and use of food organics collection for residual material aligns strongly with the Council pillars and aims to reduce food waste disposed to landfill by businesses in Merri-bek. Further assessment is provided in Table 14 (overleaf).

Table 14 Opportunity #1: organics from commercial sources

Activity aspect	Description
Target material type	Food organics
Applicable waste stream	C&I
Alignment to Council pillars	- Community behaviour change. - Local businesses, social enterprises and charities. - Resource recovery. - Council waste management services.
Activity description	Improved practices to reduce food waste and use of food organics collection for residual material.
Activity objective (intended outcome)	Reduced generation of food waste and increased diversion of residual material from landfill.
Proposed approach	- Develop a targeted communication and education program that could be run by council staff focussing on cost/benefit of minimising organics to landfill. - Prepare guidance material on food waste avoidance and opportunities for diversion using existing materials such as the Victorian Food Organics Recycling Guide (DHHS, 2016). - Identify methods for businesses to assess cost of food disposal to landfill compared to organics collection (e.g. waste calculator). - Undertake a program of site visits, email and engagement via the trading associations to engage target business types.
Reprocessors and end markets	Council service: Veolia Bulla Organics Facility
Cost estimates	CAPEX: not required OPEX: medium (ideally supported by external funding grant) Resources: 0.5-1 FTE
Challenges and barriers	- SMEs can be very busy and may not have time or interest in participation. - Potentially labour intensive to liaise with many businesses. - Council waste services may not be available to businesses that want to participate such as businesses ineligible for a Council service due to location.
Benefits	- Increased uptake of Council organics service. - Reduced costs for businesses. - Reduced greenhouse gas emissions from organics disposed to landfill.
Key stakeholders and potential partners	- SME Retail, hospitality, healthcare businesses in Merri-bek. - Cities of Boroondara, Stonnington and Melbourne (for advice). - Victorian Government.
Timeframes	Short – medium.
Case study	Business Waste & Recycling Performance Calculator (Green Industries South Australia, 2021) The Waste and Recycling Performance Calculator is designed for businesses to measure their waste and resource management performance. The tool has the capacity to estimate total waste generation volumes, reuse levels, recycling levels, and waste management collection service costs.

Activity aspect	Description
	Go Full Circle Program – Cities of Boroondara, Melbourne and Stonnington The City of Boroondara runs a program aimed at small and medium-sized hospitality, retail and professional services businesses located in Boroondara to help them learn circular economy principles and balance economic, environmental and social objectives. The course is run over four 1.5 hour sessions with topics including ‘foundations of the circular economy’, ‘circular economy in practice’, ‘overcoming barriers to change’ and ‘building momentum’. The 2023 program is the second year of the program in partnership with City of Melbourne and City of Stonnington. The program involves engaging businesses with experts in the field and provides opportunities for B2B relationship building and business to council relations. The program is limited to 10 businesses per council which are selected from expressions of interest.
Next steps	• Monitor Victorian State Government Sustainability Fund for relevant grants. • Contact Circular Economy Business Innovation Centre, Sustainability Victoria for further guidance and resources.

Opportunity 3 – Contamination in FOGO targeting residential and commercial sources

The Australian Organics Recycling Association Roadmap (AORA, 2022) suggests ‘the single greatest issue facing the [organics recycling] industry is the contamination of feedstocks, overwhelmed by plastics’ and that the introduction of FOGO nationally has exacerbated the issues with contamination and resulted in increased costs to organic processors to decontaminate FOGO feedstock or send it to landfill.

An audit report of City of Burnside in South Australia found that the average contamination rate for the organics stream was largely driven by a small proportion of households who grossly contaminate their bins (Wheeler & Xu, 2023, p. 6), indicating that a targeted anti-contamination campaign could have far reaching positive impacts.

The SA Better Practice Guide for sustainable kerbside services (Green Industries South Australia, 2023) suggests that feedback loops including a bin tagging program, truck bin weighing or camera systems could be used to help residents understand how their household is performing and help Councils provide support to households continuing to contaminate their bins despite feedback.

Further solutions Green Industries SA suggest include translating communications (which is already available from Merri-bek Council via Language Link) and offering bin locks (if neighbours are contaminating bins). As a last resort, for cases where bins continue to be contaminated, properties could be removed from the FOGO service to prevent them affecting the quality of the collected organics.

Council’s organics are sent to Veolia’s Bulla organics facility which does not accept any kind of bagged material, including certified compostable plastic bags. During consultation the representative from the Veolia organics service expressed interest in taking part in a campaign with Council to reduce contamination, citing that the most prevalent form of contamination in the organics received at Bulla was bagged material including compostable bags which cannot be processed at Veolia’s facilities.

This opportunity for a Council-led behaviour change program on FOGO contamination would target both residents and businesses using the Council organics service. Further assessment is provided in Table 15.

Table 15 Opportunity #3: reduction of contamination in food organics

Activity aspect	Description
Target material type	Food organics
Applicable waste streams	MSW, C&I
Alignment to Council pillar	- Community behaviour change. - Local businesses, social enterprises and charities. - Resource recovery. - Council waste management services.
Activity description	Campaign against contamination in FOGO stream with focus on bagged material contamination.
Activity objective (intended outcome)	Business and residents are equipped with information and required behaviours are reinforced.
Proposed approach	- Identify residential areas with persistent FOGO contamination (working with Veolia). - If further data is needed conduct visual bin audits. - Analyse the problem behaviours and potential factors leading to behaviour. - Determine suitable tactics to change behaviours (e.g. feedback loops); consider demographics of residents and businesses. - Consider if modest incentives could be applicable, including a certification scheme for well performing customers. - Develop targeted campaign focussing on identified behaviours for change. - Incorporate community/business feedback.
Reprocessors and end markets	Veolia Bulla Organics Facility.
Cost estimates	CAPEX: not required OPEX: medium – high (dependent on scale and depth of work) Resources: 0.5-1 FTE
Challenges and barriers	- Bin audits can be expensive; scope needs to be carefully designed. - Unclean bins, due to not using bags, reinforces unpleasant activity and aversion to 'doing the right thing'. - Resistant households or businesses continuing to contaminate FOGO bins may become a disproportionately large cost to Council.
Benefits	- Higher quality FOGO feedstock and end product. - Satisfies needs of FOGO contractor and potentially lowers costs to Council and ratepayers. - Maximising diversion of material from landfill.
Key stakeholders and potential partners	- Merri-bek residents. - Merri-bek food waste-generating business owners. - Veolia Bulla Organics Facility.

Activity aspect	Description
Timeframes	Short – medium.
Case study	NSW Scrap Together campaign The NSW Scrap Together campaign was run by the NSW state government with funding provided to NSW local governments to use the material in their own campaigns. While the campaign was built on a different scale to the needs of Council, it might be useful as reference material (NSW EPA, 2022). The campaign focussed on the connection between what residents put in their FOGO bins and the productive use in agriculture. One part of the campaign was directed at plastic contamination in compost.
Next steps	• Meet with Veolia to investigate a partnership approach. • Review existing data to inform the scope of the activity (e.g. whether visual bin audits are needed etc.).

Opportunity 8 – C&D material recovery

The visibility of C&D material recovery in Merri-bek is limited because mixed C&D material is generally collected and recycled by private operators. Some private waste contractors provide a receipt of the fates of the material to the C&D waste generator if requested.

Maximising recycling of C&D materials, in Merri-bek and many other areas, has been historically challenging due to actual and perceived cost of source segregation and material management. In built up areas like Merri-bek this is exacerbated by limited space for segregated waste management on many building and demolition sites.

Council have identified a range of dimensions for this opportunity including:

- communicate facilities for recyclable materials
- develop resource on products containing recycled materials
- investigate how Council can support recovery Opportunities for C&D plastic products
- investigate use of Council regulation/planning

A resource in products containing recycled materials and use of Council regulation and planning is addressed in text below. Detailed assessment is presented for three potential activities in relation to C&D material recovery for:

- Opportunity 8a – C&D recycling facilities in the region (Table 16)
- Opportunity 8b – end markets for recovering C&D materials (Table 17)
- Opportunity 8c – C&D materials – recovery of plastics (Table 18).

Directories on products containing recycling materials are handy references for use by local government, the construction industry and residents. A range of guides are available and Merri-bek would be best placed to leverage existing resources where possible. Two online examples are the SV Buy Recycled procurement toolkit (SV, 2023) and the Planet Ark recycled products directory (Planet Ark, 2023).

Development of a local version would ideally be undertaken in partnership with industry and could have the additional benefit of relationship building between Council and local construction and development businesses. Key stakeholders would be construction and building businesses operating

in Merri-bek area, industry associations such as Master Builders and manufacturers of materials using recycled content.

Council planning and regulation provides a potential lever to increase C&D material recovery and/or influence types of building material. The current objective of the Merri-bek Planning Scheme is to 'Encourage use of durable and reusable building materials'. With appropriate consultation and process Merri-bek could explore the potential to include use of recovered materials in the objective.

Identification of specific opportunities for action would involve working closely with relevant departments at Council (e.g. planning and building) and collaborating with other councils to investigate examples of successful approaches.

Table 16 *Opportunity #8a: C&D materials - C&D recycling facilities in the region*

Activity aspect	Description
Target material type	Timber, bricks, concrete, steel, plasterboard, soil
Applicable waste streams	C&D
Alignment to Council pillar	- Local businesses, social enterprises and charities. - Resource recovery.
Activity description	Council-provided information on facilities in region taking C&D wastes for use by construction and demolition businesses.
Activity objective (intended outcome)	Business operating on building and demolition sites in Merri-bek area are aware of and use the appropriate C&D recycling facilities near their location.
Proposed approach	- Develop a digital resource with information on C&D recycling facilities in the region. - This might include details such as location, contact information, materials accepted and EPA licence details. This could be built on the list provided in Appendix D. - Distribute via passive (e.g. website) and active (e.g. promoted when issuing demolition permit) channels.
Reprocessors and end markets	See Appendix D for reprocessors.
Cost estimates	CAPEX: not required OPEX: low Resources: existing
Challenges and barriers	- Distribution to relevant businesses operating in Merri-bek area given the non-continuous nature of construction and demolition businesses operating multiple sites across council borders. - Uptake and changing behaviour from status quo.
Benefits	- Potential increase of Merri-bek C&D materials recycled. - Increased understanding and engagement with the building and demolition sector. - Increased visibility into C&D recycling practices in Merri-bek. - Reduced greenhouse gas emissions from organics (timber) disposed to landfill. - Maximising diversion of material from landfill.
Key stakeholders and potential partners	- Building and demolition businesses operating on sites in Merri-bek. - C&D waste transporters.

Activity aspect	Description
	C&D recycling facilities in wider Melbourne region.
Timeframes	Short (with ongoing maintenance).
Case study	Australian waste and resource recovery infrastructure database The Australian waste and resource recovery infrastructure database (Blue Environment, 2022) is a national list of facilities involved in waste and recycling. Users can search for individual facility information or sort the data by facility type or location. The database was created by Blue Environment in 2022 and is published on the federal government Department of Climate Change, Energy, the Environment and Water website for public use. The list of C&D reprocessing facilities in Appendix D is an extract of this database which can be further developed by Council.

A common challenge in any materials lifecycle is the lack of an end market for recycled material. This is true for building products, for which there is no driver to segregate if there is no end-market for the recovered material. Council could play a role to grow end markets by supporting the recovery pathway and creating new end markets for material from demolition sites in the area.

Council could provide support to businesses that promotes deconstruction over demolition with the intention to preserve materials for further use. This could involve providing temporary storage solutions for materials for use in future projects. We note this may be challenging in the municipality due to limited storage space. Council could explore this idea with Hume Council to the north, given Hume is likely to have more potential space and the council are actively pursuing circular economy initiatives. The focus would be on easy to recover materials like high quality untreated structural timber and bricks.

There may be prospect to link this to opportunities associated with Council regulation and planning (discussed earlier), such as requirements or incentive for new construction projects to include recovered materials. A further speculative idea is for Council to explore how they could support the certification of recovered timber as structural grade, which would reduce the barrier to reuse in building work.

Table 17 Opportunity #8b: C&D materials - end markets for recovering C&D materials

Activity aspect	Description
Target material type	Timber, bricks
Applicable waste streams	C&D
Alignment to Council pillar	- Local businesses, social enterprises and charities. - Resource recovery.
Activity description	Provision of storage for high quality unpainted timber and solid bricks from demolition for reuse in new construction projects.
Activity objective (intended outcome)	Reduce reusable building materials from demolition sites in the Merri-bek area going to landfill.
Proposed approach	- Engage with Nightingale (they already recover bricks), recyclers and building industry to investigate potential approaches, materials, markets etc. - Identify potential locations and configurations (this could involve nearby councils with more space). - Consider trial approach with potential to scale up.

Activity aspect	Description
Reprocessors and end markets	End markets might be construction projects in Merri-bek and surrounding northern region.
Cost estimates	CAPEX: medium - high (dependent on existing suitable infrastructure) OPEX: medium - high Resources: existing
Challenges and barriers	• Involves more cost due to infrastructure. • Potentially difficult to engage with an industry that operates across multiple council areas and regions. • Businesses may be uncertain about risk associated with using recovered material.
Benefits	• Increased reuse of materials in C&D source stream. • Increased engagement with businesses in the sector and potential opportunity for further circular initiatives. • Reduced greenhouse gas emissions from organics (timber) disposed to landfill. • Maximising diversion of material from landfill.
Key stakeholders and potential partners	• Demolition, construction and building businesses operating in Merri-bek area. • Storage businesses in Merri-bek area. • Industry associations for expert advice.
Timeframes	Medium – long.
Case study	Deconstruction versus demolition The NSW EPA (2010) published an information booklet and series of fact sheets on house deconstruction as an alternative to demolition. The fact sheets provide tips and advice on how to plan and carry out house deconstruction and the income generated and costs avoided by deconstructing buildings compared to demolition and landfill disposal.

Plastics from the building and demolition industries are generally not well recovered. PVC and PET are the most prevalent polymers used for pipes. PVC pipes are found on all building sites and while most goes into buildings, there can be off-cuts that can be reused and reprocessed into new PVC pipes (PIPA, 2023). The Plastics Industry Pipe Association of Australia (PIPA) runs a plastic pipes recycling program with five active recycling locations in Victoria (PIPA, 2023).

Council could investigate how recycling of C&D plastics in Merri-bek is currently approached and assess how to support builders to utilise existing recycling programs such as PIPA's plastic recycling program. This might involve a system to keep clean PVC offcuts out of general waste. This could be a useful way to get data on how much virgin PVC (by weight) goes to landfill during construction. If council can collect usable data, this would help the industry develop better methods to recycle.

Table 18 Opportunity #8c: C&D materials – recovery of plastics

Activity aspect	Description
Target material type	PVC and other plastics in the C&D waste stream.
Applicable waste streams	C&D
Alignment to Council pillar	• Resource recovery.

Activity aspect	Description
Activity description	Council investigation into recovery of plastic products from the C&D recycling stream.
Activity objective (intended outcome)	Equip businesses with options to divert plastic from landfill.
Proposed approach	- Engage local building industry (e.g. Nightingale) and reproprocessors to explore interest in partnering. - Establish a pilot (potentially partner with building business and/or a reproprocessor) to run a pilot program for improving collection of PVC from construction sites.
Reproprocessors and end markets	Reproprocessors (PIPA, 2023): - Iplex Pipelines – PVC – Reservoir - NWC Nationwide Connect – PVC and PET – Epping - Pipemakers – PVC and PET – Deer Park - Vindex – PVC and PET – Sunshine - Zekt – PET – Derrimut.
Cost estimates	CAPEX: not required OPEX: medium to high (dependent on scope and scale of program) Resources: existing
Challenges and barriers	- Distribution to relevant businesses - Accessibility for business owners - Uptake
Benefits	- More Merri-bek C&D materials recycled. - Building relationships through engagement with the building and demolition sector. - Maximising diversion of material from landfill.
Key stakeholders and potential partners	- Building and demolition industry. - Industry associations such as PIPA. - C&D material recyclers.
Timeframes	Short– medium
Case study	Construction Plastics Recycling Scheme To understand the volume of available PVC pipe off-cuts and fittings from construction sites, the Master Plumbers' Association Queensland and PIPA, in conjunction with Vinidex, Iplex, Tradelink, and Reece, launched the Construction Plastics Recycling Scheme in 2021 as part of their environmental commitments. The Queensland Government provided funding support to the scheme. Collection bins have been set up at fourteen participating locations across Southeast Queensland to provide alternative outlets for discarded PVC off-cuts. There has been overwhelming positive feedback from people within the industry about the scheme, motivating businesses to go out of their way to use the bins at the locations or drop their off-cuts directly at the pipe manufactures (PIPA, 2023).
Next steps	Monitor Victorian State Government Sustainability Fund for relevant grants (e.g. trials, plastic reduction to landfill etc.).

Opportunity 10 – Circular economy council officer

Blue Environment consultation with other councils during this project indicated that circular business networks and programs delivered by the council's circular business officer were well-received. According to the Cities of Hume and Whittlesea, these officers have become integral to developing and normalising circular economy practices for businesses.

A dedicated officer could also focus on supporting Merri-bek Council to become more circular. This could include identifying and developing circular procurement opportunities (as described in opportunity 11 below).

A circular economy officer would build relations with businesses in Merri-bek and facilitate circular opportunities. As Merri-bek has a relatively small manufacturing sector compared to other councils that have a circular businesses officer, the officer would also build relations with circular business networks in neighbouring council areas across the northern region to increase market opportunities for B2B waste material reuse.

Unlike the equivalent position in other councils, the Merri-bek officer would also possibly have a larger proportion of the role directed at developing relations with SMEs based in the healthcare, retail, hospitality and professional services industries than toward manufacturing services given the commercial profile in Merri-bek. Further assessment is provided in Table 19.

Table 19 Opportunity #10: circular business council officer

Activity aspect	Description
Target material type	Multiple
Applicable waste streams	C&I, C&D
Alignment to Council pillar	• Advocacy. • Local businesses, social enterprises and charities. • Resource recovery.
Activity description	Employment of part time (0.8 position), or full time if determined appropriate by Council, Circular Economy business network support officer.
Activity objective (intended outcome)	Raise awareness and increase understanding of circular economy opportunities for businesses in Merri-bek, and increase material circularity within Merri-bek and surrounding region.
Proposed approach	• Establish case for a new role; consider using other councils to assist with evidence of benefits. • Determine the ideal remit for the role, tailored to Merri-bek's demographic and industry profile.
Reprocessors and end markets	Not applicable.
Cost estimates	Resource: 0.8 FTE or 1 FTE Whittlesea equivalent is Band 6 position Hume equivalent is also a Band 6 and 0.8 position
Challenges and barriers	• Approval to create a new role.
Benefits	• Opportunity to pioneer SMEs outside manufacturing sector in circular business networks. • Increased engagement with businesses.

Activity aspect	Description
	Further collaboration with northern region Councils.
Key stakeholders and potential partners	Cities of Whittlesea and Hume to inform business case for creating a new role.
Timeframes	Short (ongoing).
Case study	Hume City Council The Hume Circular Business Network Officer is a part time (30.4 hours per week) position \$93,328 per annum band 6. The officer is part of Hume City Council's Economy Development team and is the primary contact and driver of the Hume Circular Business Network. They build circular economy awareness, strategic connections and relationships with key stakeholders in business and industry. The aim is to encourage promotion of circularity practices in Hume businesses. They also grow membership of the network by promoting CE practice as well as providing support to Hume businesses.

Opportunity 11 – Council procurement

The use of recycled material in road surfacing projects is becoming more common with several local councils using recovered materials such as glass, plastics, printer cartridges and reclaimed asphalt. The Australian Road Research Board (2023) suggests roads made with recycled materials can be better than conventionally built roads, being more durable and with fewer potholes and road failure.

Use of recovered material in roads is a method for Council to boost end markets for recovered materials. The Victorian state government Recycled First Policy intends to optimise the use of recycled and reused Victorian materials in transport infrastructure projects and local governments are encouraged and supported to adopt a similar approach to the state government (Victoria State Government, 2020, p. 4).

The Recycled Products and Materials procurement toolkit for local government (SV, 2022) was developed as part of the Recycled First Policy to provide practical guidance to councils involved in the planning and delivery of the procurement process, seeking to include recycled products and material. Table 20 outlines the opportunity of using recycled material in Council maintained roads.

There are other emerging opportunities for use of recycled products in building materials that Council could explore, such as an alternative for plaster board (saveBOARD, n.d). At present polymer coated cardboard is hard to sort and value-add to a sufficient quality level to meet end market requirements. However, in September 2022, the Victorian Government funded a significant activity to recycle liquid paperboard (LPB) of various types, extending to numerous polymer coated packaging formats (e.g. coffee cups). The recycling process creates a fibre-polymer composite board product, suitable for a range of building and construction activities.

Table 20 Opportunity #11: Council procurement for roads and infrastructure using recycled material

Activity aspect	Description
Target material type	Plastics, glass, masonry materials.
Applicable waste streams	MSW, C&I, C&D
Alignment to Council pillar	Resource recovery.
Activity description	This activity involves procurement in road surfacing project of recycled materials.
Activity objective (intended outcome)	Increase Council procurement of products using recycled materials to drive end-markets by creating the pull through for recycled products.
Proposed approach	- Identify types and products of construction materials used by Council and determine obstacles to using locally recycled materials (e.g. specification, views of other departments in Council). - Develop a plan for purchase of recycled content materials. - Council should conduct their own investigation and cost benefit analysis of different options for infrastructure using recovered materials to suit the need of Council, residents and businesses. This might include assessment of practices of nearby councils such as Hume and Whittlesea.
Reprocessors and end markets	Reprocessors: - Downer - Close the Loop - Repurpose It - Alex Fraser.
Cost estimates (for council)	CAPEX: in line with market rates. OPEX: in line with market rates. Resources: existing.
Challenges and barriers	- Several pathways for using recycled material in roads. - Resistance to move from existing materials. - Potentially engaging new contractors for road resurfacing. - Recovered material is downcycled rather than recycled.
Benefits	- Boost for end markets of recovered material. - Supporting material diversion from landfill. - More durable roads in Merri-bek. - Maximising diversion of material from landfill.
Key stakeholders and potential partners	- Cross-departmental cooperation. - Reprocessors as outlined above.
Timeframes	Medium – long.
Case study	City of Hume roads built with soft plastics, glass and toner Downer, Hume City Council, Close the Loop, Sustainability Victoria and RED Group worked in partnership to build the first ever Australian road with soft plastics, glass and toner. Through relationships with customers, suppliers and the broader industry, Downer is incorporating greater recycled content in pavement, while achieving an overall lower greenhouse gas footprint. Sustainability

Activity aspect	Description
	Victoria supported Close the Loop and Downer with more than \$100,000 to develop specialist equipment and help with trial costs. Soft plastics from approximately 200,000 plastic bags and packaging, 63,000 glass bottle equivalents, toner from 4,500 used printer cartridges and 50 tonnes of recycled asphalt were used to build the road in Craigieburn (DCCEEW, 2021). City of Whittlesea foam bitumen asphalt base The City of Whittlesea used a foam bitumen asphalt base made from 95.3% of recycled materials to rehabilitate an area of failed pavement within Yale Drive, Epping. The recycled materials include road base with waste glass, sand and aggregates. The use of foam bitumen asphalt as a cold asphalt alternative to stabilise road bases is common and has been utilised within the City of Whittlesea historically. However, it is the first time bitumen asphalt has been produced with recycled glass materials within the council and Victoria. This new technology reduces the need for virgin materials and enables the increased reuse of recycled glass. Additionally, there is potential to replace traditional hot asphalt which has a much higher environmental footprint as it requires heating and the use of natural gas. This product has provided the City of Whittlesea with more opportunities to use more recycled content in its road infrastructure projects and to close the loop on locally sourced recovered waste glass from kerbside recycling. The City of Whittlesea partnered with suppliers, Repurpose It, in their application for funding through Sustainability Victoria's Sustainable Infrastructure Fund. The requirement for recycled products was specified in the Request for Quotation. This was then compared to market rates of comparable products. The foam bitumen asphalt product containing recycled glass is unique to the manufacturer and was used to rehabilitate the pavement instead of using conventional asphalt. The price of the foam bitumen asphalt product was compared to rates for the supply and placement of asphalt submitted by the City of Whittlesea's established panel of approved civil and asphalt contractors and was found to be in line with market rates (SV, 2021).

7. Conclusions and recommendations

This report presents a Merri-bek centric material flow analysis, and identifies and assesses local circular economy opportunities to inform the development of the future Merri-bek City Council circular economy strategy.

Like similar urban areas, significant quantities of materials are consumed and disposed in the Merri-bek area, revealing significant potential to reduce disposal of materials to landfill from all waste source streams (i.e. MSW, C&I and C&D).

The MFA suggests materials for focus should be organics, plastics, textiles, paper and cardboard and building and demolition materials. The Council also identified interest in materials in the C&D source stream based on building activity in Merri-bek. With manufacturing in decline, the growing sectors, like construction, are increasingly important target industries for circular economy initiatives. In Merri-bek this includes health care and social assistance, retail and food services, education and training, as well as construction.

There are many opportunities to pursue circular economy outcomes, with significant government support (e.g. policy context and grants), and the challenge becomes one of identifying actions which best suit Council remit, context and ambition. This study has used quantitative and evidence-based methods for filtering and synthesising a range of typical opportunity types, by material type, to identify specific actions for the Merri-bek context.

The five opportunities selected for detailed assessment deliver a robust foundation to inform the development of the circular economy strategy. In addition, the detailed analysis presented in the associated workbook provides Merri-bek City Council with a rich source of information that can inform future development of actions for different opportunity types and materials.

Blue Environment recommends that the Merri-bek City Council consider the action plans for integration into the circular economy strategy, which have been prepared for the following five opportunities:

- a program targeting businesses to increase recovery of food organics
- a campaign targeted at residents and commercial users of the Council service to reduce contamination of the FOGO waste stream
- a new council officer to facilitate a circular economy business network like the officers of Hume City Council or Whittlesea City Council
- options for Council to support recovery of C&D materials
- a Council investigation of use of recycled materials in roads.

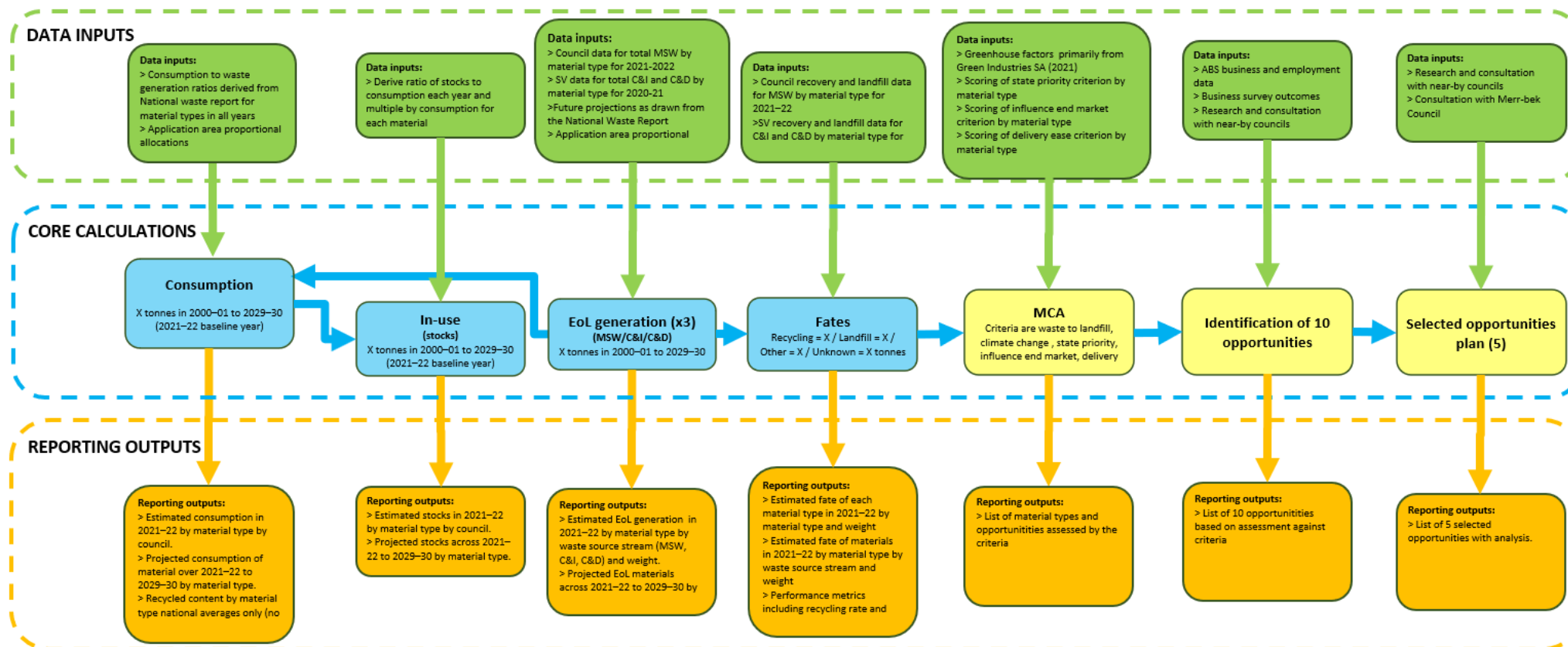
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Appendix A MFA framework and scope

A1 MFA framework



A2 MFA scope

A2.1 Materials scope

Appendix table 1 Material categories and types

Type	Category
Food organics	Organics
Garden organics	Organics
Timber	Organics
Sawdust	Organics
Biosolids (non-contaminated)	Organics
Other organics	Organics
Mixed organics	Organics
Cardboard	Paper and cardboard
Polymer coated paperboard	Paper and cardboard
Office paper	Paper and cardboard
Newsprint & magazines	Paper and cardboard
PET (1)	Plastics
HDPE (2)	Plastics
PVC (3)	Plastics
LDPE (4)	Plastics
PP (5)	Plastics
PS (6)	Plastics
Other plastics (7)	Plastics
Textiles	Textiles, leather & rubber (excl. tyres)
Leather & rubber (excl. tyres)	Textiles, leather & rubber (excl. tyres)
Glass from food & beverage containers	Glass
Other glass	Glass
Asphalt	Building & demolition materials
Bricks, concrete & pavers	Building & demolition materials
Ceramics, tiles & pottery	Building & demolition materials
Plasterboard & cement sheeting	Building & demolition materials
Soil, sand and rock	Building & demolition materials
Rubble	Building & demolition materials
Iron and steel	Metals
Aluminium	Metals
Non-ferrous metals (ex. Aluminium)	Metals
Tyres (T140)	Tyres

A2.2 Application areas scope

MFA modelling considers application areas because materials as finished products are used differently across industries. There is significant variation for materials to be in the consumption (use) phase before they reach end-of-life and get sent into the waste stream. This is evident when comparing polymers used in single-use food packaging (for example in supermarkets), with the same plastic polymer that stays in use phase for a longer period, for example milk crates or pallets (reusable packaging), or in various types of pipes for underground (construction) or irrigation (agricultural) use. The lifespan of these products varies significantly, even though they are the same material.

Presented in the table below are the modelled application areas, which are the same as those adopted for the National Waste Report 2022 MFA modelling (Blue Environment, 2023).

Appendix table 2 Modelled application areas (as defined in the 'use' process)

Application area	Comments
Agriculture	Agriculture, forestry and fishing related applications.
Built environment	Built environment (i.e., construction and demolition) related applications.
Electrical & electronic	Electrical and electronic products related applications.
Industrial	Industrial and manufacturing equipment/machinery, consumables and other inputs.
Packaging	Business-to-consumer (B2C) and business-to-business (B2B) packaging related applications.
Transport	Self-propelled vehicles, including those used in primary production and manufacturing.
Other application area	Other application related applications. Includes clothing, household goods and medical goods.
Unidentified applications	Unknown applications

A2.3 Timeline scope

The MFA baseline year is the financial year 2021–22. The underlying model was set up with a larger time boundary of -20yrs and +10 years from the baseline year to support the required stocks modelling.

The modelling period is wider than is minimally necessary for the material groups modelled to ensure good model coverage into historical stocks, particular in the built environment, and the ongoing use of some of the materials in long-lived applications, again primarily in the built environment.

A2.4 MFA indicators

The circular economy indicators developed through the MFA were recycling rate and landfill rate. The table below sets out definitions of these MFA output metrics and what they measure.

Appendix table 3 MFA system performance metrics

Metric	Definition	Measures
Recycling rate	Materials recycled back to local or overseas manufacturing divided by material entering the waste system (excluding materials sent to energy recovery).	Performance of the system in recycling end-of-life materials.
Landfill rate	Materials sent to landfill divided by materials entering the waste system.	Performance of the system in generating material losses to landfill.

A3 MCA lists

Appendix table 4 MCA scoring, environmental, waste to landfill

Parameter description	Label	Value	Unit
Significant potential for reductions in waste to landfill from the base case (do nothing).	High potential for reductions	5	Ordinal scale data
Moderate potential for reductions in waste to landfill from the base case (do nothing).	Moderate potential for reductions	4	Ordinal scale data
Small or neutral potential for reductions in waste to landfill from the base case (do nothing).	Small or neutral potential for reductions	3	Ordinal scale data
Moderate potential for increases in waste to landfill from the base case (do nothing).	Moderate potential for increases	2	Ordinal scale data
High potential for increases in waste to landfill from the base case (do nothing).	High potential for increases	1	Ordinal scale data

Appendix table 5 MCA scoring, environmental, climate change

Parameter description	Label	Value	Unit
Very high potential for reductions in greenhouse gas emissions from the base case (do nothing).	Very high potential for reductions	5	Ordinal scale data
High potential for reductions in greenhouse gas emissions from the base case (do nothing).	High potential for reductions	4	Ordinal scale data
Moderate potential for reductions in greenhouse gas emissions from the base case (do nothing).	Moderate potential for reductions	3	Ordinal scale data
Low potential for reductions in greenhouse gas emissions from the base case (do nothing).	Low potential for reductions	2	Ordinal scale data
Neutral potential for reductions in greenhouse gas emissions from the base case (do nothing).	Neutral potential for reductions	1	Ordinal scale data

Appendix table 6 MCA scoring, environmental/economic/social, state priority

Parameter description	Label	Value	Unit
SV priority material with demonstrated need for increased intervention.	Very high priority	5	Ordinal scale data
SV emerging priority material or priority material with some existing or planned intervention.	High priority	4	Ordinal scale data
SV priority material with mature existing intervention.	Medium priority	3	Ordinal scale data
Material with potential to become SV priority in the future.	Low priority	2	Ordinal scale data
Material unlikely to become SV priority.	Very low priority	1	Ordinal scale data

Appendix table 7 MCA scoring, social/economic, influence end market

Parameter description	Label	Value	Unit
This type of opportunity has very good potential to influence with 1-2 years estimated to have a significant impact on end-market uptake.	Very good	5	Ordinal scale data
This type of opportunity has good potential to influence with 1-5 years estimated to have a significant impact on end-market uptake.	Good	4	Ordinal scale data
This type of opportunity has fair potential to influence with 3-8 years estimated to have a significant impact on end-market uptake.	Fair	3	Ordinal scale data
This type of opportunity has poor potential to influence with 5-15 years estimated to have a significant impact on end-market uptake.	Poor	2	Ordinal scale data
This type of opportunity has very poor potential to influence with 10+ years estimated to have a significant impact on end-market uptake.	Very poor	1	Ordinal scale data
Opportunity is not applicable to this criterion.	Not applicable	3	Ordinal scale data

Appendix table 8 MCA scoring, technical, delivery ease

Parameter description	Label	Value	Unit
Program/project has demonstrated a very good ease of delivery considering cost to implement and typical capabilities of a council.	Very good ease	5	Ordinal scale data
Program/project has demonstrated a good ease of delivery considering cost to implement and typical capabilities of a council.	Good ease	4	Ordinal scale data
Program/project has demonstrated a fair ease of delivery considering cost to implement and typical capabilities of a council.	Fair ease	3	Ordinal scale data
Program/project has demonstrated a poor ease of delivery considering cost to implement and typical capabilities of a council.	Poor ease	2	Ordinal scale data
Program/project has demonstrated a very poor ease of delivery considering cost to implement and typical capabilities of a council.	Very poor ease	1	Ordinal scale data
Opportunity is not applicable to this criterion.	Not applicable	3	Ordinal scale data

Appendix table 9 Opportunities by stream

Opportunity stream	Opportunity	General example action areas
Council policy and regulation	Use council planning, regulation and approval frameworks for opportunities that require sustainable development and circular design.	Planning permit conditions, use of local laws, use of powers for poor bin performance.
Council procurement	Council procurement of recovered materials to provide significant and reliable end markets.	Processed organics for parks and gardens, purchase of paper, office fit outs, building materials, infrastructure etc.
Council procurement	Council sourcing of products (services) to achieve a higher order end of life fate.	Prioritise regenerative resources, consider product as a service e.g. lighting, furniture, vehicles.
Council support	Create incentives and provide support to improve circular economy outcomes.	Rate holiday for repair cafes, food charities, CE start-ups. Facilitate BtoB relationships and provide support (e.g. map businesses/institutions in the areas, make introductions across value chain, advise on business case development for funding). Promote online goods and services trading (e.g. Aspire), establish lending service (e.g. tool library). Establish or enable programs for business (e.g. CEBIC, SV supported). KPMG's Circular Advantage program.

Opportunity stream	Opportunity	General example action areas
Council support	Advocacy to State and National government to improve circular economy outcomes.	For particular policies, for harmonisation, for funding to implement CE initiatives.
Diversion of materials	Increase recovery of materials as a resource (e.g. maximise recycling and reduce contamination).	Investigate collection programs for target materials including commercial, tip shop concept, transfer station set up. Communication programs to reduce contamination of recycling streams.
Knowledge and capability building	Council communication or program to demonstrate the paradigm shift to a circular economy.	Promote local success stories such as responsible consumption, avoiding food waste, avoiding excess fast fashion, takeback programs, repair and upcycle service (Men's sheds), lease and hire options, sharing options. Promote product stewardship schemes (batteries, e-waste, mattresses, APCO packaging etc.).
Knowledge and capability building	Encourage consumers and businesses to purchase recycled content products.	Examples paper, packaging, clothing, take-away containers. Promote businesses with products.
Knowledge and capability building	Encourage consumers and businesses to choose products (or services) to achieve a higher order end of life fate.	Product as a service, regenerative products, using second-hand business products, alternate materials to SUPs, coffee cups, product miles etc., source second-hand, or surplus.
Innovation, research and pilots	Conduct research on ways to address local barriers to businesses and community implementing circular economy practices.	Partner with local universities.
Innovation, research and pilots	Partner with major waste generators or willing partners to avoid and reduce waste.	Partner with large generators and/or associations.
Innovation, research and pilots	Demonstration trials of any type and at any stage of material/product lifecycles to improve waste hierarchy outcomes.	Engage with State programs, partner with motivated businesses and/or associations.

Appendix B Stakeholder consultation

B1 Waste contractor consultation summary

Appendix table 10 Waste contractor consultation summary

Waste contractor	Purpose	Summary
Veolia	Council's FOGO contractor	- Merri-bek organics taken to Bulla Organics Facility - Veolia has capacity to take more organics and would like more FOGO as it has more nutrients - produces a soil conditioner product sold mostly for agriculture and some to garden centres and nurseries, some donations to community gardens - contamination is about 2.5%-3% - Merri-bek is one of the better council areas for contamination - main contamination risks are bagged material which cannot be de-bagged due to risk of needlestick injuries - contamination on average is 1-2 needles per day, thirty wheelie bins per day and batteries.
VISY	Council's recycling contractor	- VISY is a circular business model from their perspective - all material collected is processed in Australia - have capacity to take Merri-bek's recycling now and moving forward - contamination in Merri-bek municipality is variable – some areas do very well and others have higher contamination.
Citywide	Council's rubbish contractor for part of area	Could not be contacted.
Cleanaway	Waste contractor conducting private waste collection in the municipality	Declined due to probity issues.

B2 Local business consultation summary

Of the 25 businesses contacted, 21 completed surveys which is a response rate of 84%.

Appendix table 11 Local business consultation summary

Sector	Key takeaways
Health care and social assistance	- waste streams for rubbish, recycling and e-waste - does not generate much food waste and large quantities of leftover food are sent home with staff - they would like to build a compost on site - largest waste material is soft plastic packaging from the kitchen as all meals arrive pre-packaged, also incontinence pads, paper towels and PPE like gloves.
Health care and social assistance	- waste streams for rubbish, commingled recycling, cardboard, waste medications, confidential documents and grease trap - waste generation is mostly rubbish - large amounts of PPE but less than during COVID - circular economy initiatives of semi-automatic chemical dispenser and intention to switch to paper towel dispensers in patient areas.
Other services	- public bring small appliances and bicycles to repair - previously had Council grants to put towards larger site, have since downsized which has limited their capacity - items that can't be reused or repaired are sent to the transfer station - would like Council support for larger space or funding for a part-time or full-time employee like Yarra City Council.
Professional, scientific and technical services	- produce very little waste - equal parts rubbish, recycling and documents for secure shredding which is decreasing gradually - use recycled paper in the printer and have reusable cups for staff to use for take-away coffee - would like to see a Council service for other materials.
Office-based industries	main waste type is packaging

Sector	Key takeaways
	• barrier to recycling single-use plastic is not having storage space to meet private collection pick up volume requirements • the business resells decommissioned hardware • focussed on reusable items over single-use where possible.
Retail trade	• main waste type is cardboard for which the association has a separate cardboard pick up service with no cost to the association or the businesses • works closely with Council and will be participating in trials with Reground • most businesses are small new initiatives need to be cost effective • possible opportunities for restaurants and cafes to participate in food recycling.
Professional, scientific and technical services	• produces biohazard waste but mostly cardboard and non-recyclable packaging • also produces organic waste that is not being recycled as there is no green bin in the industrial park • running a circular business model • a lot of second-hand furniture and lab equipment in use • runs a STEM (science, technology, engineering and mathematics) charity that donates equipment to schools • working with many companies on circular economy and waste upcycling, interested in helping Council and small and medium sized businesses with research and development.
Wholesale trade	• have rubbish and recycling streams and food waste is collected as part of secure damaged goods collection • main waste type is packaging including cardboard and plastic pallet wrap • have a new line of products with bottles made from 100% recycled PET • seeking a better solution for pallet wrap – recycled or compostable • try to avoid single use consumables where possible.
Other services	• waste streams for rubbish, cardboard and paper, e-waste and manage green waste and food waste on-site • waste stream is mixture of flowers, plastics and containers and while green waste can be sorted it is dependent on the public's ability to sort prior to disposal • use of recycled products from timber, recycled plastic composite products for outdoor seating and bollards

Sector	Key takeaways
Construction	• will be exploring further circular economy initiatives as part of the GMCT sustainability strategy for 2023–24. • the building industry sees a risk in using recycled materials if the material is not already commonly used • many small builders do not have the time or motivation to invest in new or sustainable materials unless required by contract • the best way to encourage use of recycled material is to have easily accessible ways to find information on the products • mixed waste recycling system used on small sites such as apartment buildings and separated offsite at recycling facility • recovered materials include steel, concrete, timber, bricks, plaster and soil • some materials could be reused such as bricks and would have market value however the storage requirements make it not cost-effective • a barrier for recycling is having recyclers willing to take the material close enough to building sites • some environmental requirements make contracts not cost-effective for local small builders such as requiring Environmental Management System in place for very small projects.
Accommodation and food services	• produces mostly packaging waste - glass and cardboard • some food preparation waste which goes to landfill • would like segregated recycling but commingled is much cheaper • cooking oil is recycled • no single-use items in use at the restaurant, biodegradable packaging and steel straws used • excessive packaging waste is passed to them from suppliers • would like to access Council waste collection as private waste is a large cost.
Health care and social assistance	• main waste type is cardboard packaging and food • also produces significant quantities of items for hard rubbish collection that are difficult to store • have a sustainability policy that commits them to recycling and reusing materials if possible • try to use sustainable materials as part of play programs.
Arts and recreation services	• main wastes are broken or abandoned furniture, accumulated materials and wastes from renovations

Sector	Key takeaways
	- currently recycling as much as possible with appetite to recycle more - waste streams for rubbish, recycling, self-managed organics and e-waste - problems are cost, time and lack of information on how to recycle certain materials and resources on behaviour change for businesses - curate exhibitions on using recycled materials - try to reuse waste products when renovating spaces.
Construction	- main priority is reducing embodied carbon then use of materials with recycled content - each building has operational targets and guidelines including multiple waste streams that do not use chutes to encourage waste accountability - apartments are designed to accommodate a four-caddy system - buildings have eight streams including rubbish, recycling, food waste, e-waste, clothing, coffee grounds, soft plastics and others that the residents develop - some sites have council collection where possible but 90% of MUDs are serviced by commercial contractors - would like to see Council encourage businesses to prioritise renewable electricity providers.
Professional, scientific and technical services	- has private collection for rubbish, recycling and separate cardboard collection - waste to landfill is approximately quadruple the volume of waste recycled.
Waste and recycling services	- cardboard baling facility taking cardboard from surrounding 20km radius - part of a network of cardboard baling facilities across Melbourne - use a collection service such as Milkrun or a truck to pick up from SMEs and some larger businesses - throughput of five to seven kt per annum with capacity to increase cardboard recycling is driven by market forces
Education and training	- the university campus offers waste streams for all schools including paper and cardboard, commingled recycling and food and garden organics - each school, such as the School of Fashion and Textiles at Brunswick, organises its own specialised waste streams - RMIT has transitioned from using a Waste Management Strategy to a Circular Economy Strategy with key targets for reducing operational waste to landfill by 10 kg per person by 2025 and maintaining a 90% diversion from landfill rate for C&D wastes. The strategy also

Sector	Key takeaways
	- includes using CDS, expanding organics recycling and incorporating soft plastics recycling where possible - Procurement: infrastructure meets standards that prioritise recycled content, eco-friendly suppliers prioritised - suggested Brunswick Campus bin room as a possible site for food waste collection from surrounding food businesses in partnership with Council in a similar way to the City of Melbourne food waste management by precinct.
Manufacturing	- uses private collection service for waste and recycling - produces large volumes of non-recyclable production waste – plastic with chlorine. Actively exploring alternative chemical recycling processes for this waste type - planning to include recycled material in products following successful chemical recycling program for production waste - Alan Adams is active member of Australian Packaging Covenant Organisation, otherwise known as APCO.
Retail trade	- made up of retail, food services, recreation and professional services with total of 522 businesses in the precinct - most businesses have individual bins serviced by Council although some larger businesses such as pharmacies have large bins with private waste collection - packaging – especially cardboard is the largest waste item - opportunity for separate cardboard collection as there are difficulties for large boxes in commingled recycling bins – this would be especially beneficial during high turnover times such as Christmas - produce 2nd hand and vintage guide annually to promote second hand businesses - small businesses do not have time to research sustainable alternatives to their consumables such as coffee cups and only do the bare minimum for the single-use plastic bans - Association believes that a resource or educational program comparing sustainable and existing products used by businesses by cost would encourage more uptake of sustainable products - would like to see Council “dropping in” to businesses to see how they can be more circular or sustainable.

Sector	Key takeaways
Retail trade	- major waste is cardboard (36%) followed by equal quantities of food waste and rubbish (21%), and then smaller amounts of combined waxed cardboard and Styrofoam (14%) and commingled recycling (7%) - avoid single use wherever possible - space is a major constraint so waste is transported to their warehouse in Ferntree Gully to be sorted and collected.
Arts and recreation services	- works with PVC vinyl from waste promotional banners which is made into products such as bags which are sold back to the client for promotion - looks for materials that are recognised as non-recyclable and hindrances by groups like PlanetArk - works with several state departments, NGOs, some councils such as City of Melbourne and City of Greater Geelong, would like to work with Merri-bek City Council - would like to see Council using resources to provide spaces for businesses like Upshop that take depreciated products and give new life - Upshop is working to become a certified social enterprise and is undertaking a life cycle analysis with the intention to become carbon negative - aware that Merri-bek does not have a transfer station which could make it difficult for small businesses.

B3 Nearby councils consultation summary

Appendix table 12 Summary of consultations with nearby councils

Council	Representative details	Purpose	Key takeaways
Hume City Council	Zina Miceli <i>Co-ordinator Economic Development</i>	Neighbouring council with similar industries, significant circular economy initiatives and programs in place	• long standing position, circular economy officer, for sustainable business networking • Council circularity roadmap provides a clear path • good connections with businesses, SV, EPA, R&D and consultants key for success • Consultant developed training packaging 'Circular advantage program' has proved popular • Looking at extending a lower cost version of this training to businesses • circularity mainly from manufacturing sector with little activity in other areas • programs for businesses to develop their own sustainability strategies • Council collaborated with Circular Economy Victoria to deliver community and business support programs such as a 'Design Sprint' for community involvement in developing the Hume Smart Circular Hub which will include a place for hard waste recycling. • community involvement to develop smart circular hub • partnerships between tertiary students and businesses for R&D • would like to see new collaborations across the northern region for circular economy sharing across municipal boundaries.
Brimbank City Council	Nicole Butler <i>Waste education officer</i>	Neighbouring council	• Brimbank Circular Economy Innovations Precinct developed with Reground to increase the circularity of waste in Sunshine and St Albans activity centres

Council	Representative details	Purpose	Key takeaways
			• host two reusable goods drop off days per year • supports annual garage sale trail • five reusable party kits are available for loan via participating neighbourhood houses • supports Kororoit Creek Neighbourhood House Repair Café.
Darebin City Council	Nina Bailey <i>Senior sustainability programs officer</i>	Neighbouring council	• Plastics Free Business Guide • Economic Recovery Unit • support community-led initiatives such as Darebin Hard Rubbish Heroes • 'Sustainable Darebin' e-newsletter • working on behaviour change – a challenge for limiting disposable items used in neighbourhood houses was that users wanted to avoid washing up after morning teas, so Darebin City Council installed a dishwasher. • circular economy champions are important for engaging with businesses.
Whittlesea City Council	Monyq San Tropez <i>Circular economy officer</i>	Neighbouring council	• currently developing a circular economy plan focussed on supporting businesses to be circular • CE officer (0.8 position) developing relationships with businesses in Whittlesea and facilitating B2B networking • acknowledge Repurposelt based in Whittlesea as a CE champion advocating for circular economy • considering using Aspire program but main obstacle is the cost
Bendigo City Council	Scott Bryant <i>Circular economy coordinator</i>	Council with relevant circular economy programs in place	• Bendigo has four CE priorities that built on their MFA from 2020 and data from transfer stations to landfill • MFA challenged by shadow waste, B2B and private collections • Important driver was the landfill being almost full

Council	Representative details	Purpose	Key takeaways
			• has a small soft plastics collection program, cannot service bag-in-bin as MRF is not suitable • Aspire Program in place in the region. Council pays a fee, involves 115 businesses. Might slowly become more mainstream but needs time and education to reach mass. Currently an engagement and education tool • noted that many Councils are using Aspire Program • aware of recovery of soft plastics and textiles in the healthcare sector and onsite food organics dehydration technology in use in healthcare sector canteens.

Appendix C MCA outcomes

MCA outcomes

Opportunities with the same MCA score have the same rank (for example, if there are two opportunities that are ranked first equal, the next item will be ranked third in the list and so on). Given the uncertainties associated with the MCA methodology, such as various forms of bias, criteria coverage of impacts, and other limitations (Infrastructure Australia, 2021, pp. 12-14) all these opportunities could be conservatively interpreted as having similar rank.

Appendix table 13 Top five opportunities for food organics

Material type	Material category	Opportunity	Opportunity stream	Rank
Food organics	Organics	Council procurement of recovered materials to provide significant and reliable end markets.	Council procurement	1
Food organics	Organics	Council communication or program to demonstrate the paradigm shift to a circular economy.	Knowledge and capability building	1
Food organics	Organics	Create incentives and provide support to improve circular economy outcomes.	Council support	3
Food organics	Organics	Increase recovery of materials as a resource (e.g. maximise recycling and reduce contamination).	Diversion of materials	3
Food organics	Organics	Use council planning, regulation and approval frameworks for opportunities that require sustainable development and circular design.	Council policy and regulation	5
Food organics	Organics	Council sourcing of products (services) to achieve a higher order end of life fate.	Council procurement	5
Food organics	Organics	Encourage consumers and businesses to purchase recycled content products.	Knowledge and capability building	5
Food organics	Organics	Partner with major waste generators or willing partners to avoid and reduce waste.	Innovation, research and pilots	5

Appendix table 14 Top five opportunities for garden organics

Material type	Material category	Opportunity	Opportunity stream	Rank
Garden organics	Organics	Council procurement of recovered materials to provide significant and reliable end markets.	Council procurement	1
Garden organics	Organics	Council communication or program to demonstrate the paradigm shift to a circular economy.	Knowledge and capability building	1
Garden organics	Organics	Create incentives and provide support to improve circular economy outcomes.	Council support	3
Garden organics	Organics	Increase recovery of materials as a resource (e.g. maximise recycling and reduce contamination).	Diversion of materials	3
Garden organics	Organics	Use council planning, regulation and approval frameworks for opportunities that require sustainable development and circular design.	Council policy and regulation	5
Garden organics	Organics	Council sourcing of products (services) to achieve a higher order end of life fate.	Council procurement	5
Garden organics	Organics	Encourage consumers and businesses to purchase recycled content products.	Knowledge and capability building	5
Garden organics	Organics	Partner with major waste generators or willing partners to avoid and reduce waste.	Innovation, research and pilots	5

Appendix table 15 Top five opportunities for low density polyethylene (LDPE) (4)

Material type	Material category	Opportunity	Opportunity stream	Rank
Low density polyethylene (LDPE) (4)	Plastics	Council communication or program to demonstrate the paradigm shift to a circular economy.	Knowledge and capability building	1
Low density polyethylene (LDPE) (4)	Plastics	Council procurement of recovered materials to provide significant and reliable end markets.	Council procurement	2
Low density polyethylene (LDPE) (4)	Plastics	Increase recovery of materials as a resource (e.g. maximise recycling and reduce contamination).	Diversion of materials	2
Low density polyethylene (LDPE) (4)	Plastics	Create incentives and provide support to improve circular economy outcomes.	Council support	4
Low density polyethylene (LDPE) (4)	Plastics	Use council planning, regulation and approval frameworks for opportunities that require sustainable development and circular design.	Council policy and regulation	5
Low density polyethylene (LDPE) (4)	Plastics	Council sourcing of products (services) to achieve a higher order end of life fate.	Council procurement	5

Appendix table 16 *Top five opportunities for textiles*

Material type	Material category	Opportunity	Opportunity stream	Rank
Textiles	Textiles, leather & rubber	Council communication or program to demonstrate the paradigm shift to a circular economy.	Knowledge and capability building	1
Textiles	Textiles, leather & rubber	Create incentives and provide support to improve circular economy outcomes.	Council support	2
Textiles	Textiles, leather & rubber	Increase recovery of materials as a resource (e.g. maximise recycling and reduce contamination).	Diversion of materials	2
Textiles	Textiles, leather & rubber	Use council planning, regulation and approval frameworks for opportunities that require sustainable development and circular design.	Council policy and regulation	4
Textiles	Textiles, leather & rubber	Council procurement of recovered materials to provide significant and reliable end markets.	Council procurement	4
Textiles	Textiles, leather & rubber	Council sourcing of products (services) to achieve a higher order end of life fate.	Council procurement	4
Textiles	Textiles, leather & rubber	Advocacy to State and National government to improve circular economy outcomes.	Council support	3
Textiles	Textiles, leather & rubber	Encourage consumers and businesses to purchase recycled content products.	Knowledge and capability building	4
Textiles	Textiles, leather & rubber	Partner with major waste generators or willing partners to avoid and reduce waste.	Innovation, research and pilots	4

Appendix table 17 Top five opportunities for office paper

Material type	Material category	Opportunity	Opportunity stream	Rank
Office paper	Paper & cardboard	Council communication or program to demonstrate the paradigm shift to a circular economy.	Knowledge and capability building	1
Office paper	Paper & cardboard	Council procurement of recovered materials to provide significant and reliable end markets.	Council procurement	2
Office paper	Paper & cardboard	Create incentives and provide support to improve circular economy outcomes.	Council support	3
Office paper	Paper & cardboard	Increase recovery of materials as a resource (e.g. maximise recycling and reduce contamination).	Diversion of materials	4
Office paper	Paper & cardboard	Encourage consumers and businesses to purchase recycled content products.	Knowledge and capability building	5
Office paper	Paper & cardboard	Partner with major waste generators or willing partners to avoid and reduce waste.	Innovation, research and pilots	5

Appendix table 18 Top five opportunities for cardboard

Material type	Material category	Opportunity	Opportunity stream	Rank
Cardboard	Paper & cardboard	Council communication or program to demonstrate the paradigm shift to a circular economy.	Knowledge and capability building	1
Cardboard	Paper & cardboard	Council procurement of recovered materials to provide significant and reliable end markets.	Council procurement	2
Cardboard	Paper & cardboard	Create incentives and provide support to improve circular economy outcomes.	Council support	3
Cardboard	Paper & cardboard	Increase recovery of materials as a resource (e.g. maximise recycling and reduce contamination).	Diversion of materials	4
Cardboard	Paper & cardboard	Encourage consumers and businesses to purchase recycled content products.	Knowledge and capability building	5
Cardboard	Paper & cardboard	Partner with major waste generators or willing partners to avoid and reduce waste.	Innovation, research and pilots	5

Appendix table 19 Top five opportunities for timber

Material type	Material category	Opportunity	Opportunity stream	Rank
Timber	Organics	Council communication or program to demonstrate the paradigm shift to a circular economy.	Knowledge and capability building	1
Timber	Organics	Create incentives and provide support to improve circular economy outcomes.	Council support	2
Timber	Organics	Council procurement of recovered materials to provide significant and reliable end markets.	Council procurement	3
Timber	Organics	Increase recovery of materials as a resource (e.g. maximise recycling and reduce contamination).	Diversion of materials	3
Timber	Organics	Encourage consumers and businesses to purchase recycled content products.	Knowledge and capability building	3
Timber	Organics	Partner with major waste generators or willing partners to avoid and reduce waste.	Innovation, research and pilots	3

Appendix table 20 Top five opportunities for textiles

Material type	Material category	Opportunity	Opportunity stream	Rank
High density polyethylene (HDPE) (2)	Plastics	Council communication or program to demonstrate the paradigm shift to a circular economy.	Knowledge and capability building	1
High density polyethylene (HDPE) (2)	Plastics	Council procurement of recovered materials to provide significant and reliable end markets.	Council procurement	2
High density polyethylene (HDPE) (2)	Plastics	Increase recovery of materials as a resource (e.g. maximise recycling and reduce contamination).	Diversion of materials	2
High density polyethylene (HDPE) (2)	Plastics	Create incentives and provide support to improve circular economy outcomes.	Council support	4
High density polyethylene (HDPE) (2)	Plastics	Use council planning, regulation and approval frameworks for opportunities that require sustainable development and circular design.	Council policy and regulation	5
High density polyethylene (HDPE) (2)	Plastics	Council sourcing of products (services) to achieve a higher order end of life fate.	Council procurement	5

Appendix table 21 Top five opportunities for polyethylene terephthalate (PET) (1)

Material type	Material category	Opportunity	Opportunity stream	Rank
Polyethylene terephthalate (PET) (1)	Plastics	Council communication or program to demonstrate the paradigm shift to a circular economy.	Knowledge and capability building	1
Polyethylene terephthalate (PET) (1)	Plastics	Council procurement of recovered materials to provide significant and reliable end markets.	Council procurement	2
Polyethylene terephthalate (PET) (1)	Plastics	Increase recovery of materials as a resource (e.g. maximise recycling and reduce contamination).	Diversion of materials	2
Polyethylene terephthalate (PET) (1)	Plastics	Create incentives and provide support to improve circular economy outcomes.	Council support	4
Polyethylene terephthalate (PET) (1)	Plastics	Use council planning, regulation and approval frameworks for opportunities that require sustainable development and circular design.	Council policy and regulation	5
Polyethylene terephthalate (PET) (1)	Plastics	Council sourcing of products (services) to achieve a higher order end of life fate.	Council procurement	5

Appendix table 22 Top five opportunities for polypropylene (PP) (5)

Material type	Material category	Opportunity	Opportunity stream	Rank
Polypropylene (PP) (5)	Plastics	Council communication or program to demonstrate the paradigm shift to a circular economy.	Knowledge and capability building	1
Polypropylene (PP) (5)	Plastics	Council procurement of recovered materials to provide significant and reliable end markets.	Council procurement	2
Polypropylene (PP) (5)	Plastics	Increase recovery of materials as a resource (e.g. maximise recycling and reduce contamination).	Diversion of materials	2
Polypropylene (PP) (5)	Plastics	Create incentives and provide support to improve circular economy outcomes.	Council support	4
Polypropylene (PP) (5)	Plastics	Use council planning, regulation and approval frameworks for opportunities that require sustainable development and circular design.	Council policy and regulation	5
Polypropylene (PP) (5)	Plastics	Council sourcing of products (services) to achieve a higher order end of life fate.	Council procurement	5

Appendix table 23 Top five opportunities for building and demolition materials

Material type	Material category	Opportunity	Opportunity stream	Rank
Soil, sand and rock, Bricks, concrete and pavers Rubble	Building and demolition materials	Council communication or program to demonstrate the paradigm shift to a circular economy.	Knowledge and capability building	1
Soil, sand and rock, Bricks, concrete and pavers Rubble	Building and demolition materials	Council procurement of recovered materials to provide significant and reliable end markets.	Council procurement	2
Soil, sand and rock, Bricks, concrete and pavers Rubble	Building and demolition materials	Create incentives and provide support to improve circular economy outcomes.	Council support	3
Soil, sand and rock, Bricks, concrete and pavers Rubble	Building and demolition materials	Increase recovery of materials as a resource (e.g. maximise recycling and reduce contamination).	Diversion of materials	4
Soil, sand and rock, Bricks, concrete and pavers Rubble	Building and demolition materials	Encourage consumers and businesses to purchase recycled content products.	Knowledge and capability building	4
Soil, sand and rock, Bricks, concrete and pavers Rubble	Building and demolition materials	Partner with major waste generators or willing partners to avoid and reduce waste.	Innovation, research and pilots	4

Appendix D C&D waste recycling facilities

D1 C&D waste recycling facilities

Table of facilities in Melbourne extracted from the Australian waste and resource recovery infrastructure database (Blue Environment, 2022).

Appendix table 24 C&D recycling facilities

Facility or site name	Owner	Facility street address	Suburb	Postcode
Altona North Recycling (Masalovski Group)	Masalovski Group	55 McArthurs Road	Altona North	3025
Beveridge Scoria	Beveridge Scoria	61 Minton Street	Beveridge	3753
Sunshine Groupe	Sunshine Groupe	125 Bunting Road	Brooklyn	3012
Delta Group	Delta Group	473 Sommerville Road	Brooklyn	3012
Brooklyn Recycling Plant	City Circle	Jones Road	Brooklyn	3012
Barro Group	Barro Group	191 Drummond Street	Carlton	3053
Alex Fraser - Clarinda	Alex Fraser	275-315 Kingston Road	Clarinda	3169
Eco Group	Eco Group	60 Garden Road	Clayton	3168
Konstruk Recycling	Konstruk Recycling	63-67 Gardens Road	Clayton	3168
Dandenong Recycling Plant	City Circle	128-148 Ordish Road	Dandenong South	3175
Waste Converters Recycling Depot	Waste Converters Recycling	185 Dandenong Hastings Road	Dandenong South	3175
Smart Recycling	Smart Recycling Dandenong	185 Dandenong-Hastings Road	Dandenong South	3175
Alex Fraser - Epping	Alex Fraser	445-475 Cooper Street	Epping	3076
Repurpose IT	RepurposeIT	480 Cooper Street	Epping	3076
Suez ResourceCo Epping	Suez ResourceCo	480 Cooper Street	Epping	3076
Beaver Bricks	Beaver Bricks	54 Rae Street	Fitzroy North	3068
Suez ResourceCo C&D Facility	Suez ResourceCo	795 South Gippsland Highway	Hampton Park	3976
Alex Fraser - Laverton	Alex Fraser	9-19 Alex Fraser Drive	Laverton North	3026
Shiver Me Timbers	Shiver Me Timbers	50 Emu Road	Maidstone	3012
City Circle - Melton	City Circle	Treeleaf Lane	Melton	3337
Apex Waste Control	Apex Waste Control	4 Sara Grove	Tottenham	3012
Paddy's Bricks	Paddy's Bricks	240 Kensington Road	West Melbourne	3003
National Recycling Centre (DATS)	National Recycling Centre (DATS)	372-374 Dynon Road	West Melbourne	3003