CITY OF BALLARAT

Draft

Resource Recovery and Waste Management Strategy Background Report November, 2017

Environmental Evolution

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1.3			Final version incorporates feedback following public consultation

Approval

The following people are responsible for signing-off on the content of the document. Signatures constitute an acceptance and agreement of the document's content.

Name	Title	Approval Signature	Date

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Abbreviations

AWT	Alternative Waste Technology
Grampians Central West Implementation Plan	Grampians Central West Waste and Resource Recovery Implementation Plan
GCWWRRG	Grampians Central West Waste and Resource Recovery Group
C&D	Construction and demolition
C&I	Commercial and industrial
COB	*City of Ballarat*
DELWP	Department of Environment, Land, Water and Planning
EPA	Environment Protection Authority
EP Act	Environment Protection Act 1970
EPS	Expanded Polystyrene
FOGO	Food Organics and Garden Organics
GO	Garden Organics
LGPRF	Local Government Performance Reporting Framework
MRF	Materials Recovery Facility
MSW	Municipal Solid Waste
MUD	Multi-unit Development
RRC	Resource Recovery Centre
RRWMS	Resource Recovery and Waste Management Strategy
SV	Sustainability Victoria
State infrastructure plan	Statewide Waste and Resource Recovery Infrastructure Plan
TBL	Triple Bottom Line assessment
WRRG	Waste and Resource Recovery Group

Summary

The City of Ballarat Resource Recovery and Waste Management Background Report 2017 (the Report) considers current and future waste management and resource recovery in the *City of Ballarat*. The Report reviews the current status of waste management, including data on waste and recyclables generation, collection services and waste and resource recovery facilities.

The Report supports the development of a strategy that offers long-term strategic direction for sustainable waste management and provides a focus on the *City of Ballarat's* goals to be achieved over the next five years. The strategic direction is documented in the accompanying – *City of Ballarat Resource Recovery and Waste Management Strategy, 2018-2022* (the Strategy). The Report is an internal document, and information contained within is not intended for wider distribution.

In 2017, 70% of all waste processed in the *City of Ballarat* came from the municipal solid waste (MSW) sector, while 27% came from the commercial and industrial (C&I) sector and only 3% came from the construction and demolition (C&D) sector.

The *City of Ballarat* sent 26,828 tonnes of MSW to landfill in 2017. This represents approximately 253 kilograms of waste entering landfill for each person living in the *City of Ballarat*. A further 26,051 tonnes of waste were diverted through recovery processes.

The introduction of a kerbside greenwaste collection service in Ballarat's city centre in July 2016 saw more than 9,300 tonnes of green waste collected in the first year of operation, resulting in an increase in the diversion rate of municipal solid waste from 38% to almost 50%. These bins also showed very little contamination (1%). Interestingly the waste audits indicated that just under 30% of the contents of kerbside garbage bins contained potentially divertible waste.

When looking at the C&I and the C&D Sectors, the majority of waste collected was potentially divertible with 30% being potentially divertible organics and approximately 60% being potentially divertible recyclables.

To service over 40,000 homes and the various businesses, commercial operations and industries in the region, *City of Ballarat* has a range of waste and recycling facilities. These include; a waste transfer station (where waste is bulk hauled to landfill for disposal), the Smythesdale Landfill, a greenwaste interchange facility and a transfer site for recycling (where co-mingled recyclables are bulk hauled elsewhere for processing).

Using a 'business as usual' (BAU) scenario, it is projected that waste generation in the *City of Ballarat* would grow to approximately 61,000 tonnes annually by 2026. An estimated 30,000 tonnes would be recovered and 31,000 tonnes would enter landfill.

Appropriate and adaptive infrastructure is integral to the management of waste. Projected increases in waste supports the need to establish a central waste and resource recovery facility that updates the current transfer station, provides a central collection point where all waste and resources are sorted and re-purposed with minimal waste going to landfill. An All Waste Interchange facility is currently being investigated to fulfil this purpose. Further to this, the *City of Ballarat* is also investigating the options of a material recovery facility and waste to energy solutions for future resource recovery and waste management.

In order to change the BAU scenario outcome the *City of Ballarat* has set a clear vision for future resource recovery and waste management.

The *City of Ballarat's* Strategic Direction

Vision:

To achieve zero recoverable waste to landfill by 2040.

In order to achieve this Vision, four Strategic Objectives have been established to provide direction for waste and resource recovery in the *City of Ballarat* over the next five years. This Vision and the four Objectives are in line with State and regional objectives.

Objective One: Full resource recovery

The *City of Ballarat* recognises waste as a valuable resource, which is currently under-utilised. In order to achieve the Vision, the *City of Ballarat* aims to remove all valuable, recoverable materials from the waste stream prior to disposal in landfill.

Objective Two: Viable resource recovery markets

Meeting objective one is reliant on recovered resources entering a viable market. Understanding and supporting the development of viable resource recovery markets underpins the resource recovery process.

Objective Three: Adaptive infrastructure and operations

Technology in waste management has evolved considerably, with new waste sorting and processing facilities providing more cost-effective ways to achieve resource recovery and greenhouse gas abatement. Investment in infrastructure and operational delivery that adjusts in order to proactively manage new and emerging waste streams and adapts to suit the changes in demand and supply, supports the *City of Ballarat's* Vision.

Objective Four: Strategic planning

The *City of Ballarat* aims to ensure strategic planning principles are embedded in waste management planning and implementation. An adaptive management approach will be adopted to formalise information flows between strategy and planning, implementation and monitoring, evaluation and reporting, and learning and adaptation.

The Strategy also recognises waste management as a system that is central to the *City of Ballarat's* economy and that managing waste is an issue for all households and businesses. Currently, the *City of Ballarat* has a well-developed waste management sector that generates significant employment and economic activity through the collection, transportation, sorting and processing of waste.

The below table outlines Targets and proposed management options for these Objectives.

Vision: To achieve zero recoverable waste to landfill by 2040

Objectives	Full resource recovery		Viable resource recovery markets	Adaptive infrastructure and operations			Strategic Planning
Targets	**T1.1 The growth in waste generation is less than the rate of population growth.**	**T1.2 Achieve 70% diversion of waste from landfill by 2022 with a long-term goal of 85% by 2028.**	**T2.1 90% of recovered material enters a viable market stream with a focus on local enterprise.**	**T3.1 Infrastructure enables full resource recovery targets to be met.**	**T3.2 Waste management operations are adaptive and exceed industry standards and benchmarks.**	**T3.3 Reduce incidents of illegal dumping by 50% by 2022.**	**T4.1 Adaptive management principles are embedded in waste management planning and implementation.**
Management Options	Work with relevant agencies, industry and schools on waste and resource reduction and recovery education and engagement. Educate and raise awareness of waste minimisation and avoidance through the development of a **Waste Education Plan**. Advocate for **product stewardship** reuse, reduce, repurpose. (T1.1, T1.2). Provide advocacy in the community through support of waste **minimisation initiatives** (T1.1, T1.2). Identify and implement financial incentives and disincentives for waste minimisation across all sectors. Provide community leadership through local groups and businesses.	Develop a **Waste Action Program** to reduce recycling contamination across the MSW sector. Assess collection needs across all sectors, identify gaps in council services and investigate provision for those additional community needs. Educate and raise awareness of diversion options through the **Waste Education Plan**. Promote and advocate for the avoidance of single use products. Develop a business case for organic diversion options for MSW and C&I waste sectors. Encourage on-site reuse for construction & demolition waste, and work with local recyclers of C&D to better promote services in the region. Provide community leadership through local groups and business. Support GCWWRRG's investigation into increasing the recovery of materials such as wood/timber, agricultural wastes, plastics, textiles, tyres and e-waste.	Develop a **Resource Recovery Market plan**. Improve resource recovery of priority marketable products, waste streams will go to the **All Waste Interchange**. Invest in 'pre-sort' infrastructure that aims to maximise on-site resource recovery (**MRF**). (T1.1, T2.1, T3.1) Undertake a gap analysis and develop a 3-year **Strategic Resourcing Plan** to enable proactive delivery of Waste Strategy, including opportunity for Resource Recovery Market Officer. Provide support for existing and emerging waste market initiatives. Consult with industry and GCWRWRRG to gather information on innovation and market development needs and priorities.	Assess and implement options for asset rationalisation, consolidation and upgrade of landfill and RRC infrastructure. Facilitate the consolidation of waste infrastructure including depot and transfer station to an **All Waste Interchange** (T1.2, T3.1). Invest in **state-of-the-art waste service fleet**, including investigation of alternative fuel and hybrid drive systems. Continue to pursue a feasibility study that looks at all options of **waste to energy facilities** that places Ballarat as a central processor of Victoria's waste (T1.2, T3.1). Provide assistance to industry to ensure infrastructure, facilities and services are operating and managed to protect the community, environment and public health.	Establish **benchmarks for waste management services** including: landfill management; transfer station, street cleaning and waste collection and use to inform best practice and continual improvement processes. Investigate logistics and infrastructure that produce efficiencies in waste transport including understanding the viability verses distance constraint. Implement the **Smythesdale Landfill Master Plan.** Work with the GCWWRRG, industry and the EPA to progress any rehabilitation assessments and requirements for closed landfills.	Facilitate the development of an **illegal dumping action plan** with partners and key stakeholders. Work with SV and the Victorian Litter Action Alliance (VLAA) to develop and implementation best practice **litter prevention programs**. Raise awareness of illegal dumping through the **Waste Education Plan.** Provide **additional resource** for enforcement activities.	Implement **an annual review** of the RRWM Implementation Plan. Apply **adaptive management approach** to waste management. Implement a reliable and targeted local **data system** that informs waste and resource recovery decisions and contributes to regional and state data systems. Work with GCWWRRG and other councils to develop mechanisms and **contingency plans** to appropriately manage waste and material during and after emergency or unplanned events. Work with the GCWWRRG to facilitate the development of **council partnerships** to enable efficiencies in resource recovery, materials transport and disposal. Collaborate with GCWWRRG on waste **infrastructure planning.**

GCWWRRG = Grampians Central West Waste and Resource Recovery Group. EPA= Environment Protection Authority. SV = Sustainability Victoria

1. Introduction

The *City of Ballarat Resource Recovery and Waste Management Background Report 2017* (the Report) considers current and future waste management and resource recovery in the *City of Ballarat*. The Report collates information, analyses waste and resource recovery issues and trends and identifies strategic directions for the *City of Ballarat* and future management options that support these directions. The Report is an internal document and information contained within it is not intended for wider release.

The Report supports the development of a strategy that offers long-term strategic direction for sustainable waste management and provides a focus on the *City of Ballarat's goals to be achieved* over the next five years. The strategic direction is documented in the accompanying document – *City of Ballarat Resource Recovery and Waste Management Strategy, 2018-2022* (the Strategy).

The *City of Ballarat* is a member of the Grampians Central West Waste and Resource Recovery Group (GCWWRRG) and the Report and accompanying Strategy were developed in accordance with the *Grampians Central West Waste and Resource Recovery Implementation Plan* (Grampians Central West Implementation Plan).

This Background Report was developed through consideration of:

- existing waste and recycling collection and management services provided
- consultation with relevant stakeholders
- review of local, state and national policies, regulations and plans
- review of achievements and outcomes to date
- analysis of current and future waste trends
- assessment of existing waste and resource recovery infrastructure
- analysis of management options for improving waste and recycling services
- assessment of the environmental, social and financial impacts of future strategies for sustainable waste management.

2. Context

Development of the Strategy was influenced by national, state and local government acts, legislation and policies, as well as regional initiatives of the GCWWRRG. It was also developed within the context of community expectations, past performance and other issues.

2.1 Policies and Regulation

This section provides an outline of the legislation, policy and planning framework relevant to the management of waste at council level.

Commonwealth Government

The *National Waste Policy: Less Waste, More Resources* was developed in 2009 by the Commonwealth Government. This is the overarching policy for waste management and resource recovery in Australia and it complements other government action to deliver greenhouse gas emission reductions, reduce energy and water use, support jobs and invest in future long term economic growth. The policy sets directions in six key areas:

1. Shared responsibility for reducing the environmental, health and safety footprint of products and materials across the manufacture-supply-consumption chain through to end-of-life.
2. Efficient and effective Australian markets operate for waste and recovered resources, with local technology and innovation being internationally sought after.
3. Less waste and improved use of waste to achieve broader environmental, social and economic benefits.
4. Reduction of potentially hazardous content of wastes with consistent, safe and accountable waste recovery, handling and disposal.
5. Increased capacity in regional, remote and indigenous communities to manage waste and recover and re-use resources.
6. Access by decision-makers to meaningful, accurate and current national waste and resource recovery data and information to measure progress and educate and inform the behaviour and the choices of the community.

The Commonwealth Government also established National Environment Protection Measures (NEPMs); these set the basis for agreed national objectives for protecting or managing aspects of the environment (and are enforced through state legislation). Waste-related NEPMs currently in place address used packaging materials and the movement of hazardous waste between states/territories.

National product stewardship arrangements (between government and industry) are in place for televisions and computers, end-of-life tyres, waste oil, mobile phones and other products. Future arrangements for other materials are likely to be established.

Victorian Government

The Environment Protection Authority (EPA) is responsible for enforcement of the *Environment Protection Act 1970* (EP Act) which is the key legislative mechanism for environmental protection in Victoria. Among other points, it outlines the Victorian waste and resource recovery planning framework and scope for the development of state and regional waste plans, the establishment of landfill levies and industrial waste policies, as well as supporting regulations for waste and recycling facilities. Under this Act, councils are required to perform waste management functions that are consistent with Regional Waste and Resource Recovery Implementation Plans (such as the Grampians Central West Implementation Plan).

The Department of Environment, Land, Water and Planning (DEWLP) has a role in setting the state policy for waste and resource recovery. Specifically, they prepare legislative amendments and provide policy, planning, leadership, coordination and oversight of the environment portfolio. They also collaborate with other government departments, particularly the Department of Economic Development, Jobs, Transport and Resources and the Department of Health and Human Services to maximise investment and employment opportunities, and to address the community, environment and public health problems posed by waste.

The *Local Government Act 1989* outlines the roles and responsibilities of Victorian councils, with additional waste management responsibilities set out in the *Public Health and Wellbeing Act 2008.* These responsibilities include maintaining the municipality in a clean and sanitary condition, planning for and providing community services and infrastructure, ensuring that services are delivered in accordance with best value principles, and striving for continuous improvement in service delivery.

The Victorian Government also established the *Local Government Performance Reporting Framework* (LGPRF) in 2014, which is a mandatory system for consistent local government reporting across the state. Councils are required to measure and report annually on 66 performance measures set out in the framework, including waste management services. Council performance levels can be viewed and compared with other councils via the *Know Your Council* website (*https://knowyourcouncil.vic.gov.au/)*. For specific information and graphs on *City of Ballarat* performance measures for 2015-16 in relation to waste management services, refer to Section 2.6 Past Performance.

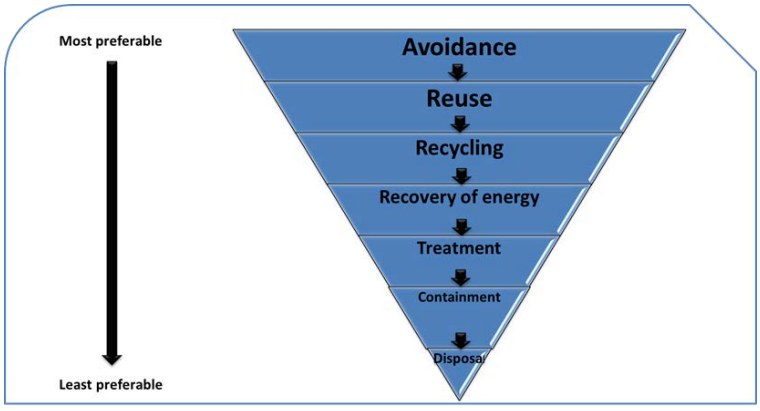
There are additional waste issues currently under consideration which may affect future waste management in the region:

- The Victorian Government is committed to banning e-waste from landfills and the use of singe use plastic bags. They are currently exploring the impact of enabling legislation.
- With recent regulations announced by all other states, Victoria currently remains the only state in Australia without legislation planned to introduce a deposit on beverage containers. There may be future pressure on the Victorian Government to join a national scheme to enact this.
- The Victorian government has recently announced its intention to conduct a major overhaul of the Environment Protection Act over the next two years.

Waste management hierarchy

Figure 2-1 **Waste Management Hierarchy**

The waste management hierarchy is the underlying principle of waste management policies in Australia and is included in the *Environment Protection Act 1970.* The hierarchy establishes the order of preference for waste management as outlined in Figure 2.1.



2.2 Victorian Strategic Directions and Initiatives

Sustainability Victoria is responsible for implementing Victorian Government policies on resource recovery and waste management including the development of the *Statewide Waste and Resource Recovery Infrastructure Plan 2015-44* (State Infrastructure Plan). This plan provides strategic directions for improving waste and resource recovery infrastructure to achieve the long-term vision of an integrated statewide waste and resource recovery system that provides an essential community service to:

- protect the community, environment and public health
- recover valuable resources from our waste
- minimise long term costs to households, industry and governments.

Goals outlined in the State Infrastructure Plan (Sustainability Victoria 2015a) are listed below.

Goal 1 Landfills will only be used for receiving and treating waste streams from which all materials that can be viably recovered, have been extracted.

Goal 2 Materials are made available to the resource recovery market through aggregation and consolidation of volumes, to create viability in recovering valuable resources from waste.

Goal 3 Waste and resource recovery facilities, including landfills, are established and managed over their lifetime to provide best economic, community, environment and public health outcomes for local communities and the state, and ensure their impacts are not disproportionately felt across communities.

Goal 4 Targeted information provides the evidence base to inform integrated statewide waste and resource recovery infrastructure planning and investment at the state, regional and local levels by industry, local government, waste and resource recovery groups, government agencies and the broader community.

The SWRRIP Amended Consultation Draft

In 2016, SV determined the need to amend the SWRRIP to incorporate key information identified during the development of the seven Regional Waste and Resource Recovery Implementation Plans (Regional Implementation Plans). On 1 August 2017 SV, released a consultation draft for public feedback. Currently feedback is closed and an amended Statewide Waste and Resource Recovery Infrastructure Plan will be published, following gazettal by the Victorian Government. The SWRRIP Amended Consultation Draft has been taken into consideration when developing the Strategy.

Sustainability Victoria has also developed a range of other strategies and frameworks related to waste including the following:

- The *Collaborative Procurement Framework* (Sustainability Victoria undated), which outlines a consistent approach to identifying, assessing and planning collaborative procurement of waste and resource recovery infrastructure and services.
- The *Infrastructure Facilitation Framework* (Sustainability Victoria undated), which provides a coordinated, consistent and long-term approach to promoting and facilitating waste and resource recovery investment opportunities locally and abroad.
- The *Victorian Market Development Strategy for Recovered Resources* (Sustainability Victoria 2016a), which aims to stimulate markets for recovered resources by reducing barriers and supporting the right conditions for material and product markets to grow and mature.

- The *Victorian Organics Resource Recovery Strategy* (Sustainability Victoria 2015b), which outlines the goals, directions, outcomes and actions for improving the management and recovery of organic waste.
- The *Victorian Waste Education Framework* (Sustainability Victoria 2016b), which provides a coordinated approach to waste and resource recovery education in Victoria.

Circular economy in Victoria

Circular economy is discussed in SV's *Victorian Market Development Strategy for Recovered Resources.* Figure 2.2 presents high level resource flows when circular economy principles are applied to Victoria. It suggests there are three key phases in the circular approach, including consumption, resource recovery and manufacturing. The linear 'take-make-dispose' supply chain approach to manufacturing and consumption is made circular by resource recovery, which brings materials back into the cycle for remanufacturing. This will result in a very small component of waste going to landfill.

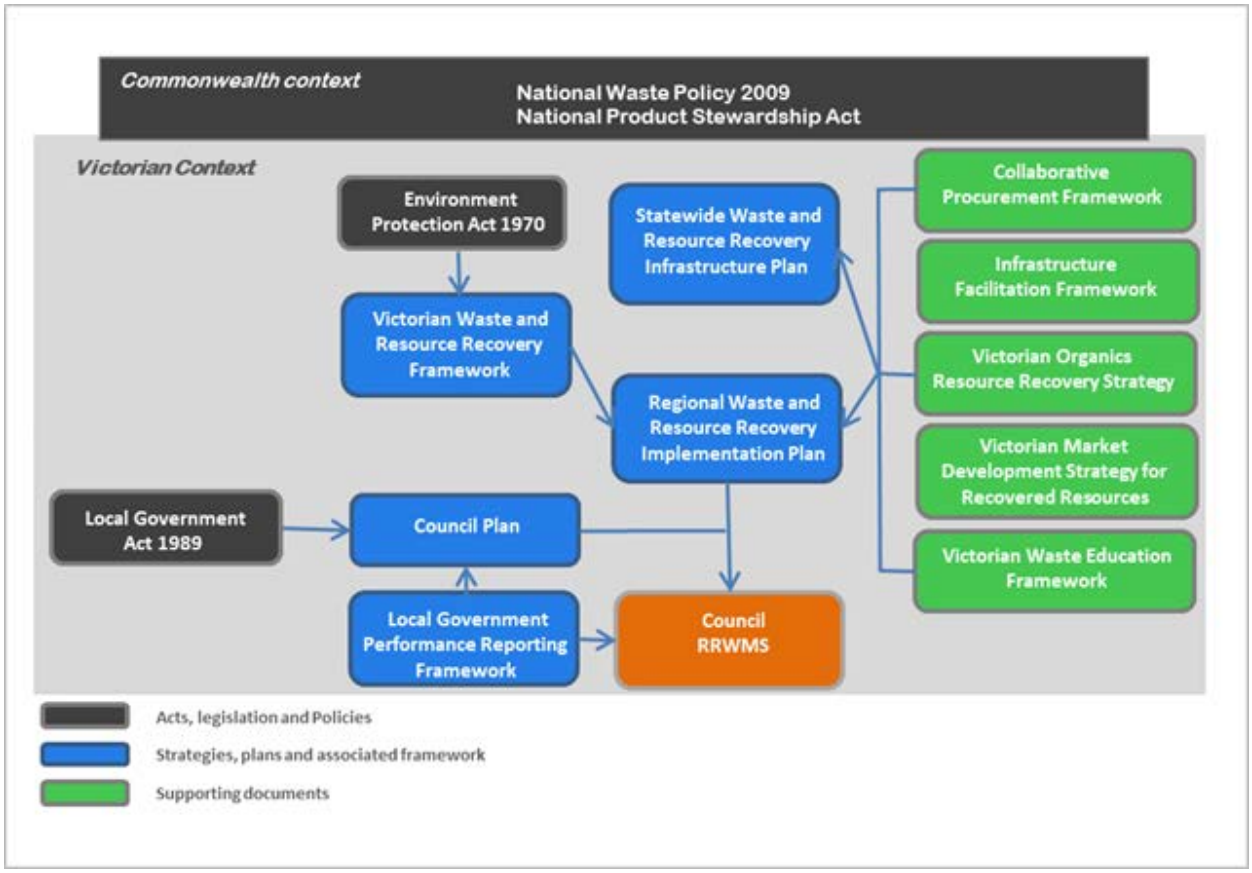
Figure 2.2 outlines how the system interacts.

Figure 2-2 **Flow of resources in Victoria's waste and resource recovery system when circular economy principles are applied.**

Source: Sustainability Victoria (2016a)

An overview of the strategic framework for the Strategy is shown in Figure 2.3.

Figure 2-3 Waste management planning framework



2.3 Regional Waste and Resource Recovery Plan

The *Grampians Central West Waste and Resource Recovery Implementation Plan* (Grampians Central West Implementation Plan) was developed by GCWWRRG in 2016. The plan identifies the infrastructure capacity needs and priorities of the region and is informed by the strategic directions and visions of the *Statewide Waste and Resource Recovery Infrastructure Plan*. Regional strategic objectives outlined in the GCWWRR Implementation Plan are to:

- Increase resource recovery and market development;
- Improve infrastructure and operations;
- Advance data collection and planning;
- Foster relationships to optimise diversion from landfill.

To deliver on these objectives, GCWWRRG has developed nine priority actions. Each priority action has sub-activities and initiatives involving various stakeholders such as GCWWRRG, councils, DELWP, EPA, industry, etc. These actions are summarised in Table 2-1.

Table 2-1 Actions and initiatives from the Grampians Central West Waste and Resource Recovery Implementation Plan involving the City of Ballarat.

No.	Action/initiative
1	Assess and, where viable, support the development of solutions and systems to increase the recovery of priority materials.
2	Facilitate the development of regional partnerships to produce efficiencies in resource recovery, materials transport and disposal.
3	Work with all levels of government, industry and investors to explore innovative and technological advancements that could inform future infrastructure development and investment.
4	Work with councils and industry to upgrade and rationalise infrastructure, improve operations and engage communities.
5	Facilitate work between councils and/or industry and the Environment Protection Authority (EPA) to progress any rehabilitation assessments and requirements for closed landfills.
6	Work with councils and relevant state planning authorities to site new infrastructure appropriately and protect existing facilities and hubs from encroachment.
7	Contribute to the development and application of a reliable state and regional data system to inform waste and resource recovery decisions.
8	Share information across government on regional infrastructure and market development needs and priorities.
9	Continue to work with relevant agencies, councils, industry, schools and the community on waste and resource recovery education and engagement.

2.4 Other Council Plans

In 2013, the *City of Ballarat Waste Management Strategy* was released. Since then two significant documents have been written, the *City of Ballarat Council Plan 2017 – 2001,* and the *Today, Tomorrow, Together: The Ballarat Strategy the vision for 2040 – A greener more vibrant and connected Ballarat***.** Both documents outline specific goals, outcomes and actions related to waste management and identify waste management as a key priority for Council (see the below summaries for details). They highlight the intention for the *City of Ballarat* to lead the way in developing best practice approaches to waste management and resource recovery that can be shared with other councils and communities.

Today, Tomorrow, Together: The Ballarat Strategy. Our vision for 2040 – A greener more vibrant and connected Ballarat (2015).

***Purpose of the strategy*:** The Ballarat Strategy outlines the *City of Ballarat's* vision and long-term plan to manage change in Ballarat moving towards 2040. Strategic directions for waste management sit under the Ballarat Strategy and will contribute to council decisions, future projects and budgets in relation to waste management and resource recovery.

Theme: Sustainable Ballarat.

Key focus: Waste and Contamination.

Goal: Reduce waste taken to landfill and associated community impacts.

Initiative 5.24 – Work with the community to reduce waste sent to landfill by 65%.

Initiative 5.25 – Take practical steps to reduce greenwaste heading to landfill.

Key action: Continue to educate the Ballarat community on the significant environmental and economic costs of waste taken to landfill, to support a trend reduction in per–capita waste generation and 65% reduction in waste volume by 2040.

Supporting actions: Support initiatives to reduce the amount of greenwaste sent to landfill, to be identified in the Waste Management Strategy 2013.

Today Tomorrow Together

The Ballarat Strategy Our Vision for 2040

Australia is one of the highest producers of waste per head of population in the world. The average Ballarat household produces 700 kilograms of waste per year, of which on average 32% is recycled. What is not recycled usually goes to landfill. Unless there is a change in trend growth, as the city grows, the amount of waste produced and sent to landfill is expected to increase at a faster rate than the rate of population growth. Larger populations tend to consume more and place increasing pressure on waste disposal arrangements.

The cost of waste management is significant in Ballarat, and a large proportion of rates are spent every year on the collection and disposal of household, commercial and industrial waste. The more productive use of waste therefore has significant cost benefits for the city, enabling more funds to be spent on other services, as well as being important for wider sustainability of the city.

The contribution of waste to greenhouse gas emissions is a particularly important issue. In 2013-14, almost 75% of all greenhouse gas emissions from *City of Ballarat* operations were from landfill. A step change reduction in these emissions would have significant overall benefits to Ballarat and its support for reduced greenhouse gas emissions.

As Ballarat looks to a more productive use of managing its waste towards 2040 and beyond, it is imperative the city provides leadership to generate less waste, increase the amount of materials for recycling and reprocessing, and reduce damage to our environment caused by waste.

Source: The Ballarat Strategy 2040

City of Ballarat **Council Plan 2017 – 2021**

Purpose of the plan: This plan drives everything the *City of Ballarat* will do over the four-year period. It sets the vision, priorities and outcomes, guides the Council's annual budget and determines the projects, services, events and other initiatives that will be funded and delivered in each financial year.

Goal: Protect, maintain and enhance our built and natural assets.

Outcome: Sustainable waste management, transport and connectivity.

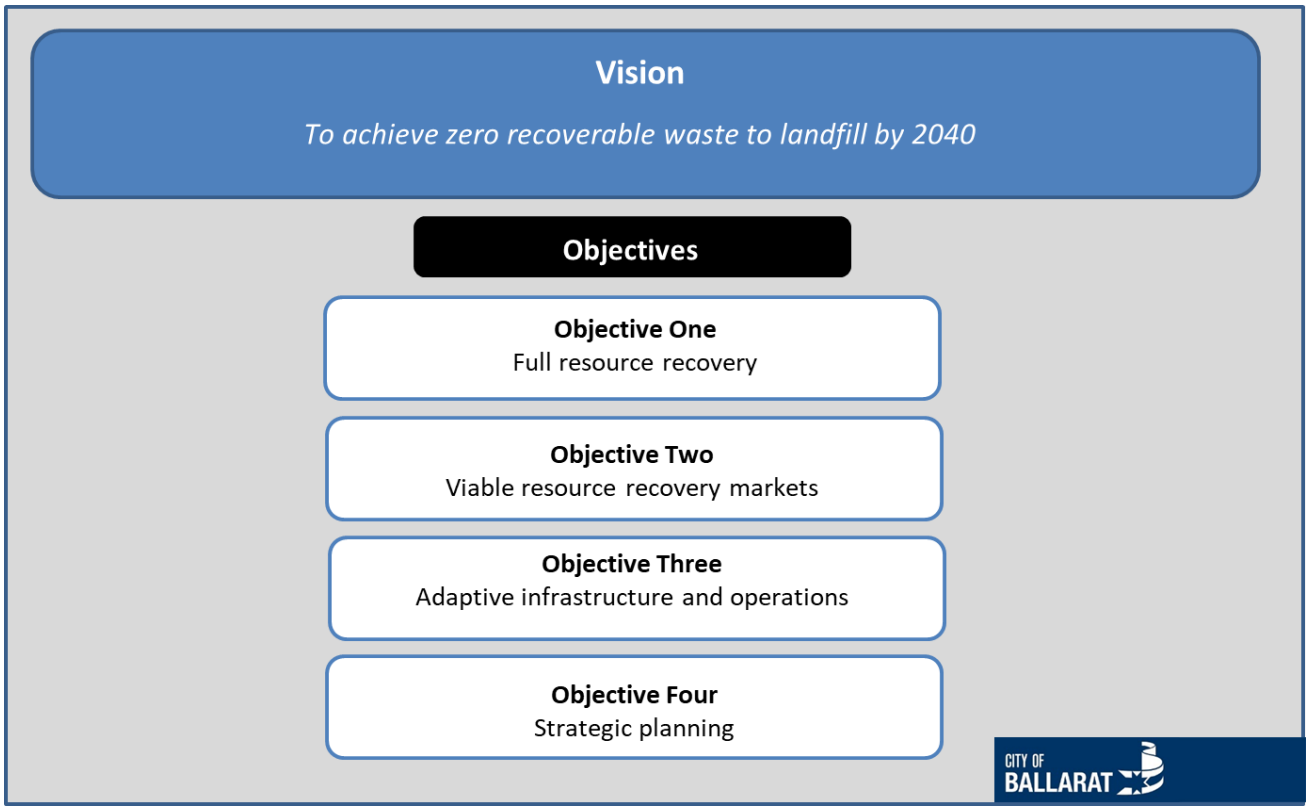
Four-year priorities: Deliver headline actions from the Ballarat Strategy including:

- Integrated waste management.
- Waste to energy project.

2.5 *City of Ballarat* Strategic Direction

The *City of Ballarat* has set a clear, long-term Vision for resource recovery and waste management (see Figure 2.4). In order to achieve this Vision four Strategic Objectives have been established to provide direction for waste and resource recovery in the *City of Ballarat* for the next five years.

Figure 2-4 **City of Ballarat Resource Recovery and Waste Management Strategy Vision and Objectives**



Strategy Vision

To achieve zero recoverable waste to land fill by 2040

The zero-waste philosophy is a whole systems approach that proposes a massive change in the way materials flow through society, resulting in no waste. It is about moving from linear to cyclical resource flows. The approach encompasses more than eliminating waste through recycling and reuse, it focuses on restructuring production and distribution systems in order to reduce waste. Figure 2.5 outlines both linear and cyclical resource flows in the waste sector.

The Strategy's Vision of zero recoverable waste is being applied through a filter of the *City of Ballarat's* area of influence and control. It focuses on waste management and planning approaches that emphasize waste prevention and encourage redesigned resource life cycles where all recoverable materials are reused and minimal waste is sent to landfill.

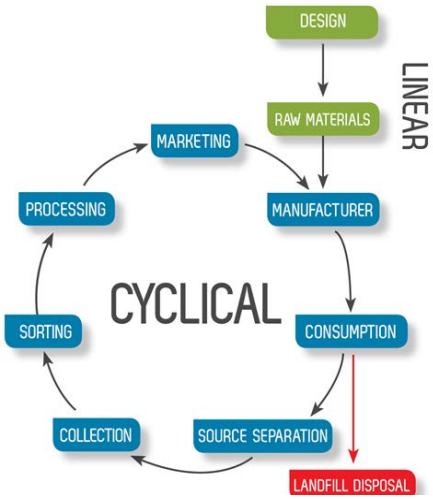


Figure 2-5 **Linear and cyclical resource flows**

City of Ballarat Objectives

Objective One: Full resource recovery

Resource recovery is the separation or selective extraction of disposed materials for a specific next use, such as recycling, composting or energy generation in order to extract the maximum benefits from products, delay the consumption of virgin resources, and reduce the amount of waste generated.

The Strategy aims to achieve full resource recovery, where all material that has a viable market has been recovered.

Objective Two: Viable resource recovery markets

Resource recovery relies on establishing or sourcing suitable market demand for products. Sourcing suitable market for recovered resources requires a strong understanding of local, national and global resource recovery markets. Market development for recovered resources is about creating and expanding appropriate and sustainable markets for the use of recovered materials and products.

The Strategy aims to ensure 90% of all recoverable resources enter viable market streams.

Objective Three: Adaptive infrastructure and operations

Infrastructure and operational delivery need to adjust in order to proactively manage new and emerging waste streams and adapt to suit the changes in demand and supply of the waste sector.

The Strategy aims to ensure infrastructure enables full resource recovery targets to be met, and waste management operations are adaptive and exceed industry standards and benchmarks.

Objective Four: Strategic Planning

Strategic planning is an organisational management activity that is used to set priorities, focus energy and resources, strengthen operations, ensure that employees and other stakeholders are working toward common goals, establish agreement around intended outcomes/results, and assess and adjust the organisation's direction in response to a changing environment. Effective strategic planning articulates not only an organization’s direction and the actions needed to make progress, but also how it will know if it is successful.

There are various frameworks and methodologies addressing strategic planning and management. The Strategy will utilise an adaptive management approach.

Adaptive management

Adaptive management is a cyclical process that formalises information flows between strategy and planning, implementation and monitoring, evaluation and reporting and learning and adaptation. This cycle is presented in Figure 2.6.

Adaptive management, as a strategy emphasises the need to learn from doing, and adapt accordingly. It provides the framework for strategic planning and sets up best practice monitoring, evaluation and reporting. It demonstrates progress and maximises opportunities for learning, during and following the implementation phase of Council strategies, programs and projects. Consistency of underlying data and information is critical to the implementation of an adaptive management approach.

Knowledge gained from monitoring and implementation provide primary information as an input into the adaptive management processes.

The flexibility and constant learning of an adaptive management approach results in an integrated system adjusting and learning from a multi-faceted network of environmental, economic and social influences.

Figure 2-6 Adaptive management cycle

Evidence-based decision making

The SWRRIP identifies evidence-based decision making as one of its strategic directions (Strategic Direction 5). It highlights that decisions to determine waste and resource recovery options will be based on evidence in order to:

- maximise economic outcomes
- provide cost-effective service delivery
- reduce community amenity, environmental and public health impacts.

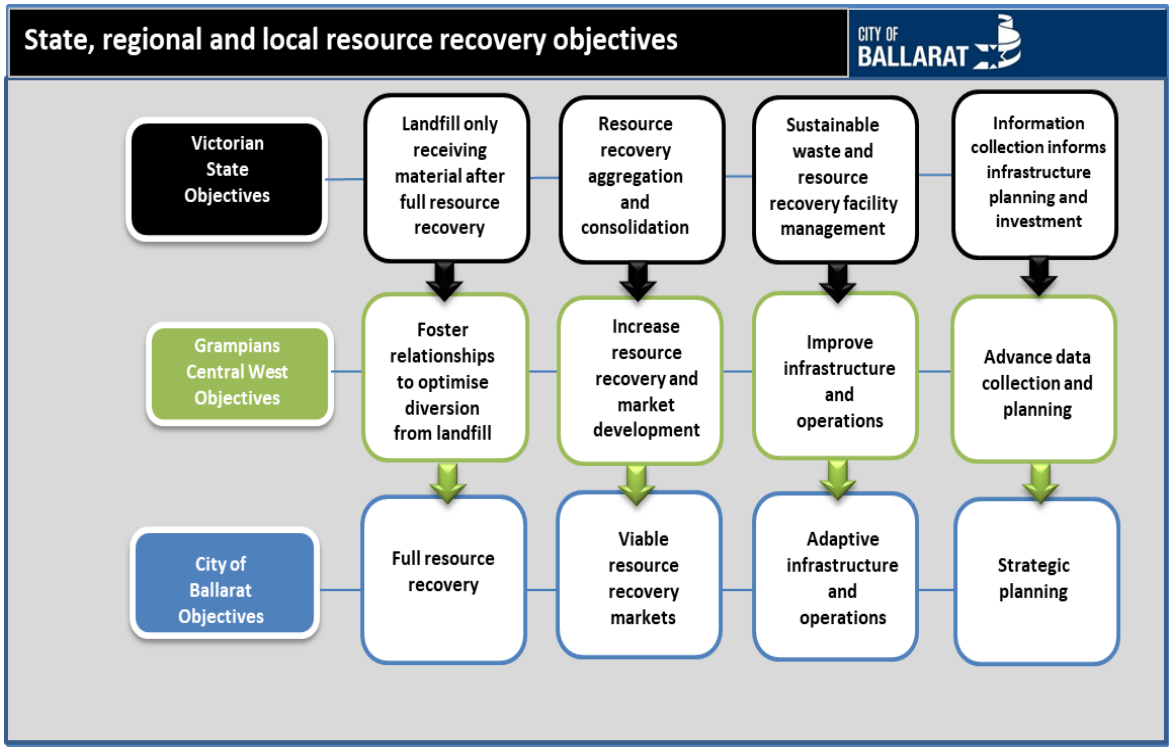
Evidence-based decision making is a process for making decisions about a program, practice, or policy that is grounded in the best available research, evidence and informed by experiential evidence from the field, and relevant contextual evidence. Applying evidence-based decision making during the Evaluation and Reporting, and the Learning and Adaptation stages will provide a robust strategy.

The Strategy aims to ensure adaptive management principles are embedded in waste management planning and implementation.

Strategic alignment of the Strategy's Objectives

These Objectives align with both statewide and regional strategic directions and aim to shape future directions in the *City of Ballarat* by addressing the current resource recovery and waste management challenges, needs and opportunities. Figure 2.7 outlines how the Strategy Objectives align to regional and State objectives.

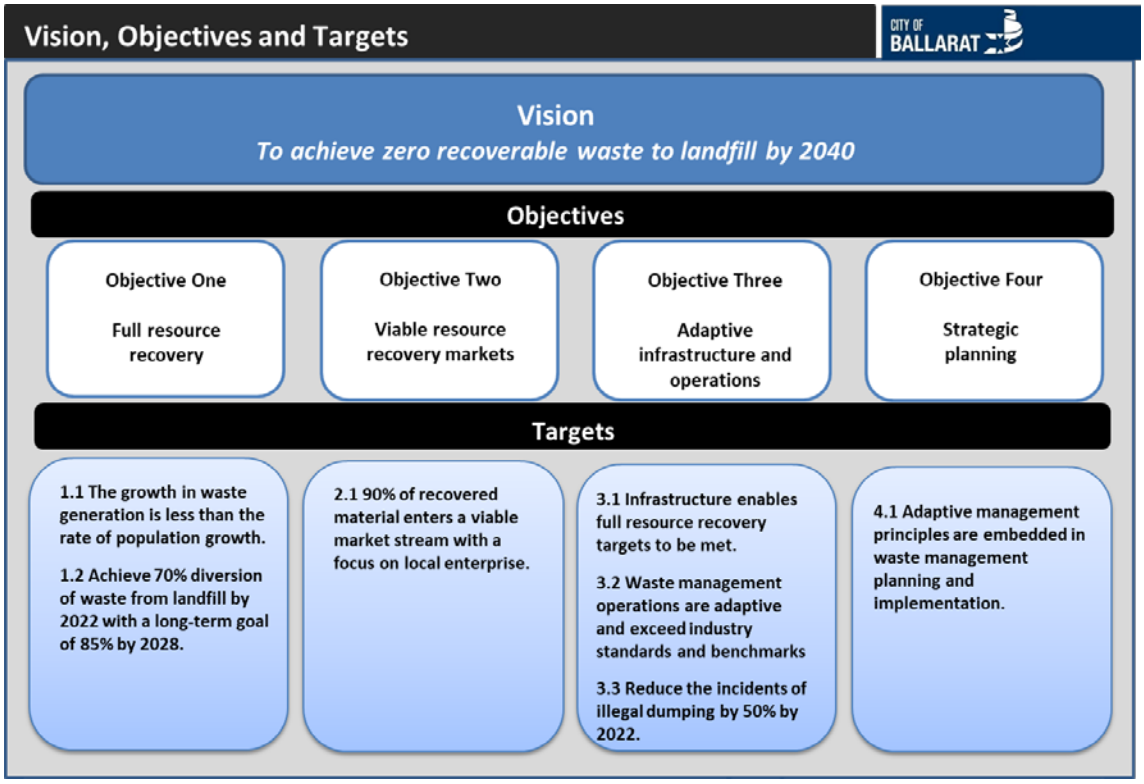
Figure 2-7 **Links to State and Regional Resource Recovery Waste Management Strategy Objectives.**



Targets

In order to meet the Strategy Vision the following Targets were developed for each of the Strategy Objectives.

Figure 2-8 **Targets to meet Strategy Objectives.**



2.6 Past performance

The *City of Ballarat* Waste Management Strategy 2013

The *City of Ballarat* adopted a Waste Management Strategy in 2008 following the development of a Waste Management Policy in 2007. The Strategy was reviewed in 2013. Since its review there have been a number of legislative changes, as well as federal and state government policy reviews.

Key achievements from the last four years include:

- An increase in diversion of waste from 34% in 2013 to 49% in 2017.
- Creation of a Waste Education Officer position.
- The introduction of a new greenwaste service in July 2016, with 9380 tonnes of greenwaste being diverted from landfill.
- The recommendation from benchmarking for the waste collection service is that the service remain in-house.
- The extension of waste audits from kerbside recycling services, to all waste streams, providing a clearer picture of the waste types generated and potential management responses.

Table 2.2 below provides a deeper understanding of the implementation of the 2013 WMS, including what worked well, what didn't work well and the reasons why.

Table 2-2 Strategic direction, goals, targets and review of the 2013 Waste Management Strategy

Strategic direction	2014 Goals and targets	2017 review at a glance
1. Achieving 65% diversion of municipal waste from landfill and reduction of Greenhouse Gas emissions	Target 1.1: Reduction of recyclables items entering landfill (from 18% to 8%).	Target not yet completed. Still working towards the 8%. It is currently sitting at 16%. Review of bin size has been delayed, however it is still an option that needs to be investigated. Implementing a contamination notification system for the green-waste collection. Investment has not been placed into a mechanised waste sorting facility to remove the following from municipal waste; paper, plastics, glass and metals from waste stream. In the staged plan for the All Waste Interchange there is an opportunity and space to place a MRF. A MRF in Ballarat potentially serves both the recovery of material from MSW and the sorting of recyclables which is currently done in Geelong. There is still a proportion of recyclables being placed in the kerbside garbage bin and therefore not being diverted from landfill. Investigation into why products are being disposed of in this manner (e.g. contaminated, recycle bin full, method of transporting, lack of knowledge, lack of care factor) needs to be investigated to determine what interventions to target. Increasing the diversion of recycling from the garbage stream would require significant behavioural intervention

Strategic direction	2014 Goals and targets	2017 review at a glance
		or a mechanical separation of the garbage to extract the useable products. (Limited plants carry this out in Australia). Recyclables are taken to SKM in Geelong (formerly Coolaroo), SKM is one of the three major providers of recycling processors in Victoria.
	Target 1.2: Reduction in garden organics waste entering landfill.	Target completed Greenwaste initiative introduced in July 2016. 9380 tonnes have been recovered and processed through this service.
	Target 1.3: Reduction in other organics wastes entering landfill.	Target not yet completed. Option is to conduct a feasibility study into food waste collection services and process options including (but not limited to) facility location, volume opportunities, management, proven methods to change behaviour etc. Currently there are no local facilities for composting food waste. However, the introduction of the greenwaste service has been a significant step towards this process as managing contamination in food organics is a significant challenge. Further assessment will be done in line with best use of products.
	Target 1.4: Reduction in prohibited wastes entering municipal waste stream.	*City of Ballarat* provides services that increase the opportunities for residents to dispose of prohibited materials. Services available include restricted asbestos receival at Ballarat Regional Landfill. The Gillies Street Transfer station provides the following services: detox your home, oil recycling, and battery collection. An annual Detox your home day is run that accepts a much wider range of materials than the permanent site. These services are funded by Sustainability Victoria. Kerbside trucks have cameras installed to provide a view of the waste, recycling and greenwaste as it is emptied into the trucks hopper. Further work needs to be undertaken to ensure residents understand what their responsibilities are, disposal options and the impact their disposal behaviours can have on those who have to pick up the bins, bury it, process it, and sort it. Further work is required to understand what materials residents need to dispose of, when to provide better opportunities to connect residents with information, and

Strategic direction	2014 Goals and targets	2017 review at a glance
		positively encourage them to dispose of materials properly. There is uncertainty as to whether residents know and understand the purpose and how to use the Transfer station in a correct manner and to its full potential. This is an opportunity to fully explore with *City of Ballarat* residents. Need to do further work on asbestos, building waste, chemical wastes with the community, also to work with real estate agents, home renovators and end of lease cleaning of rentals, and house moving to target key products and key times when this behaviour is likely to be. Previous kerbside recycling audits extended to include all waste streams and better classification of product types, including prohibited and potentially harmful wastes (e.g. batteries, e-Waste etc.)
	Target 1.5: Reduction in Greenhouse Gas (GHG) emissions.	Kerbside collected waste and waste from the transfer station are transported to the Ballarat Regional Landfill at Smythesdale, operated by the City of Ballarat. Gas is captured as the waste breaks down at the landfill and is managed through a generator that converts the methane to electricity. A flare will burn off any extra methane or the low-quality gases the generator can't utilise or handle. A gas extraction efficiency plan has been completed, which at time of writing, has commenced implementation of new infrastructure to maximise extraction of gases. This includes the opportunity of a second generator once the methane levels are of sufficient quantity to increase the volume of methane converted to electricity. Household greenwaste has been collected at the kerbside since 4th July 2016 and is separated, collected and turned into compost at a new facility in Ballan. This material includes greenwaste diverted from landfill and the greenwaste previously taken to the transfer station. Recyclables have been diverted over the last ten years to be sorted in Melbourne (currently Geelong) and on sold for reprocessing into both local and international markets. As the recyclables are being transported locally and overseas, this contributes to GHG emissions and this needs to be considered when assessing changes to the waste management system and infrastructure.

Strategic direction	2014 Goals and targets	2017 review at a glance
		Currently investigating the option to establish a Waste to Energy plant to convert significant tonnage of waste into energy/electricity.
2. Providing Best value services	Ensuring services are accessible.	Waste collection is a weekly service and is responsive to customer needs and expectations. The recycling and greenwaste service is conducted in alternate weeks. Vouchers are still available free of charge for residents to access the Transfer station to encourage them to utilise the facilities. Established benchmarking for collection. Street cleaning – in the process of collecting the base data. Footpath sweeper and road path sweeper operate every day. During this process a focus on improving the quality and efficiency has been implemented to set up more extensive schedule runs to increase the kms travelled and reduction in incoming requests. Further work that is required: • understand the needs versus expectations of the residents • identifying and understanding the gaps between the services as they are delivered. • understanding what the residents know about the services and how to access them. • Clearly communicating services availability and provision to residents • Ensuring that customer service has sufficient information to inform customers and identify their requests to allow them to be more efficiently serviced.
	Providing good value for money.	This requires improving the understanding of the costs and opportunities of all our services. A significant body of work has been carried out to improve how the data is collected, collated and verified. While this is still in progress the data validity has significantly improved. During 2016 a benchmarking exercise was carried out on the • in-house kerbside service, • the driver commitment, • service flexibility allowed by maintaining it in-house rather than contracting it out and • the introduction of the greenwaste service

Strategic direction	2014 Goals and targets	2017 review at a glance
		all the above resulted in a recommendation for the service to be kept in house. A service improvement plan has been developed and is being worked through by the drivers and management for a formal review in three years. Work is continuing on improving data collection and reporting on the services. This continual improvement process ensures increased performance on the base levels identified. Benchmarking across Councils will continue to be improved as greater transparency on the cost factors are identified. Benchmarking of Landfill Operations is currently being undertaken to establish how best to manage the daily operations of the landfill, which are currently operated under contract. Benchmarking of the transfer station and street cleaning will be undertaken over the next twelve months to improve the adaptability of the services and plan them for future growth and needs of the community. The transfer station tender has been updated and released for twelve months with option of one-year extensions to update the ten-year-old contract in line with the requirements of the current service.
3. Meeting population growth and rising costs of transport	Review the Smythesdale landfill Stage 2.	A Landfill Master Plan is currently being developed and is due for completion in November 2017. This is to understand current and potential costs and opportunities for the site. It will provide information on the total airspace and life of the landfill under a range of fill rates. It also provides detailed information on the cost per cell for construction, operation and rehabilitation. The timing of these constructions is also described.
	Undertake a review of the Improvement Plan prepared for Transfer Station in 2007 to accommodate greenwaste holding and processing capacity, vehicle access and accommodation for undercover storage of materials and goods for re-sale.	Target complete. Grinding restrictions on site had resulted in stockpiles particularly following free greenwaste week. This material is now being managed through the updated contract processing options. Including the provision of greenwaste mulch for use on the Landfill interim cap. New greenwaste kerbside service implemented and is managed via a separate interchange site. There is a reduced amount of greenwaste that is being managed at the Transfer station. Vehicle access and accommodation for undercover storage of materials and goods for resale has been completed. The development and management of the transfer station needs to be centred on a system that is reviewed from

Strategic direction	2014 Goals and targets	2017 review at a glance
		data and identifiable needs of the customers. Further work is required on understanding how to maximise use of the facility and ensure its flexibility and adaptability are built in to future designs and operations. Increasing challenges include e-waste and increase in quantity of relatively new streams such as solar panels.
	Undertake projections for travelling time and fuel costs over time to determine whether a material recovery facility will become viable within the region. Determine a suitable precinct for the retention and expansion of waste and recycling handing facilities.	Has been completed for kerbside collection Transport efficiency modelling near complete through business case development for All Waste Interchange. Still need to complete feasibility study for a MRF. Need to improve overall data collection to allow clarity of growth impacts and the opportunities for increased efficiencies.
	Where feasible the use of waste for production of heat and energy should be maximised to create decentralised renewable energy in order to reduce transport and energy costs.	There are a number of scoping projects that identify the possibility of a Waste to Energy plant in the BWEZ. A significant body of work has been carried out in relation to understanding the waste streams, the opportunities for energy and steam offtake and the requirements of Powercore in establishing a waste to energy hub. This includes assessments of commercialisations and investigations into local opportunities. This work is continuing under the Waste to Energy Ready and development of the All Waste Interchange business cases.
4. Maintain and create jobs and training opportunities	Ensure recycling kerbside collections continue to provide local employment outcomes.	Currently the recyclables from kerbside go to a facility in Geelong (previously Melbourne). Through the broader Waste to Energy Ready project, upgrade of the Transfer Station and benchmarking of the various waste services, the opportunities for developing local employment outcomes needs to be highlighted and acted upon.
	Establish a regional organic waste processing facility.	Greenwaste collection service started and is transported to a facility at Mt. Wallace (Ballan). Potential to expand the greenwaste service to include food organics. The scoping project needs to take into consideration of the contamination rate, access to a facility and the potential utilisation by a Waste to Energy Facility.
	Establish a resource recovery centre.	Investigating the feasibility of an All Waste Interchange at the BWEZ. This space has changed considerably since 2013. Originally it was defined by Packaging Recyclable and Materials Recovery Facility (MRF). However, there is a new

Strategic direction	2014 Goals and targets	2017 review at a glance
		space being created in light of new and innovative technology developments.
	In partnership with local social enterprises investigate the feasibility of establishing various resource recovery enterprises.	The *City of Ballarat* investigated with BRI the feasibility of a mattress recycling facility in Ballarat. It did not prove to be a viable option due to the financial cost per mattress. Exploring the uses of plastics and how *City of Ballarat* can divert more plastic from the transfer station – in collaboration with BRI. Other potential options can include the support in 'start-up' business such as Resale shops, 'Fix-it' cafes, Man-sheds. Further to this local research needs to be encouraged and supported (e.g. Paper freight)
5. Ensuring statutory compliance	EPA landfill licence compliance.	Employed a Supervisor and Environmental Compliance Officer. Working through compliance issues that enable *City of Ballarat* to comply with the EPA landfill licence. Staff have completed a series of PANS relating to Gas Management, installation of monitoring bores and are currently in the process of completing an updated monitoring program by December 2017.
	Risk assessments in place for all waste services.	Target not yet complete and is still being worked on. This is an ongoing process. Currently developing a risk register that encompasses operations, growth and compliance.
6. Reducing illegal dumping and litter	Undertake data collection to identify the annual costs to council of removal of illegal dumping.	Some progress has been made to collect data. Hot spots listed on regular clean up regimes. This sector of waste management is in need of a change in the conversation around illegal dumping of waste. It needs to change from fees and charges to an increased level of understanding and care. There is a high need for better collection of data and a system in place to store and effectively analyse this information.
	In conjunction with WRRMG conduct public awareness activities and community participation programs.	Ongoing. Note that during this time there has been an amalgamation of a number of regional waste groups. Ballarat now operates under the Grampians Central West Waste and Resource Recovery Group. An Education officer was appointed and worked in collaboration with the Group over the past twelve months on some community programs including illegal dumping, recycling and greenwaste kerbside contamination investigation.
	Increase enforcement of penalties for littering and illegal dumping.	Street cleaning staff work with local laws to report findings. Better reporting, targeting of areas and communication report.

Strategic direction	2014 Goals and targets	2017 review at a glance
	Support the development of a Regional Litter Management strategy coordinated by WRRMG.	Ongoing. Some targeted work has been done in illegal dumping for instance a number of community groups assist the *City of Ballarat* in cleaning up of forested areas and parklands.

Zero Waste to landfill

City of Ballarat's performance against comparable councils

The following section explores the *City of Ballarat*'s performance level against comparable councils as using 2017 data from 'Know Your Council' website. This website improves transparency and accountability of council performance through the provision of transparent information. Councils that have been selected for comparison against the *City of Ballarat* (Ballarat) include the City of Greater Geelong (Geelong), City of Greater Bendigo (Bendigo) and Horsham Rural City (Horsham).

Figure 2-9 Number of bin collection requests – comparison with neighbouring councils 2015/16

Figure 2.9 shows the number of kerbside bin collection requests received by council per 1000 kerbside bin collection households in the 2015-16 year. When compared against similar councils Ballarat and Geelong have similar bin collection requests at 164 per 1000 and 161 per 1000 respectively.

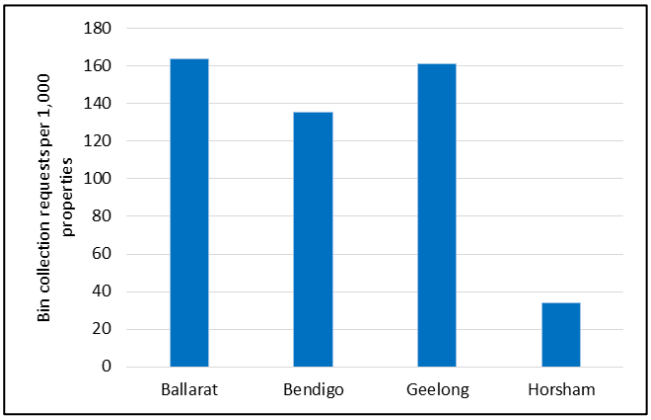


Figure 2-10 Number of bins missed 2015/16– comparison with neighbouring councils

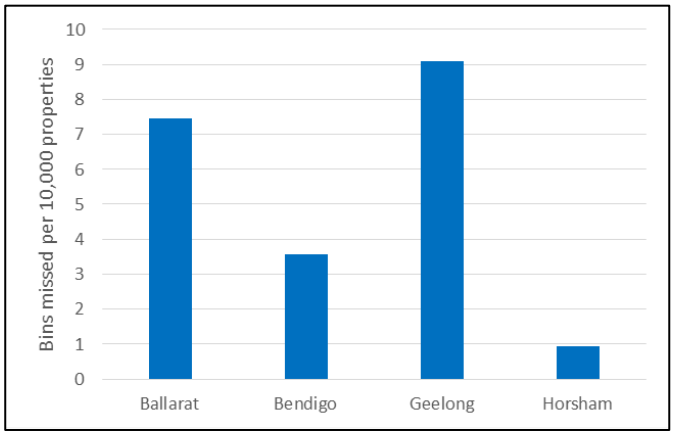


Figure 2.10 shows the number of kerbside collection bins missed per 10,000 scheduled collection bin lifts in the 2015-16 year. Ballarat averaged just over 7 bins missed per 10,000 properties. Scheduled collections are calculated based on the number of waste charges and the number of collections due. Data is calculated on 52 garbage collections and 26 recycle collections (fortnightly collection) per year.

Figure 2-11 Cost of garbage collection per bin 2015/16 – comparison with neighbouring councils

Figure 2.11 shows the direct cost to council of the kerbside garbage bin collection service per kerbside garbage collection bin. The cost per kerbside garbage collection bin in Ballarat for 2015-16 was $104. This is comparable to Geelong and Horsham that fell within a $9 of each other at $100 and $109 respectively. These calculations use the actual costs plus the nominal gate fee per tonne (exc GST) multiplied by the amount of normal garbage collected. The *City of Ballarat* do not track disposal costs because it goes directly to the landfill that is owned by the *City of Ballarat*.

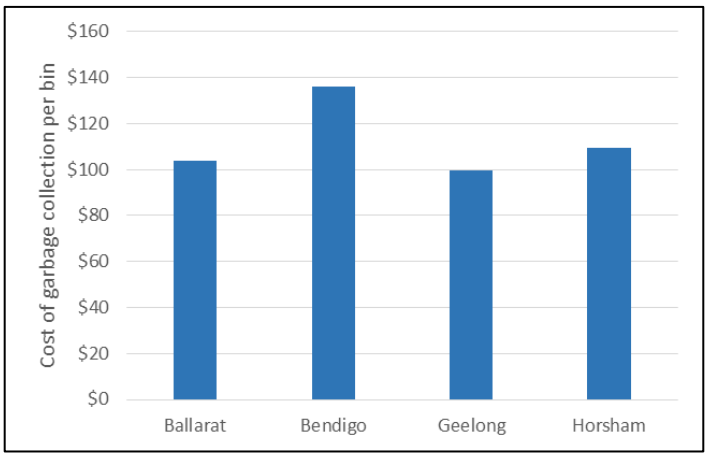


Figure 2-12 Cost of recycling collection per bin 2015/16 – comparison with neighbouring councils

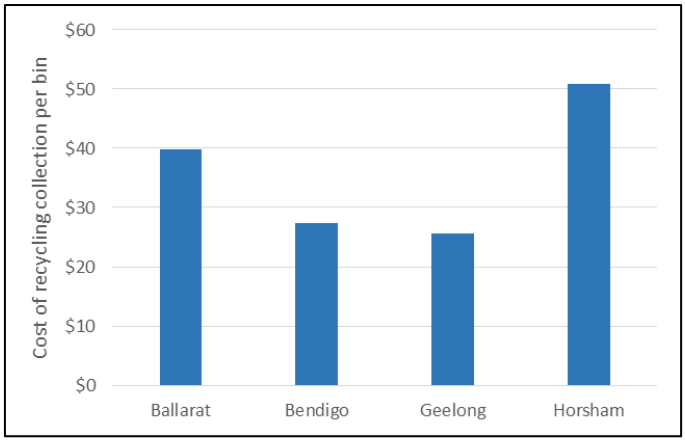
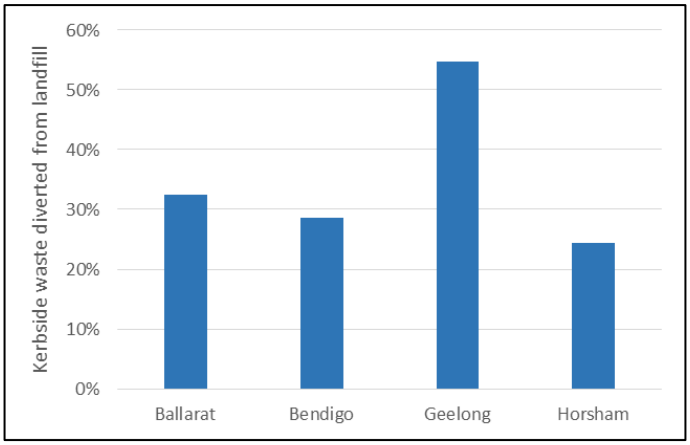


Figure 2.12 shows the direct cost to council of the kerbside recyclables collection service per kerbside recyclable collection bin. The cost per kerbside recyclable collection bin in Ballarat for 2015-16 was $39.50. Although this is higher than the Bendigo and Geelong according to the 'Know your council' the average cost to council across all councils is $38.

Figure 2-13 Diversion of waste from landfill 2015/16 – comparison with neighbouring councils

Figure 2.13 shows the percentage of garbage, recyclables and green organics collected from kerbside bins that is diverted from landfill in 2015/16.

The *City of Ballarat* introduced a green bin waste collection service in Ballarat's city centre in July 2016. The results of this initiative are not reflected in the graph below. The diversion rate at 30 June 2017 was almost 50% in Ballarat.



Community satisfaction survey

A Community Perceptions Survey was conducted in 2016 for the *City of Ballarat*. The intention was to ascertain insight into the community's perception of life in Ballarat and the performance of council in delivering services to the community. A total of 805 people were telephoned and interview with the following results:

- When asked about the usage of and satisfaction with waste collection, the respondents:
  - stated that over 90% use the waste collection service;
  - rated their perception of council's delivery of waste service as high (75+ out of 100); and
  - perceived the waste and recycling collection service to be performing well.
- When asked to rate whether the council has performed well in making decisions in the interest of the community, only 8% of the respondents stated that council had not performed well for the category of greenwaste/recycling bins. These respondents were not asked about what aspect of the service they were not satisfied with.

This revealed no actions, but to continue the surveys annually.

Other waste related studies and reports that are relevant to *City to Ballarat*

Since the development of the *2013 Waste Management Strategy*, a number of waste related studies and reports have been written that are relevant to the waste management and resource recovery for the *City of Ballarat*. Table 2.3 provides a list and key findings of these significant documents, including some that are currently being developed.

Table 2-3 **Key finding of resource recovery and waste management related studies and reports**

Document	Key findings
City of Ballarat* – Waste Audit Program February 2017.** ***Tandem Solutions Pty Ltd	• Garbage bin contained 24% recyclables, 4 % greenwaste and 72% Other. The other includes food organics which was not measured, this is an improvement for the next audit. • Recyclables contained 83% recyclable material the remaining 17% is a significant proportion of contamination. • Greenwaste contained 1% contamination • Landfill: Approximately 53% by weight was assessed visually as being able to be diverted (recyclables, greenwaste, building construction material). This includes waste outside of the City of Ballarat's control. • Recycling receival facility: Contamination of the recycling stream was approximately 8% this is significantly lower that the detailed audits of 17%. • Greenwaste facility: The greenwaste receival audit indicated a contamination rate of 1.2% by volume. This compares to the contamination rate of 1.1% by volume that was in the kerbside bin audit. Please note that whilst this report was being written a detailed by weight audit was being conducted. The result from this audit, which will be published soon, will provide specific detail by weight & percentage of what is actually present in the kerbside garbage, recycling and greenwaste bins.
Ballarat City Council – Public Place Recycling Bin Audit 2015 ***Wastemin***	The main results were as follows: By weight: • The average weight of the recycling stream is 3.80 kg per bin. • Contamination in the recycling stream is 6.8% by weight. This is an excellent result and similar to the 2013 audit. However, this does not line up with anecdotal reports from the drivers. Consideration needs to be given to the different sites and what might be influencing these suspected differences. • The majority of the recyclables in the recycling stream by weight are glass bottles and jars (60% by weight), non-glass recyclables (18% by weight) and paper/cardboard (16% by weight). • The main items in the contamination were as follows: Food, soft plastics, soiled paper, liquids, composite and polystyrene.
***City of Ballarat* – investment in an All Waste Interchange & Waste to Energy**	Stage 1 - Acquisition, servicing and subdivision of the land and construction of the All Waste Interchange – initial investment of $21.6m of which it is recommended that council contribute $6.6m of its own funding and seeking support of $15m from the State. Stage 2, 3 & 4 - Capital commitment of $10.2m to complete these stages. Stage 2 is small vehicle drop-off and resales centre. Stage 3 is the commercial and industrial

Document	Key findings
Enabling Project: Business Case ***birru***	waste sorting facility. Stage 4 is the Waste to Energy container storage and handling area. When the All Waste Interchange is fully built and a Waste to Energy Plant is operating, the total direct and indirect economic impact of the project to the region is estimated to have a net present value of $2.4 billion over 20 years. When fully developed and operational the whole project will add approximately 734 full time equivalent direct and indirect jobs to the region.
State of Environment Report 2017	**Kerbside green waste service:** Introduced in July 2016, with diversion rates of municipal waste to landfill increased from 38% to 50%. **Waste to energy:** Sources of energy supply and the cost of energy have been identified in the strategic market research undertaken by *City of Ballarat* as key barriers to the growth of industry and manufacturing in Ballarat. Accordingly, an Alternative Energy Opportunities Feasibility Assessment has been undertaken to identify opportunities for alternative and renewable energy sources for Ballarat West Employment Zone (BWEZ). The *City of Ballarat* are currently working through the various options available and are excited about the potential for BWEZ, Ballarat and industry. **Landfill greenhouse gas emissions:** The gas system operated by LMS Energy at the Ballarat Regional Landfill abated approximately 70,000 equivalent tonnes of carbon emissions in 2016/17 helping to reduce the carbon footprint of the landfill facility. The LMS Renewable Energy Facility (REF), powered by landfill gas, generated approximately 6,600 megawatt hours of renewable electricity in 2016/17 helping to power over 1,100 homes within the local community. **Data management:** Modernising the Council's waste data management systems and linking them together (e.g. transfer station, landfill and financial systems) will enable a more complete analysis package that will optimise service delivery. **Littering infringements:** The *City of Ballarat* received approximately 480 reports of illegal rubbish dumping from the community last year. Illegal dumping costs Ballarat rate payers approximately $85,000 per year. Fines start at about $300, with escalation for further offences. Council has the ability to impose abatement notices to rectify instances of dumped rubbish. The highest infringement issued for an individual in 2016/17 was $1,866 for failure to comply with an earlier notice. The *City of Ballarat* has been advocating for product stewardship as an environmental management strategy for items such as tyres and mattresses. Dumping of these two items are most disappointing due to clean up difficulty. The cost of disposal is a mere fraction of the original purchase price and there is a range of choices available, including the *City of Ballarat*'s Transfer Station. The *City of Ballarat* will be focussing strongly on illegal rubbish dumping in 2017/18 via a number of strategies (see examples in case study below). There are many known hot spots, such as Frenchman's Lane (Mount Clear), Finch's Rd (Cardigan) and the Canadian Forest.

Document	Key findings
IBM smarter cities	As one of sixteen worldwide IBM Smarter Cities Challenge grant recipients in 2014, and one of only two Australian cities to be awarded the grant in 2014, the *City of Ballarat* had access to five of IBM's top experts, who spent three weeks living here, and immersed in the City to analyse and advise on its waste management strategy. Ballarat has already invested significantly in waste management and there is depth of knowledge, expertise and systems in place. Combining local expertise and knowledge with that of IBM's experts, ensures the capture of innovative and improved ways to manage local waste resources, reduce reliance on landfill, and support economic growth. The recommendations of the IBM delegation focus on the following key areas: • Use of technology to drive waste insights. • Sort waste to recover maximum value. • Optimise transport and logistics to reduce cost. • Phase in waste to energy implementation to establish value and divert waste from landfill. • Engage the community to support the change.
Smythesdale Landfill Master Plan ***GHD Pty Ltd***	**Stage 3: Progress Report** This report provides a summary of the cell and rehabilitation plans for the future landfill expansion, along with the associated CAPEX and OPEX cost estimates. It has calculated the construction of 10 cells (lasting 2 years each) to cost $31,230,000 and rehabilitation costs of $11,250,000. **Masterplan** The Masterplan (to be released at a later date) will include assessment of Scenario A (landfill operates until remaining estimated capacity) and Scenario B (landfill operations for a further 15 years).

3. Current situation

This section reviews the current status of waste management within the *City of Ballarat*, including data on waste and recyclable generation, collection services and waste and resource recovery facilities.

3.1 Materials generated

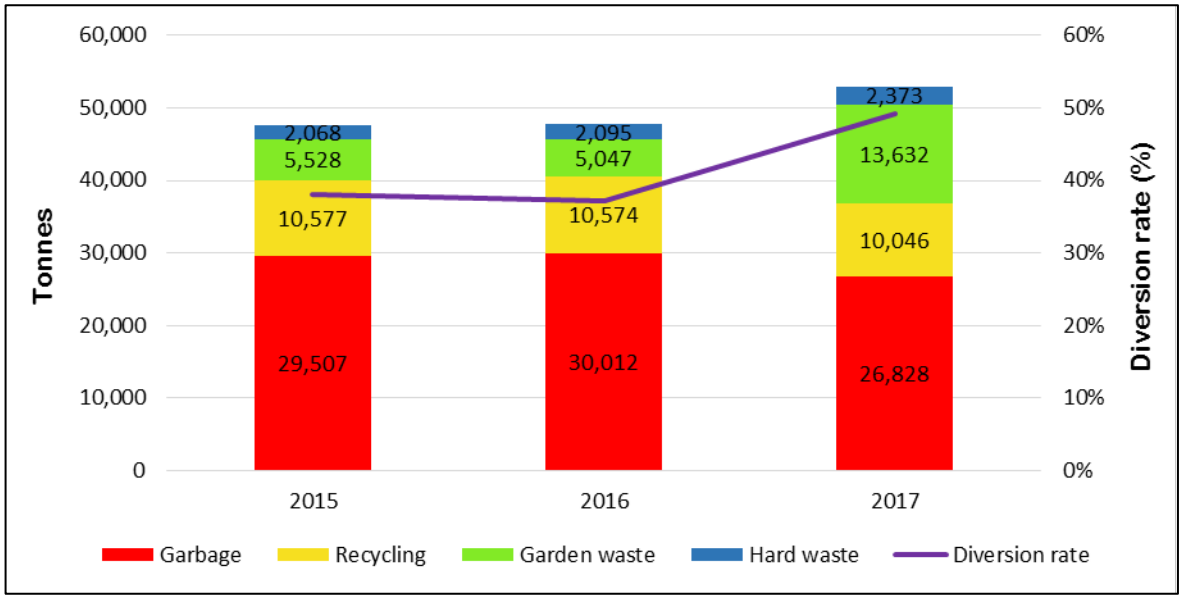
Waste generated and materials recovered

Figure 3.1 shows a breakdown of the volume in tonnes of municipal solid waste (MSW) generated in the *City of Ballarat* from 2015 to 2017. These figures are a combination of waste from the three kerbside collection services, transfer station, public place bins and landfill. The graph also indicates the rate of waste that is diverted from landfill either through recycling, garden waste or hard waste separation and recovery. In 2017 the *City of Ballarat* sent 26,828 tonnes of MSW to landfill, while 26,051 tonnes of waste were diverted through recovery processes.

The impact of the introduction of a kerbside green waste collection service in Ballarat in July 2016 can be seen between the 2016 and 2017 data. Through this service more than 9,300 tonnes of green waste were collected in the first year of operation. There was a drop in the total volume of garbage going to landfill during this time, (even though a 2% population increase occurred during this time) resulting in an increase in the diversion rate of municipal waste from 38% to almost 50%.

Whilst introducing the new service increased the total volume of materials handled by Council by just over 5,000 tonnes, it resulted in a reduction of more than 500 tonnes of green waste handled via the transfer station and over 3,000 tonnes of waste to landfill.

Figure 3-1 Waste and material generation 2015-2017



Waste audits are carried out to determine the composition of municipal kerbside bins, the results of which inform council in regards to contamination and diversion rates. Council conducted a series of visual audits of each load being deposited at the landfill, greenwaste and recyclables as well as more detailed product sorting audits. The graphs below present the data from the visual audits.

Figure 3-2 Kerbside garbage bin composition 2017

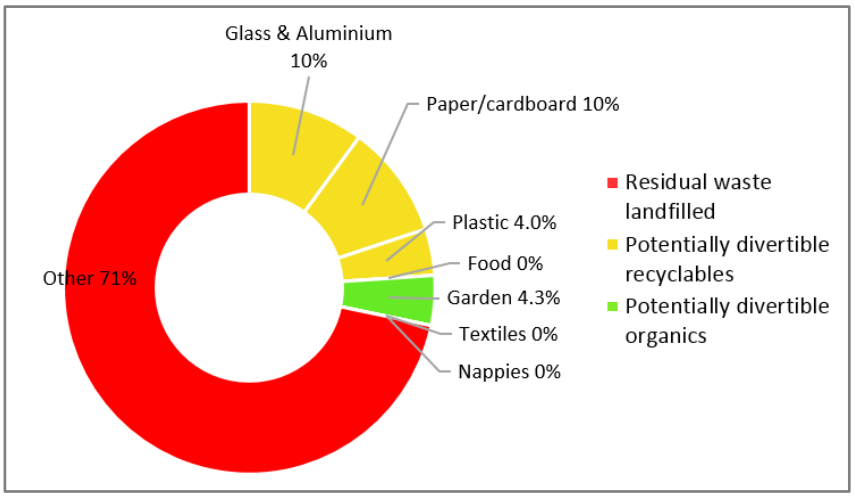


Figure 3.2 shows the average composition of waste by weight found in kerbside garbage bins. It shows just under 30% of the contents of kerbside bins currently being collected contain potentially divertible waste.

Due to limitations in the 2017 data collection process: the categories of Food, Nappies & Textiles were not identified separately and are likely recorded as Other making up part of the 71%; and the percentage of potentially divertible material is likely higher due to the poor categorisation of "Other".

Figure 3-3 Kerbside recycling bin composition 2017 (% by weight)

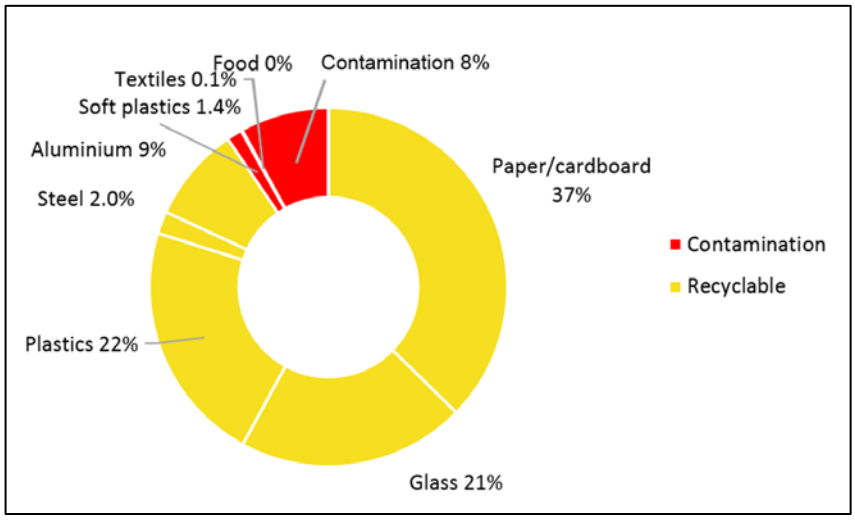


Figure 3.3 displays the average composition of waste found in kerbside recycling bins. This graph shows the average recycling bin collected contains over 90% of recyclable material. An average of 9% of waste entering kerbside bins is not recyclable. A key contaminant is bagged recyclables and it should be noted that this contamination rate is significantly less than the 17% found in the materials audit (where all the products in a sample of bins are individually weighed). The visual audit assesses every load with a visual assessment and covers more waste but is less accurate when compared to an audit conducted by weight.

Due to limitations in the 2017 data collection process Aluminium and Steel were recorded together. In order to remain consistent with previous audits the figure was split and 2% was allocated to Steel.

Figure 3-4 Materials collected from kerbside recycling 2015-2017 (% by weight)

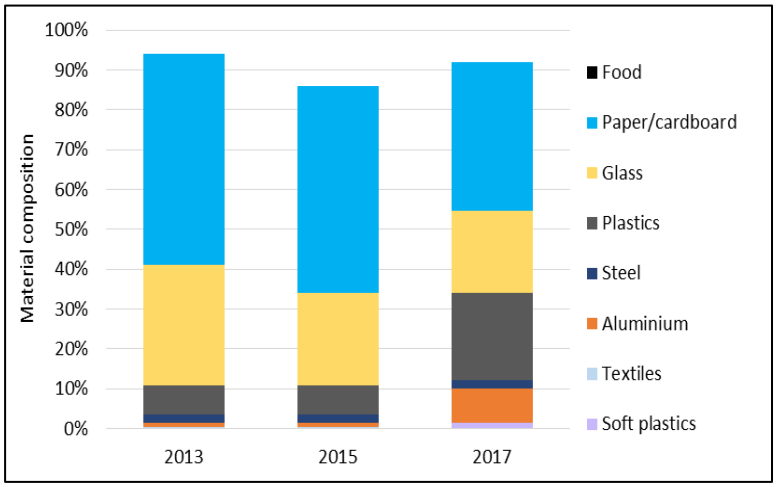


Figure 3.4 shows the change in composition of material found in kerbside recycling bins from 2013 to 2017. From 2013 to 2015 there is little change in most categories other than a drop in the percentage of glass found in kerbside recycling bins from 30% to 23%. These results may be attributed to a shift by manufacturers from glass to plastics or, as these percentages are based on weight, it may indicate a change in glass thicknesses used in manufacturing with new production methods, the glass bottles are a lot thinner and lighter.

From 2015 to 2017 there is an increase in the percentage of both aluminium (from 1% to 9%) and plastics (from 7% to 22%). This may be attributed to limitations in the data collection method used.

These changes can be used to identify trends in consumer disposal patterns and inform council of the need for further actions to encourage practice change in the local community.

Figure 3-5 Kerbside garden waste bin composition 2017 (% by weight)

Figure 3.5 shows the average composition of waste by weight found in kerbside garden waste bins with a contamination rate of only 1%. No paper, plastics or textiles were identified in the 2017 audit.

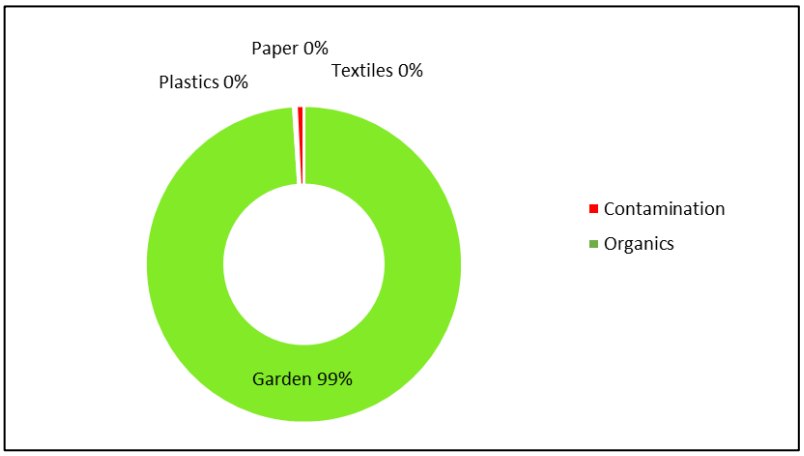


Figure 3-6 Waste by sector 2017

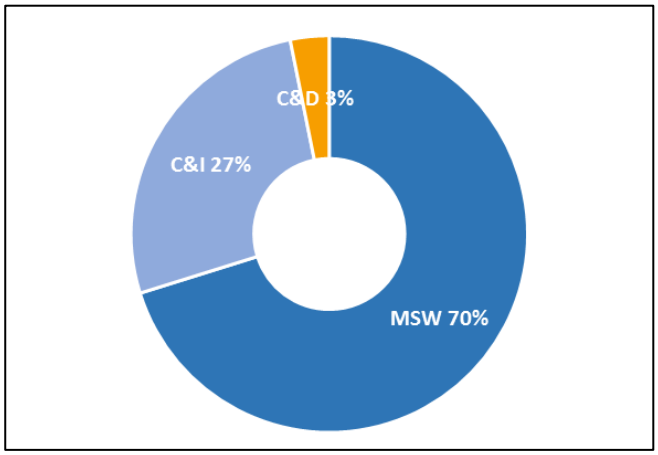


Figure 3.6 shows the percentage of the total waste processed in the *City of Ballarat* by sector. This graph shows 70% of total waste processed comes from the municipal solid waste sector (MSW), 27% from the commercial and industrial sector (C&I) and 3% from the construction and demolition sector (C&D). It is important to note that inflow may affect overall percentages as landfill figures for C&I and C&D include waste collected by contractors from outside the *City of Ballarat*. MSW consists largely of materials from kerbside collection and transfer station, however it does

contain some material from other councils in the region.

Future projections for Ballarat use an average growth in population of 1.9% per year and 1.5% growth in number of dwellings per year to 2035.

The MSW and C&I sectors are likely to increase in line with city growth, whereas C&D is likely to be higher at the moment due to accelerated construction levels.

Figure 3-7 End point of municipal solid waste (MSW) 2017

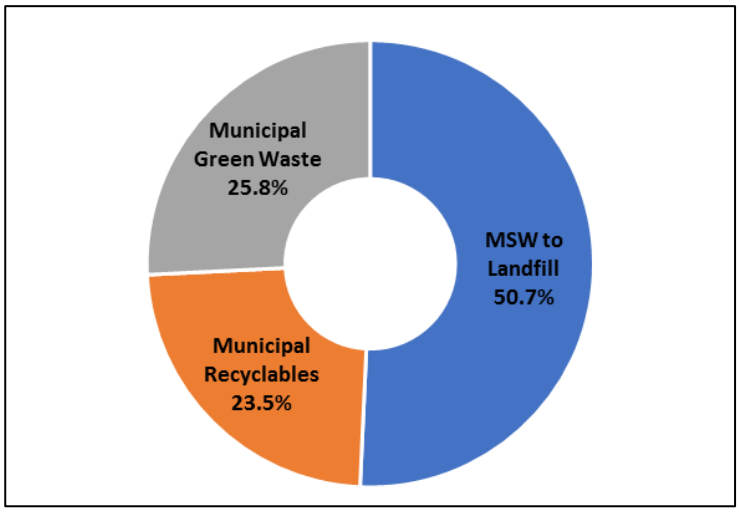
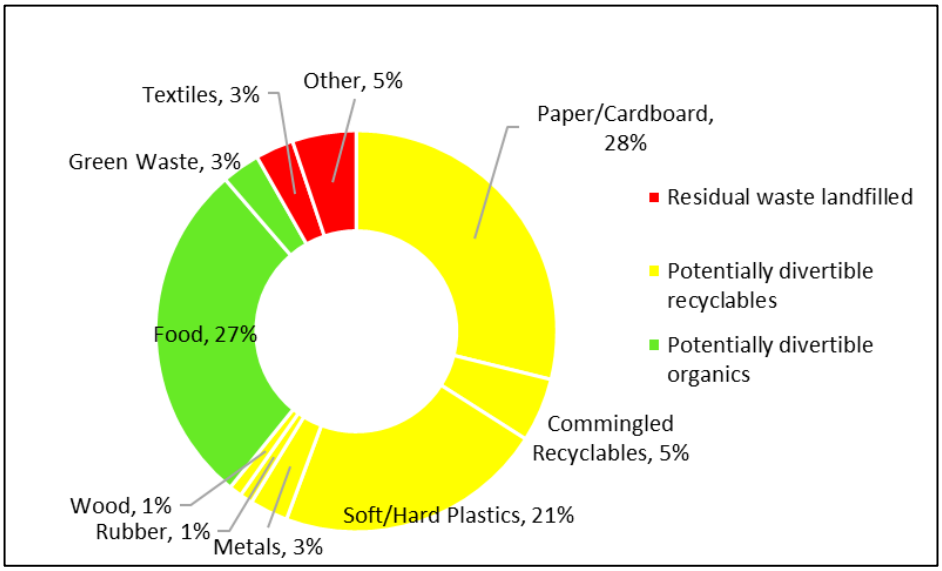


Figure 3.7 shows the percentage by weight of MSW that is recovered through recycling and green waste recovery processes. MSW to Landfill includes waste from kerbside and public place bins, street sweepings and some material from transfer station.

MSW recyclables includes waste from kerbside recycling and transfer station services, while MSW green waste includes waste from kerbside green waste and green material delivered to the transfer station. Just over 50% of MSW was landfilled, with the other 50% recovered through green waste and recyclables collection services.

Figure 3-8 Composition of waste from C&I and C&D sectors to landfill (% by weight)

Figure 3.8 show the composition of waste from the C&I and C&D sectors. The majority of C&I and C&D waste is potentially divertible with 30% being potentially divertible organics and approximately 60% being potentially divertible recyclables.



Business-as-usual

In developing strategic options for continual improvement of waste management, it is useful to consider future waste quantities generated under a 'business as usual' (BAU) scenario.

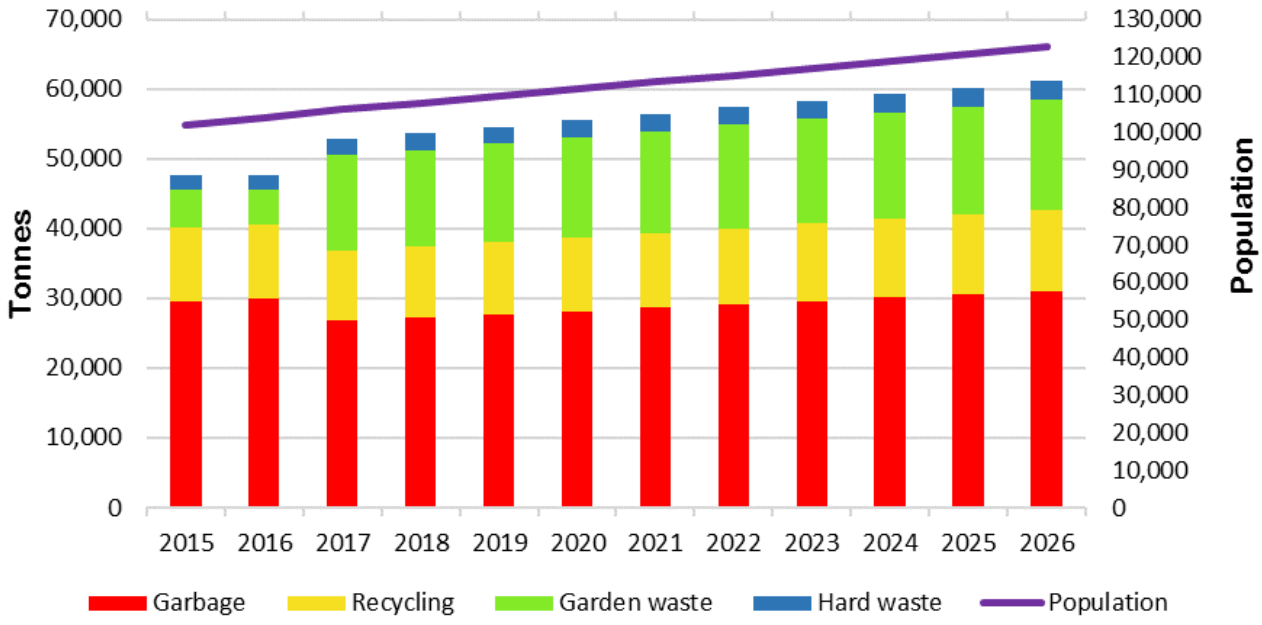
Under a BAU scenario, overall waste generation in the *City of Ballarat* is predicted to increase from 2018 to 2026 with recovery increasing at a similar rate to that of landfilling. This trend isn't consistent with statewide trends identified by Sustainability Victoria which project rates of recovery increasing above those

of landfilling into the future. However, this trend is not uniform across all councils, with variations in rates of population growth affecting the trend.

In 2017 the *City of Ballarat* sent 26,828 tonnes of waste to landfill. This represents approximately 253 kilograms of waste for each person living in the *City of Ballarat*.

Figure 3.9 shows that by 2026, it is projected that waste generation in the *City of Ballarat* will grow to approximately 61, 000 tonnes annually, with an estimated 30,000 tonnes to be recovered and 31,000 tonnes landfilled under the business as usual scenario.

Figure 3-9 Waste and material generation 2015-2026



3.2 Waste services

Kerbside collection services

The kerbside collection provided by the *City of Ballarat* is delivered in three services: Garbage, Recycling and Greenwaste. In the financial year of 2016/2017, 20,138 tonnes of waste, 9,083 tonnes of recyclables and 9,380 tonnes of greenwaste were collected. To achieve this, a fleet of 14 trucks and 17 FTE staff is employed annually to collect 44,251 garbage bins and recycling bins and 33,680 green waste bins.

Details of this kerbside collection service is described in more detail in Table 3.1 and covers bin sizes, costs, number of bins and collection frequency. It is important to note that the greenwaste kerbside collection service began in July 2017 and is a new service offered to *City of Ballarat* residents.

Table 3-1 Council kerbside collection services

Service	Bin size	Charge		Number of bins	Collection frequency
		Urban	Rural		
 Garbage	120L	$293 [1]	$293	44,510 tenements [2]	Weekly
 Recycling	240L			44,510 tenements	Fortnightly
 Garden waste	240L	$63	$63	33,925[3]	Fortnightly

Public place waste and recycling bins

In the *City of Ballarat* region there are 325 public place waste and recycling bins. Figure 3.11 provides an overview of their location. Overlapping icons depict where bin densities are high. These bins are emptied on a weekly basis, with services being increased to daily in high use areas and at events. During daylight savings the routine collection is also increased.

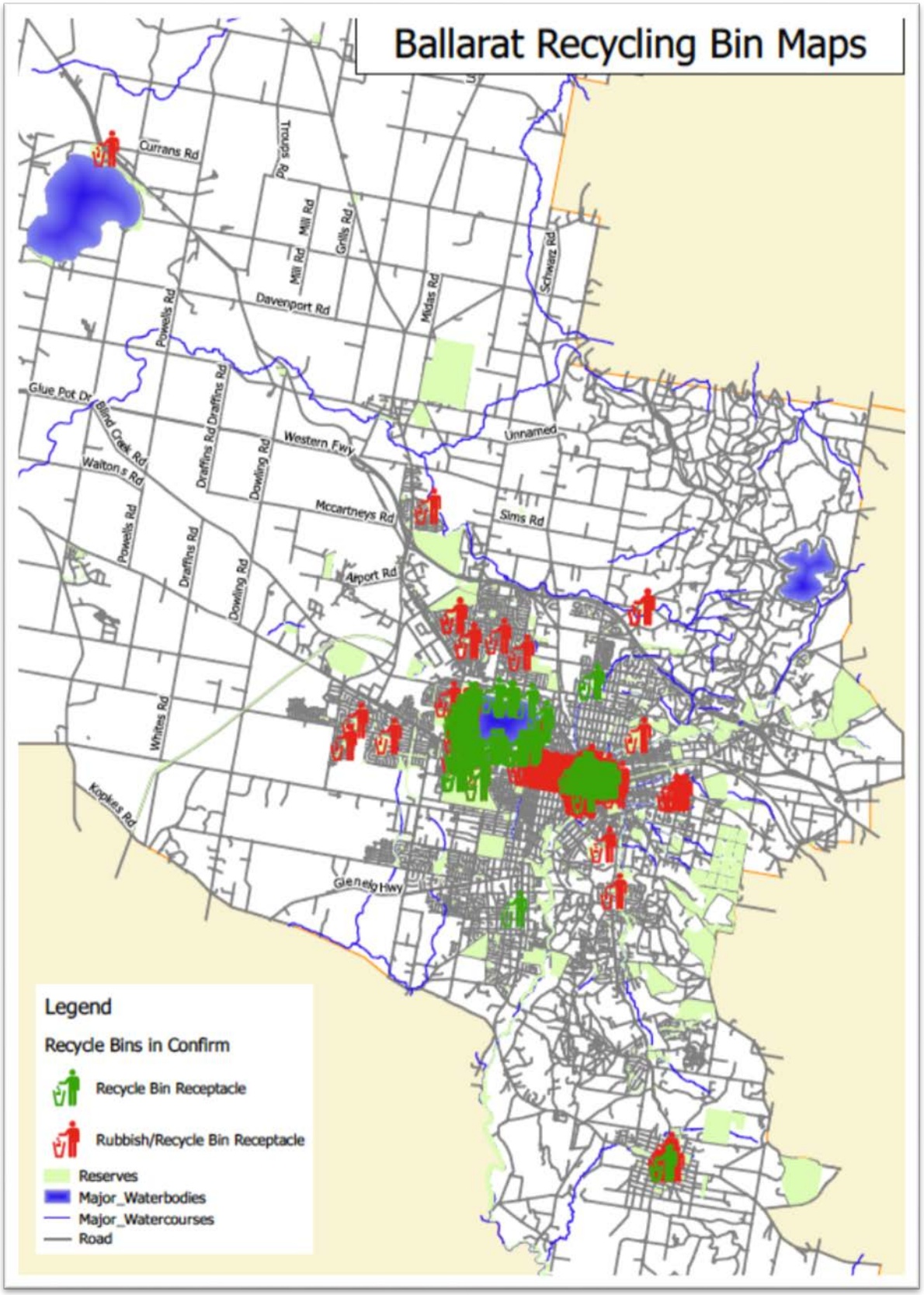
For a detailed view of the location of the public place waste and recycling bins please refer to Appendix 1.

[1] Note: Fee on rates includes kerbside recycling & general waste, street cleaning, education programs etc.

[2] Note: at 44,299 properties

[3] Note: at 33, 924 properties

Figure 3-10 Map of public place waste and recycling bins



Significant issues related to public place waste and recycling bins include the frequency of use and level of contamination. This information is based upon visual observation and anecdotal evidence from staff. A detailed data collection via a half yearly review process has commend in 2017. At this stage, educated observations speculate that the level of contamination may be attributed to;

- the location of the bin (position/visibility/ease of access);
- number of people utilising it (including sites experiencing peaks and troughs and some issues may occur only during the peak times);
- space available in preferred bin and high usage (such as during public events).
- blockages due to the small opening size of the bin entrances for waste disposal (may also contribute to nearby littering).

Some 'hot spots' identified by *City of Ballarat* staff include: high use areas, resident shopping areas; around Lake Wendouree and at public events.

Litter

Litter consists of waste products that have been disposed improperly, without consent and at inappropriate locations. It often occurs when waste has been dropped, thrown, blown off vehicles, or scattered by animals and can exist in the environment for long periods of time before degrading. Even though the *City of Ballarat* employs daily street sweepers, a network of Gross Pollutant Traps, and has a network of public placed waste and recycling bins, litter is an ongoing issue. Litter often finds its way into our waterways.

There is an opportunity for a cross departmental collaboration around litter contaminating water ways. Flood mitigation is a priority for *City of Ballarat* and are the responsible authority for ensuring water quality targets of SEPP (Water of Victoria) are planned for and implemented in new developments. There is an opportunity to integrate planning of response to street litter by looking at street sweep data, GPT and Side Entry Pit Data, Clean Up Australia Day data and look for leverage off works being done in the stormwater sector. Litter hotspots often occur where there are high densities of people such e.g. shopping centres and parks.

Best practice is usually to address the issue at the point source, which may be challenging to identify if the end point is in a creek.

The *City of Ballarat* has employed the below actions in order to combat litter.

- Ensure the bins have lids on them.
- Empty bins regularly.
- Utilise regular street sweepers.
- Develop a daily schedule to cleaning up targeted areas.
- Place gross pollutant traps at stream entrances.
- Inspections of skips, particularly development zones, prior to high wind events.
- Coordination of events such as Clean Up Australia Day, Schools and Youth Clean Up Day.
- Partnership programs with Corrections Victoria.

Further options could be identified to reduce the amount of litter in the *City of Ballarat*.

Illegal dumping

Thousands of acres of State Forest surround Ballarat area. Due to its easy access and the opportunity for concealment, these areas have become the dumping ground for illegal waste.

Photo of illegal dumping in *City of Ballarat.* Source: The Courier

Illegal dumping is an issue for the *City of Ballarat*, *and other land managers such as DELWP*, the extent and cost of which is not fully understood. Currently, there are no programs or funding allocated to manage illegal dumping. This has resulted in a gap in knowledge. Establishing a database would assist in filling that gap and support the development of a program that could target the issue effectively. Collaborating with partners such as Parks Victoria, EPA, users of the State Forests, Friends of groups and recreational groups would provide a holistic and successful approach in reducing illegal dumping.

Future forecasting

Future forecasting is a proactive action that attempts to predict future outcomes. Future forecasting waste streams allows the *City of Ballarat* to best align its infrastructure and resources positively so that waste is not considered an issue but rather an opportunity to be dealt with efficiently and effectively. It is important to consider which areas will attract products, grow in abundance and enter the waste stream.

Predicting the future of waste placement is extremely important and invaluable to the resource recovery sector. It places the *City of Ballarat* in a secure position to manage and process any new stream of waste. Waste streams may change in a relatively short period of time. Over 20 years ago large, wooden wardrobes caused concern for landfill sites and transfer stations. Today, due to contemporary walk-in robes this issue is almost non-existent in the waste stream. Currently, solar panels installed 10 to 15 years ago, are nearing the end of their lifespan. With highly toxic chemicals embedded in them, solar panels may become a major waste stream problem of the near future.

Predicting waste streams is not the only component of future forecasting. Time and effort also needs to be considered in planning in regards to housing and populations. Below is a short list of issues, by no means exhaustive, that may be taken into consideration:

- Is there a trend to increase housing density? How will this impact on waste collection and removal?
- Older people might choose to stay in their own homes longer. How will they be serviced if they cannot place their bins on the curb?
- High rise buildings – how will their waste collection occur in a safe and reliable manner?

Commercial collections

The *City of Ballarat* provides two types of commercial waste disposal services to businesses and industries: a Transfer station and the Smythesdale landfill.

Transfer Station

This facility is owned by the *City of Ballarat* but operated by a contractor. The transfer station operates seven days a week, and predominantly receives and processes solid waste and recyclable materials delivered by residential, and small commercial and industrial property owners. A significant proportion of this material is suitable for reuse and recycling.

The transfer station contract includes: the acceptance of source-separated material; the transportation of waste material to *City of Ballarat*'s landfill; an arrangement for the reprocessing of green waste off-site; the disposal of recyclable material for reprocessing; the acceptance and disposal of hazardous material in conjunction with the *City of Ballarat*; as well as, the provision of a resource recovery area within the site.

Location: Gillies Street South, Ballarat.

Opening times: Monday to Friday 8:00 to 4pm, Weekend 10:00 to 4:00pm.

Closed: Christmas Day, New Year's Day, Anzac Day and Good Friday

Voucher system: every landholder in the *City of Ballarat* receives 2 free transfer vouchers with their payment of rates.

Products that the transfer station collects by cubic metre: prunings, grass clippings, leaves, branches, rock, brick, concrete (no metal or plastic), hard waste, wood, plastics, household waste, building waste (Inc. plastic, metal, plasterboard), treated timber and general waste (costs vary depending upon the material) clean hard and soft wood (not treated).

Products that are accepted and not weighed: mattresses, refrigerators, air conditions, tyres for cars, 4WD, light trucks, trucks, and tractors, e-waste. (costs vary depending upon the material)

Products that are accepted without a charge: metal, steel and aluminium (including whitegoods, televisions, empty/dry paint cans, small auto parts – no car bodies), detox – empty paint tins, oils, batteries (residential quantities), fluorescent tubes and compact fluorescent globes (CFLs), household recycling material: newspapers, magazines, flattened cardboard, plastic bottles & containers (HDPE, PET, PVC), agricultural drums (triple rinsed) and assorted household chemicals.

Products not accepted: liquid waste, asbestos (aside from chemicals accepted in the detox program).

Refer to Appendix 2 for transfer station fees and charges for 2017/18.

Smythesdale Landfill

The Smythesdale landfill is located on the Glenelg Highway within Golden Plains Shire and owned by the *City of Ballarat*. The landfill is one of the *City of Ballarat'*s larger assets. The site opened in 1996 and is operated under contract management. It is important to note that a Master Plan is currently being written

for the Smythesdale landfill. This Masterplan maps out the future use, management and compliance for the next 20 years.

Location: 1380 Glenelg Hwy, Smythesdale

Type: commercial and not open to the public.

Products that are accepted: asbestos, Category C soil, cleanfill, industrial and commercial waste, mixed rubble, rock, soil, fill, subsoil and clay, low level contaminated waste Category C,

Products not accepted: tyres, liquid wastes, chemical wastes.

Refer to Appendix 3 for landfill charges for 2017/18

Materials Recovery Facility (MRF)

Currently, there is not a Materials Recovery Facility (MRF) for the receipt and separation of recyclables in Ballarat. Recyclables are transported in bulk from a central handling facility in Ballarat to Geelong. Major Facilities are located in Melbourne, Bendigo, Geelong and Stawell. A facility of this type would require a location on industrial land near a major transport hub, as glass, paper, plastics, aluminium and steel materials tend to be transported in large bulk quantities to Australia's capital cities and overseas. The *City of Ballarat* may consider the establishment of a regional facility at the Ballarat West Employment Zone (BWEZ), however the current volumes available and proximity to other MRF's may prevent such a proposal being feasible. If container deposit legislation were to be introduced this may become viable.

E-waste

In Australia e-waste (electronic waste) is growing up to three times faster than general municipal solid waste. It covers a range of items we all use and discard from our daily working and home lives, including televisions, computers, mobile phones, kitchen appliances and white goods.

These items contain both hazardous and valuable materials that can be recovered when they reach the end of their working life. Acknowledging the risks and opportunities associated with e-waste, the Victorian Government has committed to banning e-waste from landfill in Victoria. The e-waste ban is designed to achieve a range of positive outcomes for the Victorian environment, community and industry.

The development of the Waste Management Policies to ban e-waste from landfill and ensure appropriate management of e-waste is a joint project between DELWP and the Environment Protection Authority.

Victoria's seven waste and resource recovery groups, who help to deliver waste and resource recovery programs around the state, will join with these other agencies to discuss the ban and the supporting measures with stakeholders.

A policy impact assessment and draft Waste Management Policies that will give effect to the ban have now been released for public comment for three months, with the ban expected to be implemented by July 2018.

The valuable materials in e-waste can be recovered. E-waste re-processors accept a diverse range of used electronic waste, and use a variety of methods to recover these valuable materials. Both e-waste and processed e-waste materials must be handled and stored with due care in order to avoid leakage and the release of hazardous substances into air, water or soil.

EPA has introduced new legal requirements for the reprocessing of specified e-waste. These requirements will also assist in supporting legitimate and sustainable e-waste recycling opportunities in Victoria.

Banning of Single Use Plastic bags – a new policy for the Victorian State Government

Plastic pollution is becoming an urgent environmental problem. Plastic bags and other plastic products break down into smaller and smaller pieces overtime, becoming difficult to manage. They can end up in our waterways, lakes and oceans – contributing to litter and posing a significant hazard to the ecosystems it enters into. In October this year the Labour Government stated they will ban sing-use light weight plastic shopping bags in Victoria. They are currently consulting with the wider community and businesses to investigate how they can best implement the policy.

Turning waste into Energy

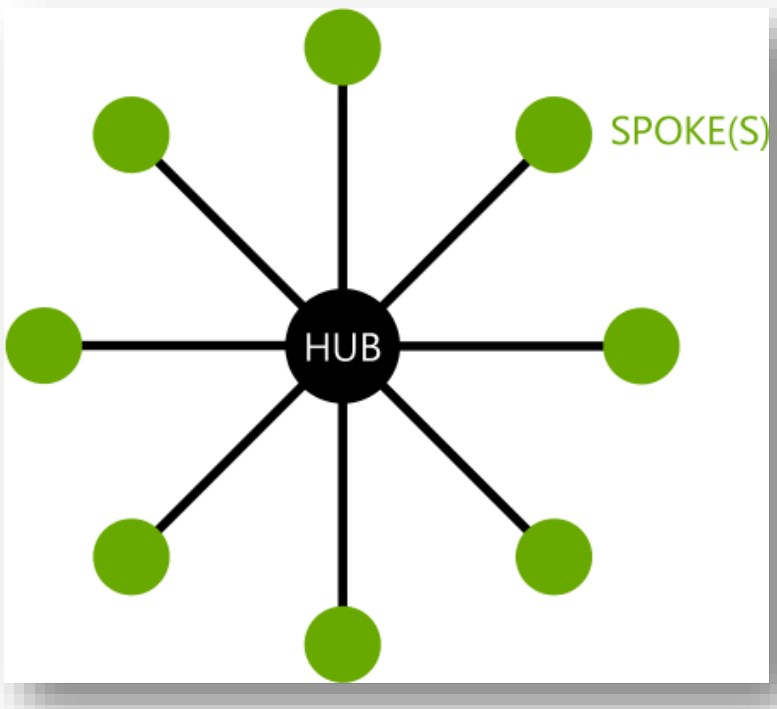
With Victoria's waste growing as fast as our population there is a driving force to seek out new and innovative approaches to increase our resource recovery and keep waste from being sent to landfill. Generating energy from waste can extract value from waste that would otherwise go to landfill. This new form of waste management can add reliable renewable energy to the exiting energy mix and reduce the regions reliance on landfill. It can also assist with *City of Ballarat's* efforts of becoming carbon neutral by reducing greenhouse gas emissions.

In October 2017 the Victorian Government released a discussion paper on converting waste to energy to support the development of new technologies, including anaerobic digestion and thermal treatment of waste. Along with this discussion paper there is a Waste to Energy Infrastructure fund that provide significant amounts of funding to projects that help businesses and waster corporations upgrade their waste management practices. Feedback received on the recently released discussion paper will help inform the Victorian Government's development of a waste to energy policy, to be released in 2018.

Waste and resource recovery hub

Stated in the Statewide Waste and Resource Recovery Infrastructure Plan is the concept of 'hubs and spokes'. In the context of waste management, a 'hub and spoke' is a network of infrastructure that facilitates the consolidation of individual material streams to achieve tonnages that attract industry investment.

City of Ballarat intends to become a Resource Hub that will manage and recover waste and material streams from the surrounding region, with the vision to expand out to receive waste from Geelong, Bendigo and Horsham and surrounding areas. The proposed location for the resource hub is the BWEZ All Waste Interchange and Waste to Energy Plant. This hub would service a large area and provide infrastructure on a large scale to sort, consolidate and reprocess a range of materials at a significant level.



Spokes are the sequence of activities that move materials from waste generators to (and from) hubs e.g. for collection, transport and sorting. The length of the spoke and hence the location of the hub for a particular material stream is influence by the impact of transport costs on the margin of return for that particular steam.

The proposed location for the hub is ideal as it has the appropriate buffers to support waste and resource activities, is based near a train line and freeway and offer good access to transport networks. It has the potential to be located in close proximity to complementary activities that can provide feedstocks and markets for the products and services made from the activities.

In establishing the Resource Hub in Ballarat, the *City of Ballarat* will need to take already into consideration the criteria outline in the SWRRIP, and learn from the strengths and weaknesses of established hubs in Victoria and Australia wdie.

3.3 Recycling and waste disposal facilities

To service over 40,000 homes and the various businesses, commercial operations and industries in the region, *City of Ballarat* has a range of waste and recycling facilities. The *City of Ballarat* also has a number of historic landfills which are now closed. Table 3.2 lists these facilities, their current state, and specific actions required to meet future demands.

Table 3-2 Waste infrastructure status and action plan

Facility	Current status	Actions required
Transfer Station	• Fully operational • Facilities require upgrading	• Maintain and expand the service to the community. • Create a design that transitions site users into recycling by layout and access. It must accommodate the growing number of material being diverted or planned to be diverted (e-waste and its expansion into anything with a cord or battery). • Relocate transfer station to All Waste Interchange.
Smythesdale Landfill	• Fully operational	• Implement Smythesdale Landfill Master Plan including review of waste input scenario changes. • Review operational benchmarking.
Greenwaste interchange facility	• Fully operational	• Maintain service to community. • Relocate greenwaste interchange facility to All Waste Interchange. • Potential to expand to process food organics • Reduce contamination of 1% to 0.5% through targeted education campaign.
Transfer site for recycling	• Fully operational	• Maintain the service. • Review potential to relocate to All Waste Interchange once current contract expires.
Closed landfills x 4	• No longer operational	• Maintain management of the closed landfills that require active management including ongoing monitoring, maintenance and reporting to EPA update and implement regular reviews to ensure adequate management in place.

In recent years, environment protection measures for landfills have increased in line with the knowledge of their impacts. Improved engineering and management practices come at a cost and it is more efficient to provide such expensive infrastructure as a regional asset. There is a trend towards rationalising landfills, with closure of small landfills and replacement with transfer stations (or resource recovery centres).

With this in consideration, and as the amount of waste significantly increases each year, there is a growing need for *City of Ballarat* to establish a central waste and resource recovery facility. The facility currently being investigated is called the All Waste Interchange and has the potential to update the current transfer station, provide a central location for all waste and resources to be collated, sorted and re-purposed before what is unrecoverable is transported to the landfill.

With the waste being sent to landfill, there is an opportunity to participate in the industry trend to establish advanced waste treatment technologies as an alternative to landfill disposal. This includes technologies such as gasification, pyrolysis, anaerobic digestion, composting and other waste to energy technologies. The technologies suited to municipal solid waste require large volumes of waste (at least 100,000 tonnes per year depending on the technology) to justify the large capital outlay involved (over $30 million for most

systems). The *City of Ballarat* intends to work in collaboration with other councils and the GCWWRRG to investigate and assess innovative opportunities for waste to energy as well as vessel composting.

To compliment the services provided by *City of Ballarat* there are a number of private waste and resource recovery operators. Table 3.3 provides a brief list of who they are and which form of waste and/or resource recovery they operate in. It is envisaged that in the future this list will grow with the intention of extracting more and new recoverable materials and supplying it to existing and emerging recovery markets in the region and beyond.

Table 3-3 List of privately owned and operated waste and resource recovery facilities located within the council boundaries of City of Ballarat.

Form of waste or resource recovery	Operator
Metal recycling	• Ballarat scrap metal and recycling • Kings Marine stores • Onesteel recycling
Waste to energy – anaerobic digester	• Berry bank farm
Aggregate, masonry and soils	• Ballarat concrete recycling • Chis Bev Pty LTD • KKC Recycling
Paper/Cardboard	• Paper Freight Australia • Ballarat regional industries
Plastic	• Replas
Organics	• Castlegate James (food waste) • Garden recycling centre (garden waste)
Resource Recovery Interchange Facility	• Recycling interchange facility

4. Management options

This section outlines potential management options for improved waste management and resource recovery. These management options have been developed in line with the Strategy Objectives and aim to meet Targets developed for each objective.

The management options have been developed through a number of processes including;

- workshops with key stakeholders
- analysis of previous strategy actions
- analysis of existing data and trends
- benchmarking of best practice across the waste management industry at both national and international levels.

Seven approaches have been identified to support the delivery of the management options. These include the following:

1. Waste generation, minimisation and avoidance;
2. Education and awareness;
3. Waste collection, sorting and recovery;
4. Waste processing infrastructure;
5. Research and development;
6. Planning and data capture; and
7. Regulation.

The following tables outline the Strategy Objectives, key Targets, approaches and management options.

4.1 Objective One: Full resource recovery

Table 4-1 Management actions for objective one, target 1.1

OBJECTIVE 1	FULL RESOURCE RECOVERY		
TARGET 1.1	**The growth in waste generation is less than the rate of population growth.**		
APPROACH	**Education and awareness**	**Waste generation, minimisation and avoidance**	**Regulation**
MANAGEMENT OPTIONS	• Educate and raise awareness of waste minimisation and avoidance through the development of a Waste Education Plan. • Work with relevant agencies, industry and schools on waste and resource reduction and recovery education and engagement. • Provide community leadership through local groups and businesses (T1.1, T1.2).	• Provide advocacy in the community through support of waste minimisation initiatives (T1.1, T1.2). • Identify and implement financial incentives and disincentives for waste minimisation across all sectors.	• Advocate for recycling levies to be applied to consumer items to fund disposal and recycling.

Table 4-2 Management actions for objective one, target 1.2

OBJECTIVE 1	FULL RESOURCE RECOVERY			
TARGET 1.2	**Achieve 70% diversion of waste from landfill by 2022 with a long-term goal of 85% by 2028.**			
APPROACH	**Waste collection, sorting and recovery**	**Planning and data capture**	**Education and awareness**	**Regulation**
MANAGEMENT OPTIONS All SECTORS MSW SECTOR C&I WASTE SECTOR C&D WASTE SECTOR	• Invest in 'pre-sort' infrastructure that aims to maximise on-site resource recovery (T1.1, T2.1). • Consolidation of waste infrastructure including depot and transfer station to an All Waste Interchange model (T1.2, T3.1). • Assess collection needs across all sectors, identify gaps in council services and investigate provision for those additional community needs. • Advocate for product stewardship reuse, reduce, repurpose. • Promote and advocate for the avoidance of single use products • Develop a business case for organic diversion options for MSW and C&I waste sectors. • Provide incentives for businesses that are innovative waste reducers. • Provide advocacy in the community through support of waste minimisation initiatives (T1.1, T1.2). • Support GCWWRRG's investigation into increasing the recovery of materials such as wood/timber, agricultural wastes, plastics, textiles, tyres and e-waste.	• Develop a feasibility study that looks at all options of waste to energy facilities that places Ballarat as a central processor of Victoria's waste (T1.2, T3.1). • Adopt a circular waste management approach across all waste sectors. • Develop a Waste Action Program to reduce recycling contamination across the MSW sector.	• Educate and raise awareness of diversion options through the Waste Education Plan. • Provide community leadership through local groups and businesses (T1.1, T1.2).	• Identify and implement financial incentives and disincentives for appropriate waste sorting and recycling across all sectors.

4.2 Objective Two: Viable resource recovery markets

Table 4-3 Management actions for objective two, target 2.1

OBJECTIVE 2	VIABLE RESOURCE RECOVERY MARKETS		
TARGET 2.1	**90% of recovered material enters a viable market stream with a focus on local enterprise.**		
APPROACH	**Research and Development**	**Waste processing infrastructure**	**Planning and data capture**
MANAGEMENT OPTIONS	• Provide support for existing and emerging waste market initiatives • Share information across government on market development needs and priorities. • Advocate and support research to develop local markets in line with circular economy – bio economy, industrial ecology. • Establish and implement findings from research and development projects with universities and other learning institutions.	• Improve resource recovery of priority marketable products, divert waste streams to the All Waste Interchange. • Invest in 'pre-sort' infrastructure that aims to maximise on-site resource recovery (T1.1, T2.1, T3.1).	• Investigate the need for a Resource Recovery Market officer at council level. • Develop a resource recovery market plan • Consult with industry and GCWWRRG to gather information on innovation and market development needs and priorities. • Adopt an in-house ethical procurement policy in Council.

4.3 Objective Three: Adaptive infrastructure and operations

Table 4-4 Management actions for objective three, target 3.1

OBJECTIVE 3	ADAPTIVE INFRASTRUCTURE AND OPERATIONS			
TARGET 3.1	**Infrastructure enables full resource recovery targets to be met.**			
APPROACH	**Waste processing infrastructure**	**Regulation**	**Research and Development**	**Planning and data capture**
MANAGEMENT OPTIONS	• Invest in 'pre-sort' infrastructure that aims to maximise on-site resource recovery (T1.1, T2.1, T3.1). • Facilitate the consolidation of waste infrastructure including depot and transfer station to an All Waste Interchange model (T1.2, T3.1). • Develop a feasibility study that looks at all options for a waste to energy facility that places Ballarat as a central processor of Victoria's waste (T1.2, T3.1). • Invest in State of the art collection fleet	• Provide assistance to industry to ensure infrastructure, facilities and services are operated and managed to protect the community, environment and public health.	• Assess and implement options for asset rationalisation, consolidation and upgrade of landfill and RRC infrastructure.	• Share information across government on council infrastructure needs and priorities.

Table 4-5 Management actions for objective three, target 3.2

OBJECTIVE 3	ADAPTIVE INFRASTRUCTURE AND OPERATIONS
TARGET 3.2	**Waste management operations are adaptive and exceed industry standards and benchmarks**
APPROACH	**Planning and data capture**
MANAGEMENT OPTIONS	• Establish benchmarks for waste management services including: landfill management; transfer station, street cleaning and waste collection and use to inform best practice and continual improvement processes. • Investigate logistics and infrastructure that produce efficiencies in waste transport including understanding the viability versus distance constraint. • Implement the Smythesdale Landfill Master Plan. • Work with the GCWWRRG, industry and the EPA to progress any rehabilitation assessments and requirements for closed landfills.

Table 4-6 Management actions for objective three, target 3.3

OBJECTIVE 3	ADAPTIVE INFRASTRUCTURE AND OPERATIONS		
TARGET 3.3	**Reduce incidents of illegal dumping by 50% by 2022.**		
APPROACH	**Regulation**	**Planning and data capture**	**Education and awareness**
MANAGEMENT OPTIONS	• Provide additional resource for enforcement activities.	• Facilitate the development of an illegal dumping action plan with partners and key stakeholders.	• Raise awareness of illegal dumping through the Waste Education Plan. • Work with SV and the Victorian Litter Action Alliance (VLAA) to develop and implement best practice litter prevention programs.

4.4 Objective Four: Strategic planning

Table 4-7 Management actions for objective three, target 4.1

OBJECTIVE 4	STRATEGIC PLANNING	
TARGET 4.1	**Adaptive management principles are embedded in waste management planning and implementation.**	
APPROACH	**Planning and data capture**	**Research and Development**
MANAGEMENT OPTIONS	• Implement an annual review of the RRWM Implementation Plan. • Conduct six-monthly data audit of all waste sectors. • Implement a reliable and targeted local data system that informs waste and resource recovery decisions and contributes to regional and state data systems. • Apply adaptive management approach to waste management. This includes; strategy and planning, implementation and monitoring, evaluation and reporting and learning and adaption. • Implement sustainable contract management processes to ensure best use of funds • Work with GCWWRRG and other councils to develop mechanisms and contingency plans to appropriately manage waste and material during and after emergency or unplanned event. • Collaborate with GCWWRRG on waste infrastructure planning. • Work with the GCWWRRG to facilitate the development of council partnerships to enable efficiencies in resource recovery, materials transport and disposal. • Review all current documentation and practices to reflect the Strategy 2018-2022.	• Work with all levels of government, industry and investors to explore innovative and technological advancements that could inform future infrastructure development and investment. • Establish a process to flag new and/or expanding waste streams and identify potential solutions.

5. Assessment of options

This section assesses the feasibility of potential options identified in Section 4, using a 'triple bottom line' (TBL) approach that analyses the environmental, social and financial impacts.

5.1 Financial analysis

From the various management options identified in Section 4, there are proposed initiatives that stand out and if funded, could change the landscape in the *City of Ballarat* from managing waste to fully recovering resources and providing significant amounts of energy. Table 5.1 details these proposed initiatives as well as the current services with a description, the capital investment required, and a timeline of specific actions to activate them.

Collection, disposal and processing services will continue to be delivered as it is a requirement under the Local Government Act. The following services, kerbside collection, greenwaste, landfill, and recycling, will continue to be provided to residents and businesses in the *City of Ballarat* with a particular focus on improving effectiveness of diversion from landfill. The notation in the timeline section explains relevant contractual arrangements and highlights specific activities pertaining to certain services. In relation to the resource recovery and energy production section there are four suggested actions that outline the steps that need to be taken, and predicted timelines required to get a waste to energy facility operating in Ballarat.

Table 5-1 Proposed Initiatives and current ongoing services

PROPOSED INITIATIVES OPTION TIMETABLE	DESCRIPTION AND CAPITAL INVESTMENT		2017	2018	2019	2020	2021	2026	2032	2037
COLLECTION SERVICES	**Three bins weekly garbage, fortnightly alternating greenwaste and recycling**		Ongoing review of the collection frequency & use							
DISPOSAL AND PROCESSING SERVICES	**Maintain current services**	**Greenwaste**	Contract 1 + 1 + 1			New contract required and review processing options				
		Organics	Review organics inclusion based on contamination percent and WTE intake							
		Recycling	Review options contract (expires 2019)			New contract/new Materials Recovery Facility				
		Landfill	Regularly review landfill levy							
RESOURCE RECOVERY AND ENERGY PRODUCTION										
Upgrade Transfer Station to All waste interchange				2018						
Materials Sorting Options					2019					
Power Off Take and Sub station					2019					
Waste To Energy Facility						2020				

Table 5.2 provides an outline of the various projects, staging and verification phases that need to occur to implement the proposed project initiatives and management options. There are four phases described that will allow a gradual change from the *City of Ballarat's* current state to becoming a Regional Hub of waste management and resource recovery. With some of the project requiring a significant amount of investment (e.g. All Waste Interchange and Waste to Energy Facility) this proposed method will ensure a smooth transition from the *City of Ballarat's* current resource recovery and waste management services to new services. This will enable *the City of Ballarat to* reach their Vision, Objective and Targets.

Table 5-2 Project Feasibility, Staging and Verification Phases

Phase	Actions		Estimated cost
Phase 1	Understanding our waste streams		Works carried out within council approved budget 16/17 and 17/18
	Aligning Waste Contracts		
	Service Delivery Benchmarking		
	Development of Adaptable Waste Strategy		
	Development of Landfill Master Plan		
	Subdivision Works - costing's and funding		
	Securing of Site for development of waste and resource recovery facility		
	Detailed Planning for All Waste interchange		
	Opportunity For Energy off take		
Phase 2	BWEZ development	BWEZ Construction	initial investment of $22.16 M (COB $6.6M & State $15M)
	Land Secure		
	Funding Securities		
	Facilities Planning	All waste interchange	
	Develop and Build All Waste Interchange		
Phase 3	Waste To Energy	Waste to Energy	$20M capital cost for first 5 years and then a public private partnership
	Commercialisation and Implementation		
	Contract Sourcing - construction, operations offtakes		
Phase 4	Construction		EOI and Tender Process

Figure 5.3 is an indicative graph and compares the projected income and expenditure for the landfill and waste to energy. In 2017, *City of Ballarat* will pay a landfill levy to the Victorian government of $64/tonne (dark orange) and outlays $86/tonne for the management of the landfill (light orange). Alongside the landfill costs is the projection of waste to energy cost/tonne (blue). The projections are then extrapolated over a 20-year period, at 5-year intervals. By 2037 not only is the cost/tonne for the waste to energy less than the landfill costs, it is also providing an alternative energy source and income for *City of Ballarat*.

Figure 5-3 Comparative model of expenditure and income - landfill and waste to energy 2017 - 2037

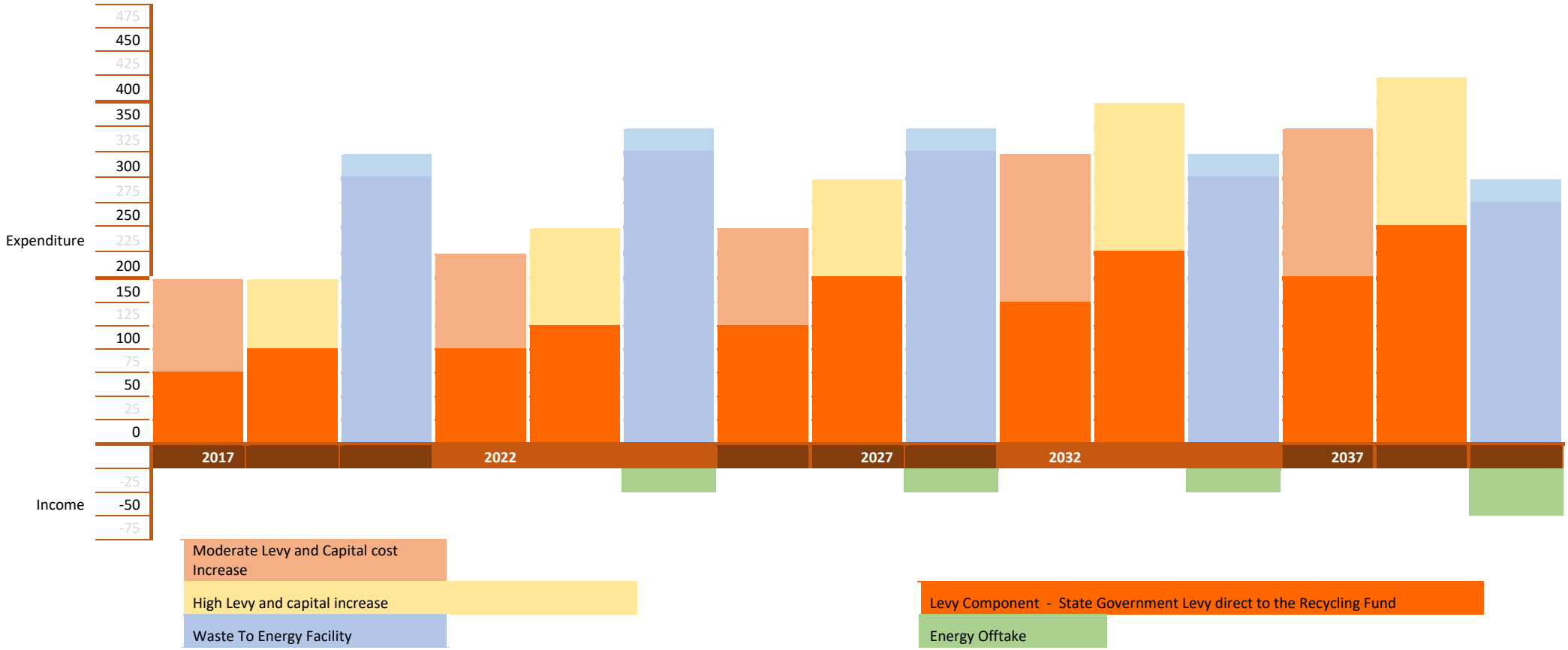
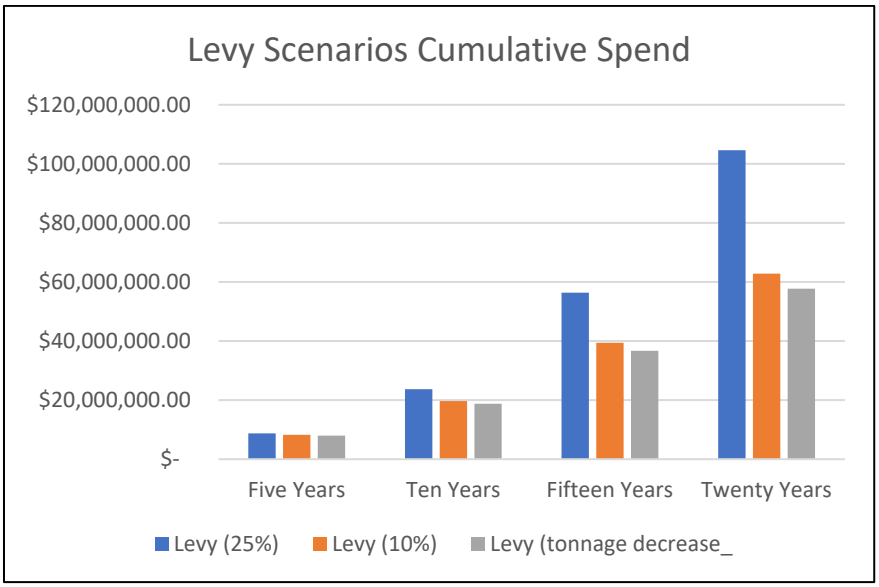


Figure 5-4 Cumulative Expenditure Landfill Levy Component only

Figure 5.4 calculates 3 different levy scenarios: 10% increase (blue), 25% increase (orange) and 10% increase with specific actions increasing the diversion of waste from landfill (grey). Over 20 years the cost of the levy can be significantly reduce if actions to divert waste from the landfill are implemented.



5.2 Triple bottom line (TBL) assessment

A Triple Bottom Line (TBL) assessment process can effectively support policy development by offering a broader range of perspectives and richer evidence to the attention of decision makers. The primary objective of conducting a TBL assessment is to assist in developing sound policy aimed at reducing any negative consequences of action, maximising positive impacts, and fostering collaboration.

A TBL assessment was used to assess the proposed management options for their environmental, social and economic impacts. Different units of measure were used for each category. Conducting a TBL assessment extends the analysis of management options beyond monetary costs to include social and the environmental impacts.

For each management option the following issues were considered in assessing the impacts:

- **Environmental:**
- En1: waste and litter reduction (including avoidance and minimisation)
- En2: resource recovery
- En3: contamination of recovered resources
- En4: resource consumption in implementing the strategy
- En5: impact on surrounding environment.
- **Social:**
- S1: level of service to the community (including equity of access)
- S2: community acceptance
- S3: impact on amenity
- S4: awareness and compliance with waste management systems and policies
- S5: health and safety.
- **Economic:**
- Ec1: financial cost of implementation and operation
- Ec2: regional economic development
- Ec3: local employment.

A panel of experts, consisting of external environmental consultants, *City of Ballarat* operational staff and leadership group, evaluated the management options using the above process. A score of 1 (positive impact), -1 (negative impact) or 0 (no impact) was assigned to each action. Total score for each management option is shown in Table 5.3. The actions were then ranked or prioritised as High, Medium or Low based on their total score.

Table 5-1 Environmental, social and economic impact assessment

No.	Management options	En1	En2	En3	En4	En5	Score	S1	S2	S3	S4	S5	Score	Ec1	Ec2	Ec3	Score	Total	Rank HML
OBJECTIVE 1: FULL RESOURCE RECOVERY																			
TARGET 1.1 – The growth in waste generation is less than the rate of population growth																			
	Work with relevant agencies, industry and schools on waste and resource reduction and recovery education and engagement.	1	1	1	1	1	**5**	0	1	1	1	1	**4**	1	1	1	**3**	**12**	**H**
	Educate and raise awareness of waste minimisation and avoidance through the development of a Waste Education Plan.	1	1	1	1	1	**5**	1	1	1	1	1	**5**	0	1	0	**1**	**11**	**H**
	Advocate for product stewardship – reuse, reduce, repurpose.	1	1	1	1	1	**5**	1	1	1	1	1	**5**	1	0	0	**1**	**11**	**H**
	Provide advocacy in the community through support of waste minimisation initiatives	1	0	0	1	1	**3**	0	1	1	0	0	**2**	1	0	1	**2**	**7**	**M**
	Identify and implement financial incentives and disincentives for waste minimisation across all sectors.	1	1	1	0	-1	**2**	1	-1	-1	1	1	**1**	-1	1	1	**1**	**4**	**L**
	Provide community leadership through local groups and businesses.	0	0	0	1	0	**1**	0	0	0	1	0	**1**	1	0	0	**1**	**3**	**L**
TARGET 1.2 – Achieve 70% diversion of waste from landfill by 2022 with a long-term goal of 85% by 2028																			
	Develop a Waste Action Program to reduce recycling contamination across the MSW sector.	1	1	1	1	1	**5**	1	1	1	1	1	**5**	1	0	0	**1**	**11**	**H**
	Assess collection needs across all sectors, identify gaps in council services and investigate provision for those additional community needs.	1	1	1	1	1	**5**	1	1	1	1	1	**5**	-1	1	1	**1**	**11**	**H**

No.	Management options	En1	En2	En3	En4	En5	Score	S1	S2	S3	S4	S5	Score	Ec1	Ec2	Ec3	Score	Total	Rank HML
	Educate and raise awareness of diversion options through the Waste Education Plan.	1	1	1	1	1	**5**	1	0	1	1	1	**4**	1	0	0	**1**	**10**	**H**
	Provide advocacy in the community through support of waste minimisation initiatives.	1	0	1	1	1	**4**	1	0	1	0	1	**3**	1	1	1	**3**	**10**	**H**
	Invest in 'pre-sort' infrastructure that aims to maximise on-site resource recovery.	0	1	1	1	1	**4**	1	1	1	1	1	**5**	-1	1	1	**1**	**10**	**H**
	Consolidation of waste infrastructure including depot and transfer station to an All Waste Interchange model.	0	1	1	1	1	**4**	1	1	1	1	1	**5**	-1	1	1	**1**	**10**	**H**
	Adopt a circular waste management approach across all waste sectors.	1	1	0	1	1	**4**	1	0	1	1	1	**4**	-1	1	1	**1**	**9**	**H**
	Provide incentives for businesses that are innovative waste reducers.	1	1	1	1	1	**5**	0	1	1	1	1	**4**	0	0	0	**0**	**9**	**H**
	Identify and implement financial incentives and disincentives for appropriate waste sorting and recycling across all sectors.	1	1	1	1	1	**5**	0	1	1	1	1	**4**	0	0	0	**0**	**9**	**H**
	Continue to pursue a feasibility study that looks at all options of waste to energy facilities that places Ballarat as a central processor of Victoria's waste.	0	1	1	1	0	**3**	1	1	0	1	0	**2**	1	1	1	**3**	**9**	**H**
	Develop a business case for organic diversion options for MSW and C&I waste sectors	0	1	1	1	1	**4**	1	0	0	1	1	**3**	0	1	1	**1**	**9**	**H**
	Promote and advocate for the avoidance of single use products.	1	1	1	1	0	**4**	0	1	0	1	1	**3**	-1	1	1	**1**	**8**	**M**

No.	Management options	En1	En2	En3	En4	En5	Score	S1	S2	S3	S4	S5	Score	Ec1	Ec2	Ec3	Score	Total	Rank HML
	Encourage on-site reuse for construction & demolition waste and work with local recyclers of C&D to better promote services in the Region.	0	1	1	1	1	**4**	0	-1	0	1	0	**0**	1	0	0	**1**	**5**	**M**
	Advocate for product stewardship reuse, reduce, repurpose.	0	0	0	0	0	**0**	1	1	0	1	0	**3**	1	0	0	**1**	**4**	**L**
	Provide community leadership through local groups and business	0	0	0	1	0	**1**	0	1	0	0	0	**1**	1	0	0	**1**	**3**	**L**
	Support GCWWRRG's investigation into increasing the recovery of materials such as wood/timber, agricultural wastes, plastics, textiles, tyres and e-waste.	0	0	0	0	0	**0**	0	1	0	1	0	**2**	1	0	0	**1**	**3**	**L**
OBJECTIVE 2: VIABLE RESOURCE RECOVERY MARKETS																			
TARGET 2.1 – 90% of recovered material enters a viable market stream with a focus on local enterprise																			
	Develop a Resource Recovery Market plan	1	1	1	1	1	**5**	1	1	1	1	1	**5**	1	1	1	**3**	**13**	**H**
	Improve resource recovery of priority marketable products, waste streams will go to the All Waste Interchange.	1	1	1	1	1	**5**	1	1	1	1	1	**5**	0	1	1	**2**	**12**	**H**
	Advocate and support research in resource recovery and waste management.	1	1	1	1	1	**5**	1	1	1	1	1	**5**	-1	1	1	**1**	**11**	**H**
	Invest in 'pre-sort' infrastructure that aims to maximise on-site resource recovery.	0	1	1	1	1	**4**	1	1	1	1	1	**5**	-1	1	1	**1**	**10**	**H**
	Undertake a gap analysis and develop a 3-year Strategic Resourcing Plan to enable proactive delivery of Waste Strategy, including opportunity for Resource Recovery Market Officer.	1	1	1	1	1	**5**	1	1	1	1	1	**5**	-1	0	0	**-1**	**9**	**H**

No.	Management options	En1	En2	En3	En4	En5	Score	S1	S2	S3	S4	S5	Score	Ec1	Ec2	Ec3	Score	Total	Rank HML
	Establish and implement findings from research and development projects with universities and other learning institutions.	1	1	1	1	1	**5**	0	0	0	1	0	**1**	0	1	1	**2**	**8**	**H**
	Adopt an in-house ethical procurement policy in Council	0	0	0	1	0	**1**	1	1	0	1	0	**3**	0	0	0	**0**	**4**	**L**
	Share information across government on market development needs and priorities.	0	0	0	0	0	**0**	0	0	0	1	0	**1**	0	0	0	**0**	**1**	**L**
	Provide support for existing and emerging waste market initiatives	0	0	0	0	0	**0**	0	0	0	1	0	**0**	0	0	0	**0**	**1**	**L**
	Consult with industry and GCWWRRG to gather information on innovation and market development needs and priorities.	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	**0**	**0**	**L**
OBJECTIVE 3: ADAPTIVE INFRASTRUCTURE AND OPERATIONS																			
TARGET 3.1 – Infrastructure enable full resource recovery targets to be met																			
	Assess and implement options for asset rationalisation, consolidation and upgrade of landfill and RRC infrastructure.	1	1	1	1	1	**5**	1	1	1	1	1	**5**	-1	1	1	**1**	**11**	**H**
	Invest in 'pre-sort' infrastructure that aims to maximise on-site resource recovery	0	1	1	1	1	**4**	1	1	1	1	1	**5**	-1	1	1	**1**	**10**	**H**
	Facilitate the consolidation of waste infrastructure including depot and transfer station to an All Waste Interchange.	0	1	1	1	1	**4**	1	1	1	1	1	**5**	-1	1	1	**1**	**10**	**H**
	Invest in state-of-the-art waste service fleet, including investigation of alternative fuel and hybrid drive systems	1	1	1	1	1	**5**	1	1	1	1	1	**5**	-1	0	0	**-1**	**9**	**H**

No.	Management options	En1	En2	En3	En4	En5	Score	S1	S2	S3	S4	S5	Score	Ec1	Ec2	Ec3	Score	Total	Rank HML
	Conduct a feasibility study that looks at all options for a waste to energy facility that places Ballarat as a central processor of Victoria's waste.	0	1	1	1	0	**3**	1	1	-1	1	0	**2**	1	1	1	**3**	**8**	**M**
	Provide assistance to industry to ensure infrastructure, facilities and services are operating and managed to protect the community, environment and public health	1	1	0	0	1	**3**	0	1	1	0	1	**3**	1	0	1	**2**	**8**	**M**
	Share information across government on council infrastructure needs and priorities.	0	0	0	0	0	**0**	0	0	0	1	0	**1**	0	0	0	**0**	**1**	**L**
TARGET 3.2 – Waste management operations are adaptive and exceed industry standards and benchmarks																			
	Establish benchmarks for waste management services including: landfill management; transfer station, street cleaning and waste collection and use to inform best practice and continual improvement processes.	0	1	1	1	1	**4**	1	1	1	1	1	**5**	0	1	0	**1**	**10**	**H**
	Implement the Smythesdale Landfill Master Plan	0	0	0	0	0	**0**	1	1	1	1	1	**5**	-1	1	1	**1**	**6**	**M**
	Work with the GCWWRRG, industry and the EPA to progress any rehabilitation assessments and requirements for closed landfills.	0	0	0	0	1	**1**	0	0	1	0	1	**2**	0	0	0	**0**	**3**	**L**
	Investigate logistics and infrastructure that produce efficiencies in waste transport including understanding the viability verses distance constraint	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	**0**	**0**	**L**
TARGET 3.3 – Reduce incidents of illegal dumping by 50% by 2022																			
	Facilitate the development of an illegal dumping action plan with partners and key stakeholders.	1	0	0	1	1	**3**	1	1	1	1	1	**5**	0	0	0	**0**	**8**	**M**

No.	Management options	En1	En2	En3	En4	En5	Score	S1	S2	S3	S4	S5	Score	Ec1	Ec2	Ec3	Score	Total	Rank HML
	Work with SV and the Victorian Litter Action Alliance (VLAA) to develop and implementation best practice litter prevention programs.	1	0	0	0	1	**2**	1	1	1	0	1	**4**	0	0	0	**0**	**6**	**M**
	Raise awareness of illegal dumping through the Waste Education Plan	1	0	0	0	1	**2**	1	1	1	0	1	**4**	-1	0	0	**-1**	**5**	**M**
	Provide additional resource for enforcement activities.	0	0	0	0	1	**1**	1	1	1	0	1	**4**	-1	0	0	**-1**	**4**	**L**
OBJECTIVE 4: STRATEGIC PLANNING																			
TARGET 4.1 – Adaptive management principles are embedded in waste management planning and implementation																			
	Implement an annual review of the Strategy Implementation Plan.	1	1	1	1	1	**5**	1	1	1	1	1	**5**	1	0	0	**1**	**11**	**H**
	Apply adaptive management approach to waste management. This includes; strategy and planning, implementation and monitoring and evaluation and reporting.	1	1	1	1	1	**5**	1	1	1	1	1	**5**	1	0	0	**1**	**11**	**H**
	Establish a process to flag new and/or expanding waste streams and identify potential solutions.	1	1	1	1	1	**5**	1	0	1	1	1	**4**	0	1	1	**2**	**11**	**H**
	Conduct 6-monthly audits of all waste sectors.	1	1	1	1	1	**5**	0	0	1	1	1	**3**	0	0	0	**0**	**8**	**M**
	Implement a reliable and targeted local data system that informs waste and resource recovery decisions and contributes to regional and state data systems.	1	1	1	1	1	**5**	1	0	1	1	1	**4**	-1	0	0	**-1**	**8**	**M**
	Work with GCWWRRG and other councils to develop mechanisms and contingency plans to appropriately manage waste and material during and after emergency or unplanned events.	0	1	1	1	1	**4**	1	0	1	1	1	**4**	-1	0	0	**-1**	**7**	**M**

No.	Management options	En1	En2	En3	En4	En5	Score	S1	S2	S3	S4	S5	Score	Ec1	Ec2	Ec3	Score	Total	Rank HML
	Work with the GCWWRRG to facilitate the development of council partnerships to enable efficiencies in resource recovery, materials transport and disposal.	0	1	0	1	0	**2**	1	1	0	0	0	**2**	0	1	1	**2**	**6**	**M**
	Work with all levels of government, industry and investors to explore innovative and technological advancements that could inform future infrastructure development and investment.	0	1	0	1	0	**2**	1	1	0	0	0	**2**	0	1	1	**2**	**6**	**M**
	Implement sustainable contract management processes to ensure best use of funds	0	0	0	0	0	**0**	1	1	1	0	0	**3**	1	0	1	**2**	**5**	**M**
	Collaborate with GCWWRRG on waste infrastructure planning	0	1	0	0	1	**2**	1	0	1	1	1	**4**	0	0	0	**0**	**6**	**M**

Based on the outcomes from the sustainability assessment, each option has been prioritised according to a low (L), medium (M) or high (H) priority as shown in Table 5.4

Table 5-2 Prioritised strategic actions

No.	Management options	Environmental	Social	Economic	Total	Rank HML
OBJECTIVE 1: FULL RESOURCE RECOVERY						
TARGET 1.1 – The growth in waste generation is less than the rate of population growth	Work with relevant agencies, industry and schools on waste and resource reduction and recovery education and engagement.	5	4	3	**12**	**H**
	Educate and raise awareness of waste minimisation and avoidance through the development of a Waste Education Plan.	5	5	1	**11**	**H**
	Advocate for product stewardship reuse, reduce, repurpose.	5	5	1	**11**	**H**
	Provide advocacy in the community through support of waste minimisation initiatives	3	2	2	**7**	**M**
	Identify and implement financial incentives and disincentives for waste minimisation across all sectors.	2	1	1	**4**	**L**
	Provide community leadership through local groups and businesses.	1	1	1	**3**	**L**
TARGET 1.2 – Achieve 70% diversion of waste from landfill by 2022 with a long-term goal of 85% by 2028	Develop a Waste Action Program to reduce recycling contamination across the MSW sector.	5	5	1	**11**	**H**
	Assess collection needs across all sectors, identify gaps in council services and investigate provision for those additional community needs.	5	5	1	**11**	**H**
	Educate and raise awareness of diversion options through the Waste Education Plan.	5	4	1	**10**	**H**
	Provide advocacy in the community through support of waste minimisation initiatives.	4	3	3	**10**	**H**
	Invest in 'pre-sort' infrastructure that aims to maximise on-site resource recovery.	4	5	1	**10**	**H**
	Consolidation of waste infrastructure including depot and transfer station to an All Waste Interchange model.	4	5	1	**10**	**H**

No.	Management options	Environmental	Social	Economic	Total	Rank HML
	Adopt a circular waste management approach across all waste sectors.	4	4	1	**9**	**H**
	Provide incentives for businesses that are innovative waste reducers.	5	4	0	**9**	**H**
	Identify and implement financial incentives and disincentives for appropriate waste sorting and recycling across all sectors.	5	4	0	**9**	**H**
	Continue to conduct a feasibility study that looks at all options of waste to energy facilities that places Ballarat as a central processor of Victoria's waste.	3	2	3	**8**	**M**
	Promote and advocate for the avoidance of single use products.	4	3	1	**8**	**M**
	Develop a business case for organic diversion options for MSW and C&I waste sectors	4	3	1	**8**	**M**
	Encourage on-site reuse for construction & demolition waste and work with local recyclers of C&D to better promote services in the region.	4	0	1	**5**	**M**
	Advocate for product stewardship reuse, reduce, repurpose.	0	3	1	**4**	**L**
	Provide community leadership through local groups and business	1	1	1	**3**	**L**
	Support GCWWRRG's investigation into increasing the recovery of materials such as wood/timber, agricultural wastes, plastics, textiles, tyres and e-waste.	0	2	1	**3**	**L**

No.	Management options	Environmental	Social	Economic	Total	Rank HML
OBJECTIVE 2: VIABLE RESOURCE RECOVERY MARKETS						
TARGET 2.1 – 90% of recovered material enters a viable market stream with a focus on local enterprise	Develop a Resource Recovery Market plan	5	5	3	**13**	**H**
	Improve resource recovery of priority marketable products, waste streams will go to the All Waste Interchange.	5	5	2	**12**	**H**
	Advocate and support research in resource recovery and waste management	5	5	1	**11**	**H**
	Invest in 'pre-sort' infrastructure that aims to maximise on-site resource recovery.	4	5	1	**10**	**H**
	Undertake a gap analysis and develop a 3-year Strategic Resourcing Plan to enable proactive delivery of Waste Strategy, including opportunity for Resource Recovery Market Officer.	5	5	-1	**9**	**H**
	Establish and implement findings from research and development projects with universities and other learning institutions.	5	1	2	**8**	**H**
	City of Ballarat adopt an ethical procurement policy	1	3	0	**4**	**L**
	Share information across government on market development needs and priorities.	0	1	0	**1**	**L**
	Provide support for existing and emerging waste market initiatives	0	0	0	**1**	**L**
	Consult with industry and GCWWRRG to gather information on innovation and market development needs and priorities.	0	0	0	**0**	**L**

No.	Management options	Environmental	Social	Economic	Total	Rank HML
OBJECTIVE 3: ADAPTIVE INFRASTRUCTURE AND OPERATIONS						
TARGET 3.1 – Infrastructure enable full resource recovery targets to be met	Assess and implement options for asset rationalisation, consolidation and upgrade of landfill and RRC infrastructure.	5	5	1	**11**	**H**
	Invest in 'pre-sort' infrastructure that aims to maximise on-site resource recovery	4	5	1	**10**	**H**
	Facilitate the consolidation of waste infrastructure including depot and transfer station to an All Waste Interchange.	4	5	1	**10**	**H**
	Invest in state-of-the-art waste service fleet, including investigation of alternative fuel and hybrid drive systems	5	5	-1	**9**	**H**
	Conduct a feasibility study that looks at all options for a waste to energy facility that places Ballarat as a central processor of Victoria's waste.	3	2	3	**8**	**M**
	Share information across government on council infrastructure needs and priorities.	0	1	0	**1**	**L**
	Provide assistance to industry to ensure infrastructure, facilities and services are operating and managed to protect the community, environment and public health	3	3	2	**8**	**M**
TARGET 3.2 – Waste management operations are adaptive and exceed industry standards and benchmarks	Establish benchmarks for waste management services including: landfill management; transfer station, street cleaning and waste collection and use to inform best practice and continual improvement processes.	4	5	1	**10**	**H**
	Implement the Smythesdale Landfill Master Plan	0	5	1	**6**	**M**

No.	Management options	Environmental	Social	Economic	Total	Rank HML
	Work with the GCWWRRG, industry and the EPA to progress any rehabilitation assessments and requirements for closed landfills.	1	2	0	**3**	**L**
	Investigate logistics and infrastructure that produce efficiencies in waste transport including understanding the viability verses distance constraint	0	0	0	**0**	**L**
TARGET 3.3 – Reduce incidents of illegal dumping by 50% by 2022	Facilitate the development of an illegal dumping action plan with partners and key stakeholders.	3	5	0	**8**	**M**
	Work with SV and the Victorian Litter Action Alliance (VLAA) to develop and implementation best practice litter prevention programs.	2	4	0	**6**	**M**
	Raise awareness of illegal dumping through the Waste Education Plan	2	4	-1	**5**	**M**
	Provide additional resource for enforcement activities.	1	4	-1	**4**	**L**

No.	Management options	Environmental	Social	Economic	Total	Rank HML
OBJECTIVE 4: STRATEGIC PLANNING						
TARGET 4.1 – Adaptive management principles are embedded in waste management planning and implementation	Implement an annual review of the RRWM Implementation Plan.	5	5	1	**11**	**H**
	Apply adaptive management approach to waste management. This includes; strategy and planning, implementation and monitoring and evaluation and reporting.	5	5	1	**11**	**H**
	Establish a process to flag new and/or expanding waste streams and identify potential solutions.	5	4	2	**11**	**H**
	Conduct bi-annual audit of all waste sectors and implement changes according to the data received.	5	3	0	**8**	**M**
	Implement a reliable and targeted local data system that informs waste and resource recovery decisions and contributes to regional and state data systems.	5	4	-1	**8**	**M**
	Work with GCWWRRG and other councils to develop mechanisms and contingency plans to appropriately manage waste and material during and after emergency or unplanned events.	4	4	-1	**7**	**M**
	Work with the GCWWRRG to facilitate the development of council partnerships to enable efficiencies in resource recovery, materials transport and disposal.	2	2	2	**6**	**M**
	Work with all levels of government, industry and investors to explore innovative and technological advancements that could inform future infrastructure development and investment.	2	2	2	**6**	**M**
	Implement sustainable contract management processes to ensure best use of funds	0	3	2	**5**	**M**
	Collaborate with GCWWRRG on waste infrastructure planning	2	4	0	**6**	**M**

6. Conclusions

This Report has reviewed the current status of waste management within the *City of Ballarat*, including material generated, waste collection and disposal services provided and recycling and waste disposal facilities. This review provides background information for the development of a strategy that offers long-term strategic direction for sustainable waste management and provides a focus on the *City of Ballarat's* goals to be achieved over the next five years.

The *City of Ballarat's* Strategic Direction

Vision

To achieve zero recoverable waste to landfill by 2040.

In order to achieve this Vision, four Strategic Objectives and seven Targets have been established to provide direction for waste and resource recovery in the *City of Ballarat* over the next five years.

Objective One: Full resource recovery.
Target 1.1 The growth in waste generation is less than the rate of population growth.
Target 1.2 Achieve 70% diversion of waste from landfill by 2022 with a long-term goal of 85% by 2028.

Objective Two: Viable resource recovery markets.
Target 2.1 90% of recovered material enters a viable market stream with a focus on local enterprise.

Objective Three: Adaptive infrastructure and operations.
Target 3.1 Infrastructure enables full resource recovery targets to be met.
Target 3.2 Waste management operations are adaptive and exceed industry standards and benchmarks.
Target 3.3 Reduce incidents of illegal dumping by 50% by 2022.

Objective Four: Strategic planning.
Target 4.1 Adaptive management principles are embedded in waste management planning and implementation.

The below table outlines proposed management options to be considered for inclusion in the *City of Ballarat Resource Recovery and Waste Management Strategy, 2018-2022*. These management options have been developed through a number of processes including: workshops with key stakeholders; analysis of previous strategy actions; and benchmarking of best practice across the waste management industry. They are in line with State and regional objectives and aim to meet targets developed for each of the four Strategy Objectives.

A Triple Bottom Line assessment was used to assess each management option for their environmental, social and economic impacts.

Vision: To achieve zero recoverable waste to landfill by 2040

Objectives	Full resource recovery		Viable resource recovery markets	Adaptive infrastructure and operations			Strategic Planning
Targets	**T1.1 The growth in waste generation is less than the rate of population growth.**	**T1.2 Achieve 70% diversion of waste from landfill by 2022 with a long-term goal of 85% by 2028.**	**T2.1 90% of recovered material enters a viable market stream with a focus on local enterprise.**	**T3.1 Infrastructure enables full resource recovery targets to be met.**	**T3.2 Waste management operations are adaptive and exceed industry standards and benchmarks.**	**T3.3 Reduce incidents of illegal dumping by 50% by 2022.**	**T4.1 Adaptive management principles are embedded in waste management planning and implementation.**
Management Options	Work with relevant agencies, industry and schools on waste and resource reduction and recovery education and engagement. Educate and raise awareness of waste minimisation and avoidance through the development of a **Waste Education Plan**. Advocate for **product stewardship** reuse, reduce, repurpose. (T1.1, T1.2). Provide advocacy in the community through support of waste **minimisation initiatives** (T1.1, T1.2). Identify and implement financial incentives and disincentives for waste minimisation across all sectors. Provide community leadership through local groups and businesses.	Develop a **Waste Action Program** to reduce recycling contamination across the MSW sector. Assess collection needs across all sectors, identify gaps in council services and investigate provision for those additional community needs. Educate and raise awareness of diversion options through the **Waste Education Plan**. Promote and advocate for the avoidance of single use products. Develop a business case for organic diversion options for MSW and C&I waste sectors Encourage on-site reuse for construction & demolition waste, and work with local recyclers of C&D to better promote services in the region. Provide community leadership through local groups and business. Support GCWWRRG's investigation into increasing the recovery of materials such as wood/timber, agricultural wastes, plastics, textiles, tyres and e-waste.	Develop a **Resource Recovery Market plan**. Improve resource recovery of priority marketable products, waste streams will go to the **All Waste Interchange**. Invest in 'pre-sort' infrastructure that aims to maximise on-site resource recovery (**MRF**). (T1.1, T2.1, T3.1) Undertake a gap analysis and develop a 3-year **Strategic Resourcing Plan** to enable proactive delivery of Waste Strategy, including opportunity for Resource Recovery Market Officer. Provide support for existing and emerging waste market initiatives Consult with industry and GCWRWRRG to gather information on innovation and market development needs and priorities.	Assess and implement options for asset rationalisation, consolidation and upgrade of landfill and RRC infrastructure. Facilitate the consolidation of waste infrastructure including depot and transfer station to an **All Waste Interchange** (T1.2, T3.1). Invest in **state-of-the-art waste service fleet**, including investigation of alternative fuel and hybrid drive systems. Continue to pursue a feasibility study that looks at all options of **waste to energy facilities** that places Ballarat as a central processor of Victoria's waste (T1.2, T3.1). Implement the **Smythesdale Landfill Master Plan.** Work with the GCWWRRG, industry and the EPA to progress any rehabilitation assessments and requirements for closed landfills. Provide assistance to industry to ensure infrastructure, facilities and services are operating and managed to protect the community, environment and public health.	Establish **benchmarks for waste management services** including: landfill management; transfer station, street cleaning and waste collection and use to inform best practice and continual improvement processes. Investigate logistics and infrastructure that produce efficiencies in waste transport including understanding the viability verses distance constraint.	Facilitate the development of an **illegal dumping action plan** with partners and key stakeholders. Work with SV and the Victorian Litter Action Alliance (VLAA) to develop and implementation best practice **litter prevention programs**. Raise awareness of illegal dumping through the **Waste Education Plan** Provide **additional resource** for enforcement activities.	Implement **an annual review** of the RRWM Implementation Plan. Apply **adaptive management approach** to waste management. Implement a reliable and targeted local **data system** that informs waste and resource recovery decisions and contributes to regional and state data systems. Work with GCWWRRG and other councils to develop mechanisms and **contingency plans** to appropriately manage waste and material during and after emergency or unplanned events. Work with the GCWWRRG to facilitate the development of **council partnerships** to enable efficiencies in resource recovery, materials transport and disposal. Collaborate with GCWWRRG on waste **infrastructure planning.**

GCWWRRG = Grampians Central West Waste and Resource Recovery Group. EPA= Environment Protection Authority. SV = Sustainability Victoria

References for additional information

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Sustainability Victoria (2015b) *Victorian Organic Resource Recovery Strategy,* Sustainability Victoria, Melbourne

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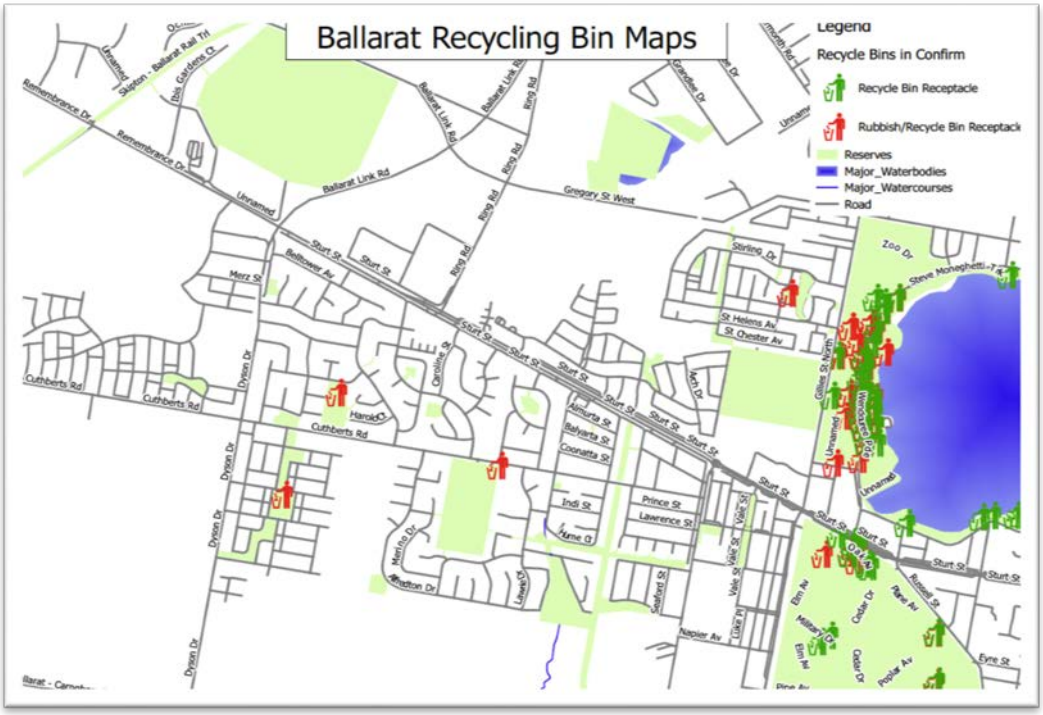
Sustainability Victoria (2016b) *Victorian Waste Education Strategy,* Sustainability Victoria, Melbourne

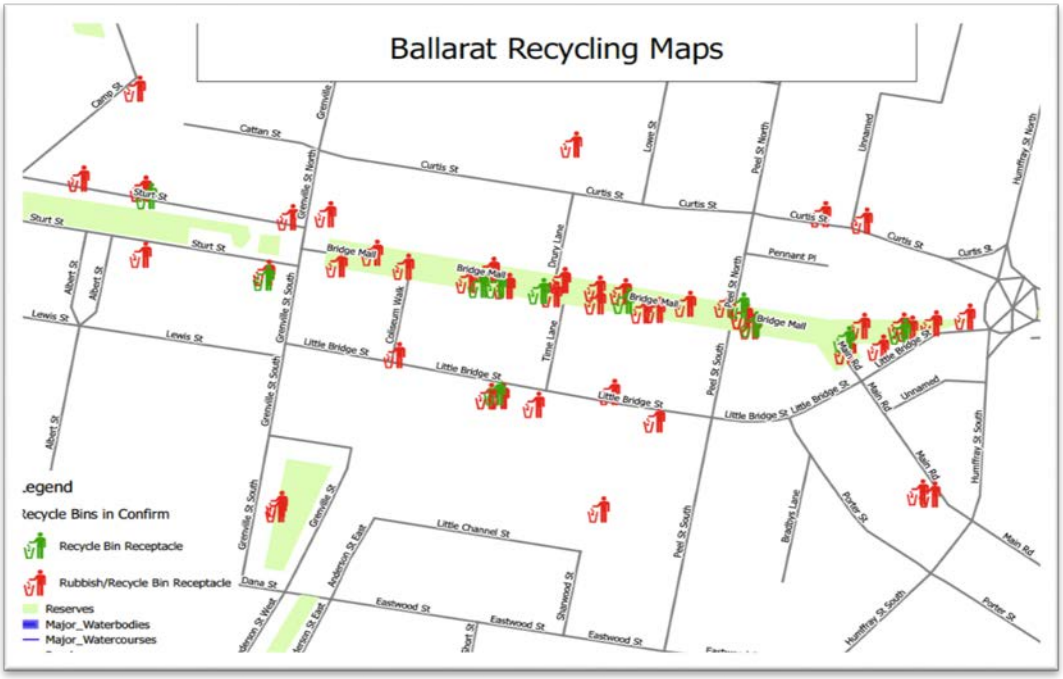
Appendices

Appendix A Detailed map of recycle bins by location

Alfredton

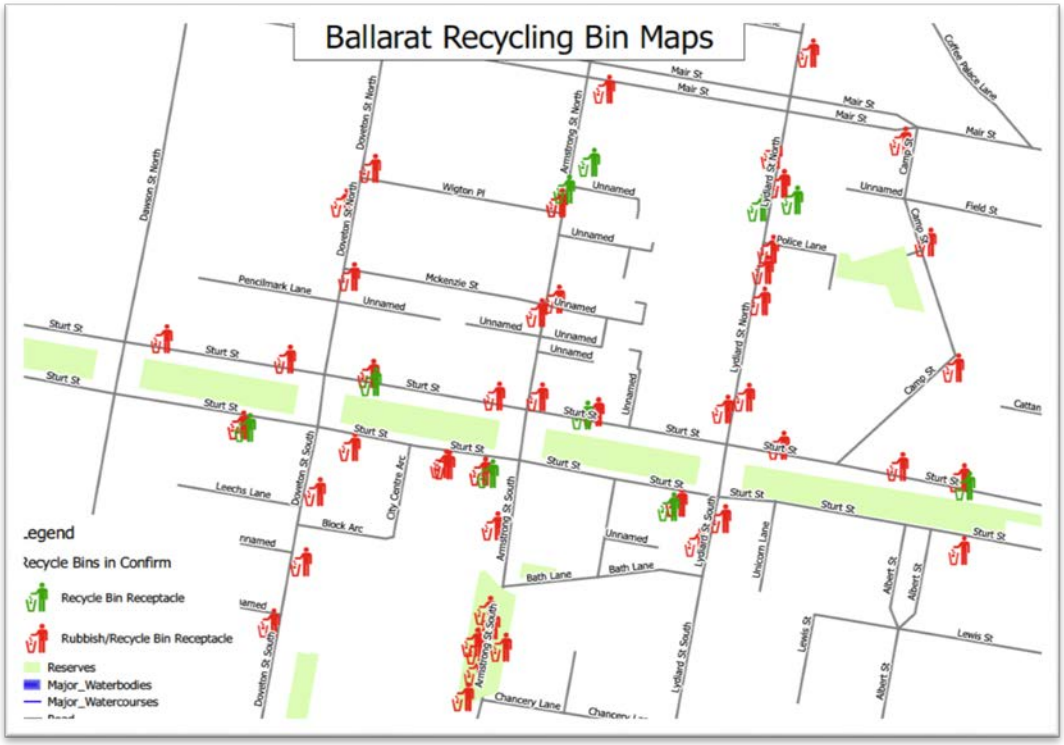


Bridge Mall



Buninyong

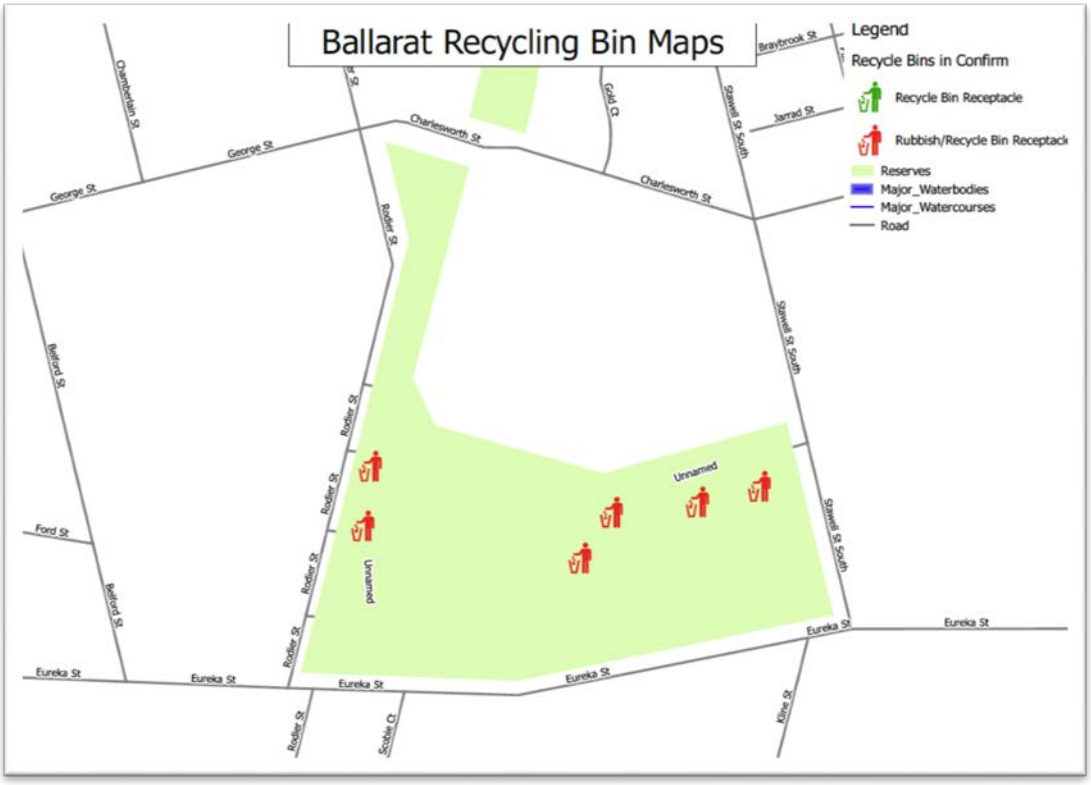
CBD



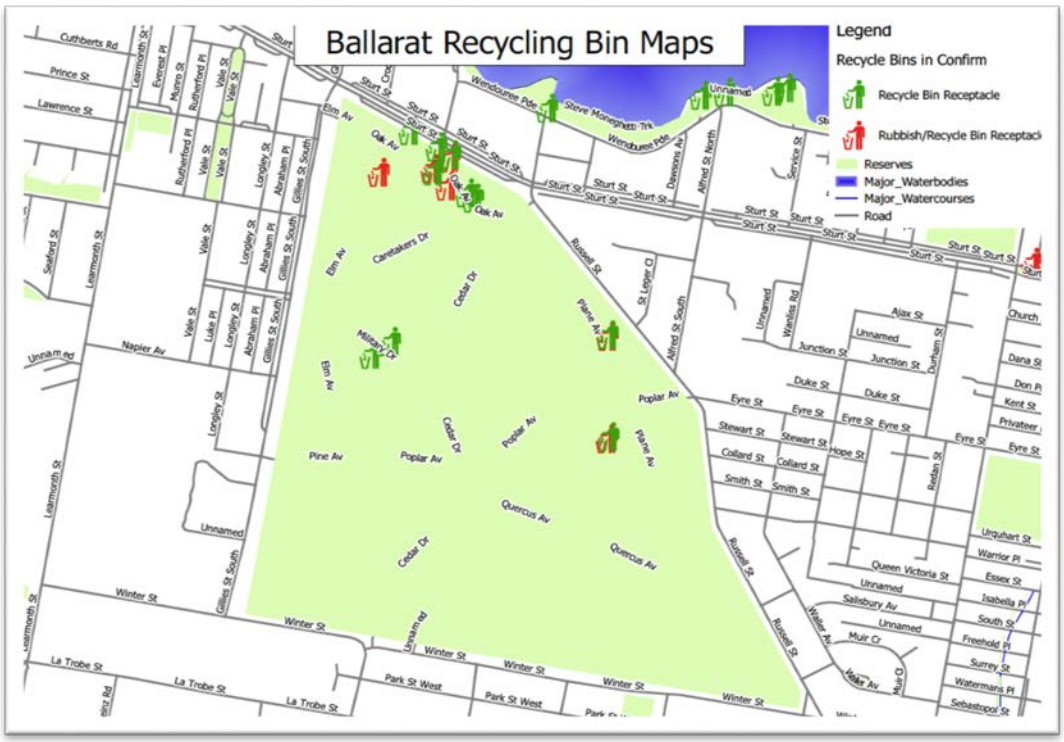
Lake Wendouree

Learmonth

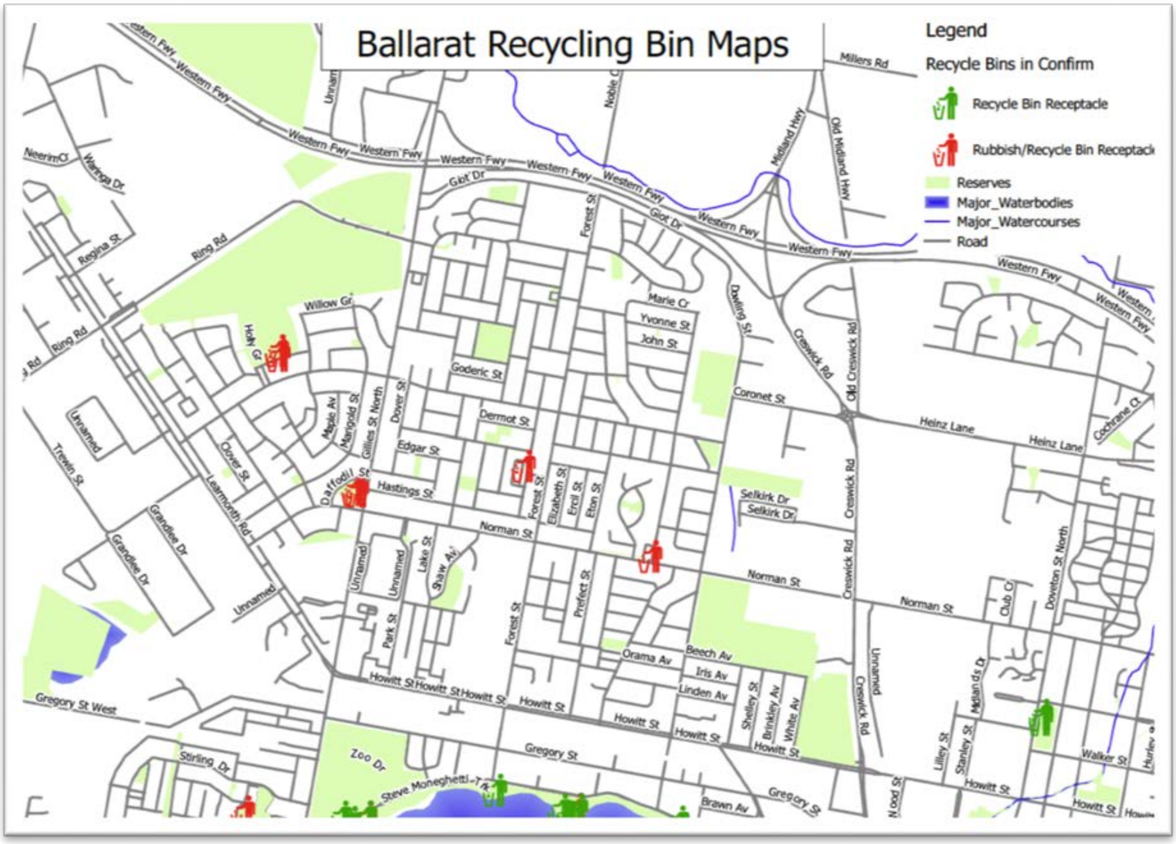
Museum of Australian Democracy at Eureka (M.A.D.E)



Victoria Park



Wendouree



Ballarat Recycling Bin Maps
Legend
Recycle Bins in Confirm
Recycle Bin Receptacle
Rubbish/Recycle Bin Receptacle
Reserves
Major_Waterbodies
Major_Watercourses
Road

Appendix B Transfer Station Fees & Charges 2017/18

Location: Gillies Street Sth, Ballarat (opposite Victoria Park)
Opening Hours
Monday to Friday 8.00am to 4.00pm
Weekends 10.00am to 4.00pm
Facility is closed Christmas Day, New Years Day, Anzac Day and Good Friday

Products By Cubic Metre

PRODUCT	DESCRIPTION	COST PER CUBIC METER
General Waste 0.5 Cubic Meter	Hard Waste, Wood, Plastics, Household Waste, Building Waste (Inc Plastic, Metal, Plasterboard), treated timber	$24.00
General Waste by Cubic Meter		$49.00
Rubble Cubic Metre	Rock, Brick, Concrete (No Metal or Plastic)	$59.60
Green Waste Cubic Metre	Pruning's, grass clippings, leaves, branches	$22.00
Timber	Clean hard and soft wood (not treated)	$30.00

Non - Weighed Products

PRODUCT	COST PER ITEM
Mattress	$30.00
Refrigerators	$17.50
Air Conditioners	$7.50
Tyres- Cars	$6.80
Tyres – 4WD & Light Truck	$15.60
Tyres – Truck	$66.80
Tyres- Tractor	N/A
E-Waste Small	No charge

FREE

Metal steel and aluminium (incl.whitegoods, Televisions, empty/dry paint cans, small auto parts – no car bodies)
Detox – Paints, Oils, Batteries (Residential quantities), fluorescent tubes and compact fluorescent globes (CFLs)
Household recycling material: newspapers, magazines, flattened cardboard, plastic bottles & containers (HDPE, PET, PVC)

NOTE: Aside from chemicals accepted in the detox program – no liquids & no asbestos are accepted on site.

VOUCHERS: Vouchers will be validated on redemption; however, customers must ensure sufficient payment is able to be made should voucher be invalidated due to previous use.

Appendix C Ballarat Regional Landfill Fees & charges 2017/18

Location:

1380 Glenelg Hwy, SMYTHESDALE
Gatehouse Phone Number 03 5342 8540
Landfill is a commercial site and is not open to the public

Opening Hours:
Monday to Friday 7.00 am to 4.30 pm
Saturday 9.00 am to 3.00 pm
Thursday between 10.00am and 12.00pm (by appointment only)
Asbestos (commercial and residential) by appointment only
Category C Soil by appointment only
Cleanfill – POA

Weighed Products

PRODUCT	DESCRIPTION	RATE PER TONNE (INC GST)
Industrial and commercial waste	Waste from commercial and industrial sources (falling below EPA prescribed waste categorisation)	$175.50
Industrial/Commercial (Half load minimum)	Waste from commercial and industrial sources (minimum load – half tonne or less)	$87.75
Mixed Rubble	Rock, Rubble & Concrete (No Metal)	$172.20
Clean Fill – POA – Certificate Required	Soil, Fill, Subsoil, Clay & Rock (to less than 150mm)	POA*
Low Level Contaminated Waste	Category C – Requires pre approval (contact City of Ballarat Customer Service on 5320 5500)	$196.60
Asbestos (Commercial Quantities)**	Must Pre book – Ph. 5342 8540	$220.60
Asbestos (less than 120kg)	Pre booking required – Acceptance conditions apply	$70.00

*POA = PRICE ON APPLICATION
**Restricted Access will apply – Council reserves the right to deny access based on site conditions – Pre-booking required. Refer to Ballarat Regional Landfill – Receiving of Asbestos Doc 104
Note: Tyres, liquid wastes, chemical wastes are not accepted on site. Penalties will apply if identified in load.