



# City of Kwinana

## Three Bin Feasibility Assessment

Report



Prepared for City of Kwinana


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## Executive Summary

Talis Consultants (Talis) was engaged by the City of Kwinana (the City) to assess the feasibility of the kerbside management options (the Assessment) available and as applicable to the City. The kerbside management options reviewed within this Assessment are outlined in Table E-1. Each of the options includes processing of residual waste at the Kwinana Waste to Energy (WtE) facility.

**Table E-1: Options Modelled**

Option #	Description	Bin Configuration	Recycling	Organics	Residual Waste
1	2 Bin WtE		360L/240L yellow lid bin Emptied fortnightly Processed at MRF*	NA	240L red lid bin Emptied weekly WtE Conversion
2	3 Bin GO WtE			240L lime-green lid bin Emptied fortnightly Processed at ORF^	140L red lid bin Emptied weekly WtE Conversion
3	3 Bin FOGO WtE			240L lime-green lid bin Emptied <u>weekly</u> Processed at ORF^	140L red lid bin Emptied fortnightly WtE Conversion

Notes: \*MRF - materials recycling facility

^ORF - organics recycling facility

Based on data provided by the City and using agreed estimates, the modelling determined the financial implications along with the material and resource recovery rates for each kerbside collection option. In this instance, resource recovery is equivalent to landfill diversion. Additionally, a high-level assessment was also undertaken of the carbon emissions resulting from each option. Table E-2 summarises the results of the modelling works.

**Table E-2: Modelling results Summary**

Option #	Description	Average Cost (\$/hhld/yr)	Material Recovery Rate	Resource Recovery Rate	Carbon Emissions (kg CO <sub>2</sub> -e/household/year)
1	2 Bin WtE	\$363	35%	97%	82
2	3 Bin GO WtE	\$398	49%	97%	90
3	3 Bin FOGO WtE	\$449	56%	98%	95

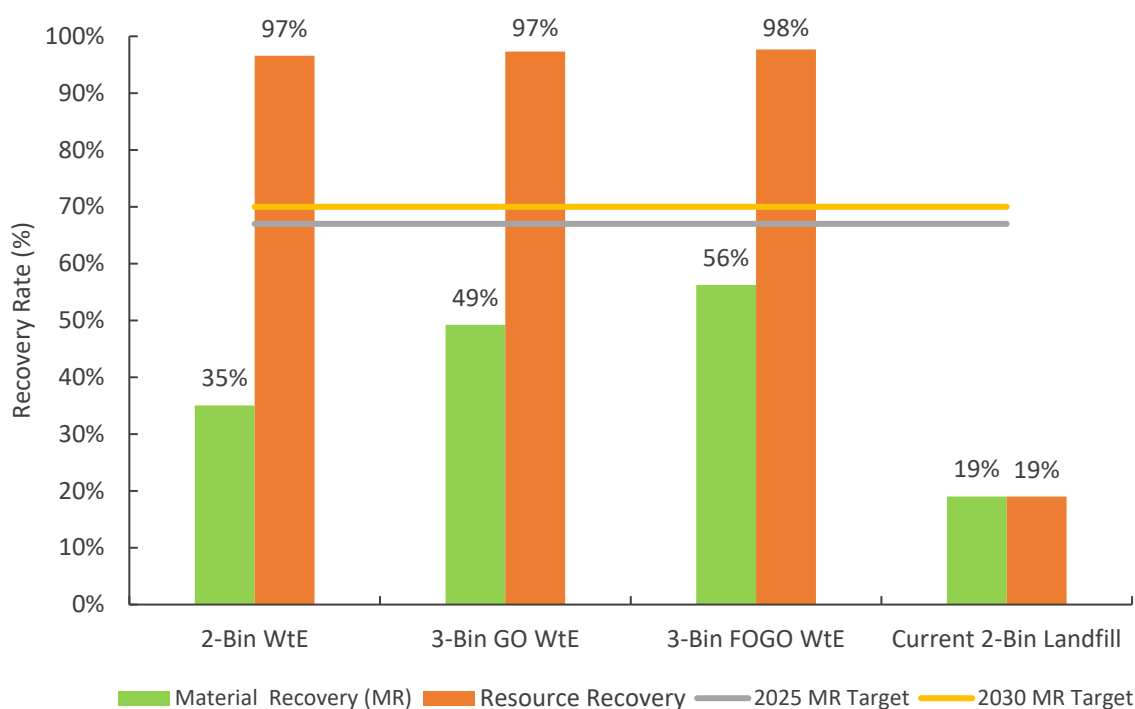
These results do not consider any additional costs associated with processors accepting highly contaminated organic material, which typically incurs a higher gate fee.

The key findings arising from the works within this report are detailed within the following sections.

### Recovery Rates

The modelling considered both the material recovery rates, which exclude the energy recovery component and the resource recovery rates, which is the equivalent of diversion of waste from landfill for all three kerbside collection options. The key findings from the modelling are:

- Transitioning from landfill to WtE increases material recovery by 16% and resource recovery by 78% in a 2-bin system;
- The 2-bin WtE option has the lowest material recovery rate of 35%;
- Material recovery reaches 49% and 56% with the 3-bin GO WtE and 3-bin FOGO WtE options respectively;
- Overall resource recovery rates in all options are at least 97%, representing high landfill diversion (see Figure E-1).

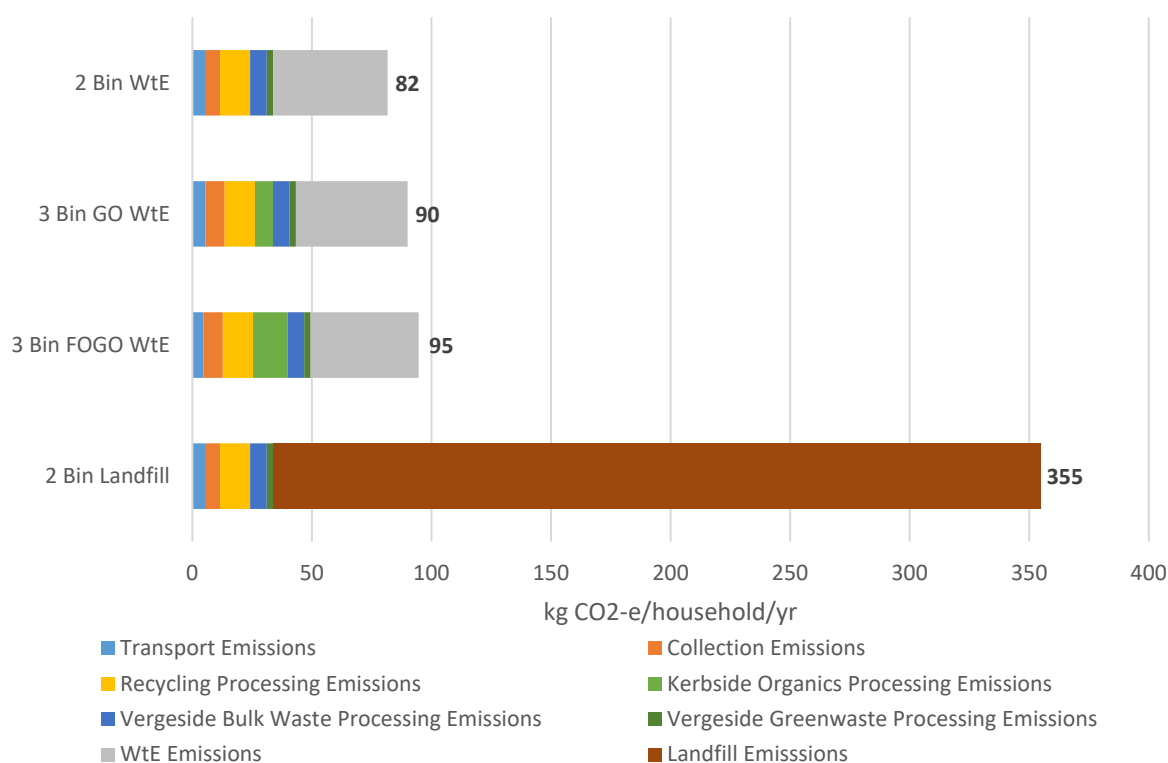


**Figure E-1: Material and Resource Recovery Rates**

It is noted that although a significant improvement, the material recovery rates (even with the preferred better practice option of a 3-bin FOGO service) do not meet the Western Australia Waste Avoidance and Resource Recovery Strategy 2030 (State Waste Strategy 2030) material recovery targets of 67% by 2025 and 70% by 2030.

### Carbon Emissions

The Assessment focused on determining a range of carbon emissions that may arise from different processing solutions. Published carbon emission data from the Talis Perth and Peel FOGO Feasibility Study report were utilised along with average compositional data provided by the City. The results of the carbon assessment are provided in Figure E-2.



**Figure E-2: Estimated Carbon Emissions per Bin Service Option**

The key findings arising from the carbon assessment are as follows:

- The results of the carbon emissions assessment demonstrates that 2-bin WtE option results in the lowest emissions;
- Sending residual waste to landfill results in significantly higher carbon emissions than sending residual waste to WtE; and
- The 3-bin FOGO WtE option results has the highest carbon emissions out of the kerbside collection options assessed due to the increased carbon production from the processing and transport of organics.

### Financial Implications

Talis developed a detailed financial model to analyse the costs of each of the three options over the 10-year period. The model includes annual increases applicable to population, household and contract pricing.

The key findings of the financial modelling are as follows:

- The least expensive kerbside collection option for the City is the 2-bin WtE option, which will cost an average of \$363 per household each year and a total of \$84.1M over the 10 year period;
- The most expensive kerbside collection option is the 3-bin FOGO WtE option, which will cost an average of \$449 per household each year and a total of \$104.1M over the 10 year period; and
- The 3-bin GO WtE kerbside collection option cost an average of \$398 per household each year and a total of \$92M over the 10 year period.

The modelled costs have been summarised below in Table E-3.

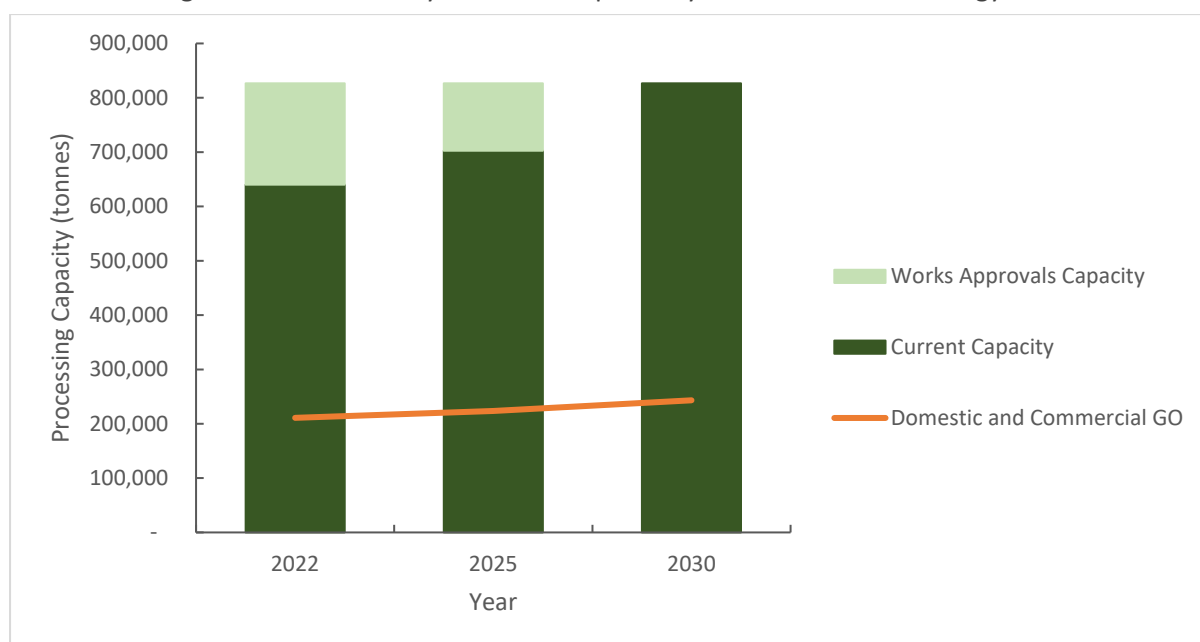
**Table E-3: Financial Modelling Summary**

Option	Average Annual Cost (\$/household)	Average Annual Operating Cost	Total System Cost
<b>2-Bin WtE</b>	\$363	\$8.4M	\$84.1M
<b>3-Bin GO WtE</b>	\$398	\$9.2M	\$92.0M
<b>3-Bin FOGO WtE</b>	\$449	\$10.4M	\$104.1M

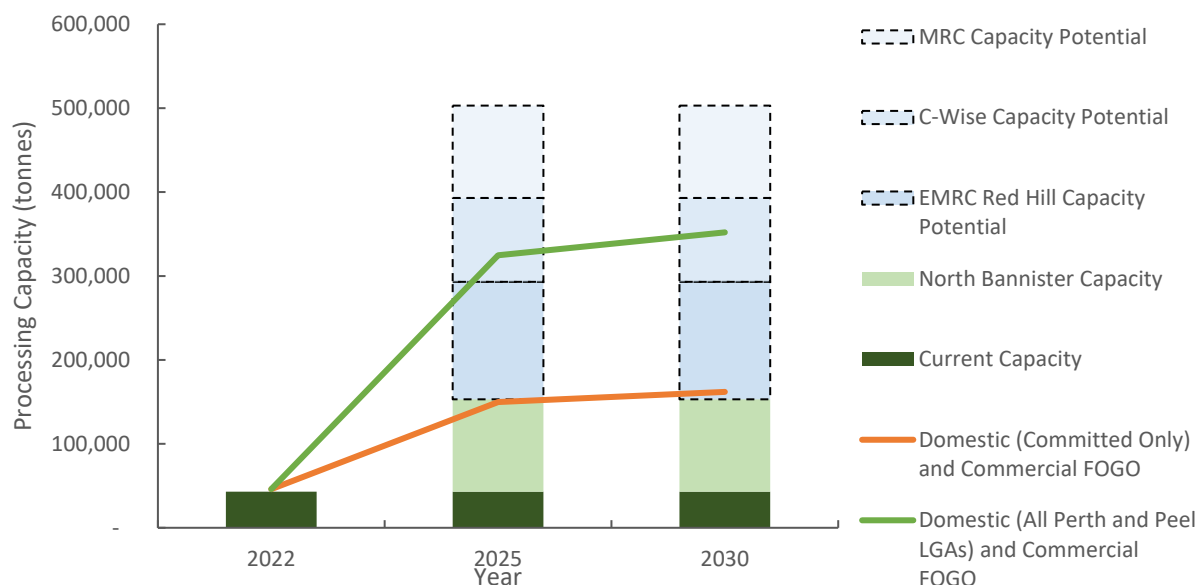
### Organics Processing Capacity

Organics processing capacity was determined by reviewing existing processing facilities and those with current works approvals in and surrounding the Perth and Peel regions. The Assessment considered both domestic and commercial organic material for both GO and FOGO. The analysis determined that:

- There is sufficient processing capacity for GO processing based on current licence capacity (Figure E-3);
- There is a lack of processing capacity in existing FOGO facilities (Figure E-4);
- The expected increase of processing capacity of 100,000 tonnes at Veolia's North Bannister FOGO facility will ensure sufficient FOGO processing capacity for all local governments that have already committed to changing to a FOGO system;
- Additional facilities will be required for processing of FOGO, should all local governments change to a 3-bin FOGO system as is required by the State Waste Strategy 2030.



**Figure E-3: Domestic and Commercial GO Processing Capacity**



**Figure E-4: Domestic and Commercial FOGO Processing Capacity**

## Risk Assessment

The Risk Assessment was conducted using the risk matrix approved by the City. The summary of the key findings across each option is as follows:

- The 2-bin WtE option has the least risk compared to the other options as it represents no change for the residents. The main risks with this option are non-alignment with the State Waste Strategy 2030 and community expectations, and the anticipated exceedance of residual waste tonnages for WtE supply agreement by 2033-34;
- The 3-GO WtE option has moderate to low risks and is arguably better value for money and easier to use than the 3-bin FOGO WtE system. At a moderate level, the main risks for this option include non-alignment with the State Waste Strategy 2030, complexity due to the use of an additional bin and some negative public opinion due to the change;
- The 3-bin FOGO WtE option introduces the most risks as it is the most expensive and complicated option. There is also a moderate risk of the City not finding a suitable contractor to process FOGO and some negative public opinion.

Table E-4 shows the risk levels of the key risks and other risks associated with each kerbside collection option.

**Table E-4: Risk Summary**

Risk Type	Risk Level		
	2-bin WtE	3-bin GO WtE	3-bin FOGO WtE
Non-alignment with State Waste Strategy	High	Moderate	NA
Complexity of bin system	Low	Moderate	High
Negative public opinion	Moderate	Moderate	Moderate
Increased costs	NA	Moderate	High
Organics contamination	NA	Low	High
Processing capacity	NA	Low	Moderate

## Community Engagement

As part of the Assessment, the City engaged the community through an extensive community-wide survey and a focus group workshop.

Residents from across the City took part in the survey with 896 responses, collecting a representative sample size. The survey results found:

- 66% of all respondents wanted a third bin;
- 40% of all respondents wanted a FOGO bin; and
- 63% of the respondents in favour of a three-bin system were willing to pay \$50 or more per annum extra for the additional service.

A select group of residents who completed the survey were invited to attend a focus group. The selected attendees varied in age, opinion and residential area. Following a detailed presentation, the attendees ranked aspects associated with various kerbside collection systems based on their perceived level of importance. These aspects were grouped into criterion under broader environmental, social, economic and governance factors. These results are shown in Table E-4.

**Table E-5: Focus Group Ranking**

Factor	Rank	Criteria	Rank
Environmental	1	Greenhouse Gas Emissions	1
		Material Recovery	2
Social	2	Waste Awareness and Behaviour Change	1
		Simplicity of System	2
		Accessibility to all Households	3
		Public Demand for Bin System	4
		Opportunities for Partnerships/ Collaboration	5
Economic	3	Value for Money	1
		Employment Opportunities	2
		Risk of Contaminated Organics	3
		Increase to Household Waste Service Cost	4
Governance	4	Organics Processing Options	1
		Impact to Collection Service	2
		Alignment with State Waste Strategy 2030 and Policy	3
		Public Perception	4

## Multi- Criteria Assessment

A three-level scoring system was utilised to evaluate the three different kerbside waste service options against each of the criteria in Table E-5. A scoring of 3 (advantageous), 2 (neutral) or 1 (disadvantageous) was used with the highest score being determined to have the most advantages. The results of the Multi-Criteria Assessment (MCA) are shown in Table E-6.



**Table E-6: MCA Scoring and Weighting**

Factor	Criteria	Weighting %	Weighted Score by Option		
			2-bin WtE	3-bin GO WtE	3-bin FOGO WtE
<b>Environmental</b>	Material Recovery	12	12	24	36
	Greenhouse gas emissions	18	54	36	36
<b>Economic</b>	Increase to household waste service costs	12	36	24	12
	Risk of contaminated organics	7.5	22.5	15	7.5
	Value for money	10.5	10.5	31.5	21
<b>Social</b>	Public demand and perception of bin system	7	14	14	21
	Simplicity and accessibility	8	24	16	8
	Waste awareness and behaviour change	5	5	10	15
<b>Governance</b>	Alignment with State Waste Strategy 2030 and policy	10	10	20	30
	Processing Options	10	30	30	20
<b>Total</b>		<b>100</b>	<b>218</b>	<b>220.5</b>	<b>206.5</b>

The MCA shows that based on the weighted scores; all three kerbside waste collection service options are acceptable. The analysis also showed that no option is ideal and no option is completely unfavourable. Therefore, all options are viable for consideration by the City.

### Preferred Solution

Having regard for the range of different aspects under the environmental, economic, social and governance factors that the City needs to consider, Talis' preference is that the City initially change to a 3-bin GO WtE system and then to a 3-bin FOGO system in the future. The business case for the City to transition directly to a 3-bin FOGO WtE system is not compelling at this time. The direct alignment to the Waste Strategy 2030 and 7% material recovery gain that the City would achieve using the FOGO system over a GO system is currently outweighed by the 6% higher carbon emissions, \$1.2M higher annual cost and increased level of risk associated with certain aspects of the FOGO system, at present.

An incremental change to a 3-bin GO WtE system allows the City to address some of the environmental concerns, through a more simplistic system, which allows for a gradual change. This initial change would also be appreciated by those in the community wanting change and could be acceptable to

others in the community, not wanting change when the difference in costs between the 3-bin FOGO WtE system is communicated. This approach would set the City up well, both financially and from the governance perspective, to change to a 3-bin FOGO WtE system in future years once the business case to do so becomes stronger.

## Recommendations

Based on the works and findings from the Assessment, Talis puts forward the following recommendations for the City's consideration:

### 2023-24

- Engage with DWER to inform them of the findings of the Assessment.

### 2024-25

- Subject to the discussions with DWER, consider changing to a 3-bin GO WtE kerbside collection service, with the following bin configuration to properties above 350m<sup>2</sup>:
  - 140L red lid bin emptied weekly for residual waste including FO sent to WtE;
  - 240L/360L yellow lid bin emptied fortnightly for recycling sent for processing; and
  - 240L lime-green lid bin emptied fortnightly for GO sent for processing.
- Allow properties that do not receive a GO bin to opt in.
- Introduce the new GO bins to residents following a thorough community engagement and marketing campaign to inform residents of the changes.

### 2029-30

- If not required earlier, in 2029-30 consider changing to a 3-bin FOGO WtE kerbside collection service, with the following configuration of standard service to all SUDs and MDDs not sharing bins:
  - 140L red lid bin emptied fortnightly for residual waste sent to WtE;
  - 240L/360L yellow lid bin emptied fortnightly for recycling sent for processing; and
  - 240L lime-green lid bin emptied weekly for FOGO sent for processing, along with a kitchen caddy and an annual supply of compostable caddy liners.
- Consider the best options for properties that do not receive a FOGO service.
- Introduce the new FOGO kerbside collection system to residents following a thorough community engagement and marketing campaign to inform residents of the changes.

### General

- Provide on-going community engagement and education to ensure optimum material recovery.
- Advocate for the DWER to provide additional funding for the introduction of GO and FOGO services, to offset the additional costs incurred by local governments and subsequently rate payers.
- Closely monitor kerbside residual waste volumes and future projections against the Waste Supply Agreement thresholds with Avertas WtE. Take appropriate actions to ensure all kerbside residual waste volumes have appropriate treatment and/or disposal services.
- Regularly review changes to legislation, industry activities and market conditions for their implications to the City waste services.

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## 1 Introduction

The City of Kwinana (the City) currently operates a two-bin kerbside waste collection service for its residents. The service consists of a weekly collection of residual waste sent to landfill and a fortnightly collection for commingled recycling sent for processing.

The City is home to approximately 49,500 residents and is one of the fastest growing local governments in Western Australia (WA)<sup>1</sup>. The City also encounters socio-economic challenges being the most disadvantaged population in the Perth metropolitan region with a Socio-Economic Indexes for Areas (SEIFA) score of 972<sup>2</sup>. Accordingly, decisions made by the City need to give careful consideration to the financial impact on the community.

The WA Waste Avoidance and Resource Recovery Strategy 2030<sup>3</sup> (State Waste Strategy 2030) was released in 2019, focusing on material recovery targets rather than landfill diversion compared to previous state waste strategies and guidance. For municipal solid waste (MSW), these targets are 67% by 2025 and 70% by 2030 for the Perth and Peel regions. The State Waste Strategy 2030 also includes a key strategy that outlines the requirement for all local governments in Perth and Peel to provide residents with a three-bin food organics, garden organics (FOGO) service by 2025.

The former WA Waste Strategy released in 2012<sup>4</sup> introduced landfill diversion targets to help improve resource recovery. In response to this, the City entered into a Waste Supply Agreement with the Kwinana Waste to Energy Project (Avertas WtE)<sup>5</sup> to meet the targets, with a commitment to supply between 6,000 -20,000 tonnes of residual waste per annum once the facility is operational. Currently, this residual waste is being sent to landfill. However, once the facility is operational the City would be able to achieve resource recovery rates of 97% or more.

Since the introduction of the State Waste Strategy 2030, two bodies of work assessing FOGO feasibility within the Perth and Peel region have been undertaken. The works include MRA Consulting's Impacts and Benefits of Kerbside Collection Systems Perth and Peel, released October 2021<sup>6</sup> (MRA Report) commissioned by the Department of Water and Environmental Regulation (DWER). Talis's FOGO Feasibility Study Perth and Peel Region released March 2022<sup>7</sup> (Talis FOGO Report) was commissioned by Rivers Regional Council. The kerbside collection systems assessed as part of these reports included a two-bin system, a three-bin system with a garden organics (GO) bin; and a three-bin system with a FOGO bin with residual waste in all systems going to either waste to energy (WtE) or landfill. The reports found several factors which influence how feasible and viable the different kerbside collections are. Both studies grouped a large number of local governments using generalised assumptions, which did not always reflect City specific factors.

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<sup>1</sup> REMPLAN (2022)

<sup>2</sup> Australian Bureau of Statistics (2016)

<sup>3</sup> Waste Avoidance and Resource Recovery Strategy 2030

Strategic\_Direction\_Waste\_Avoidance\_and\_Resource\_Recovery\_Strategy\_2030.pdf  
(wasteauthority.wa.gov.au)

<sup>4</sup> Western Australia Waste Strategy "Creating the Right Environment" WA-Waste-Strategy.pdf  
(instantwaste.com.au)

<sup>5</sup> City of Kwinana (2021)

<sup>6</sup> MRA Consulting Group (2021)

<sup>7</sup> Talis Consultants (2022)



Several local governments across Perth have already implemented either a 3-bin GO or a 3-bin FOGO system. This includes some of the City's neighbouring local governments including the Cities of Cockburn and Rockingham who have implemented the 3-bin GO system, while the Cities of Melville and Fremantle have implemented a 3-bin FOGO system. Therefore, the City's residents are becoming more environmentally conscious and are raising queries in relation to a 3<sup>rd</sup> bin service.

These developments have prompted the City to seek an independent review of the following three kerbside waste service options, as applicable to the City:

- Two-bin system with recycling processing, and residual waste sent to waste to energy (WtE) (2-bin WtE);
- Three-bin system with recycling and GO processing, and residual waste sent to WtE (3-bin GO WtE); and
- Three-bin system with recycling and FOGO processing, and residual waste sent to WtE (3-bin FOGO WtE).

Talis Consultants (Talis) was engaged by the City to fulfil the requirements of this Kwinana 3-bin Feasibility Assessment (the Assessment).

This Report provides a detailed understanding of the works undertaken and the key findings of the Assessment and provides recommendations for the City and its elected members to consider for its future resource recovery and waste management operations.

## 1.1 Objectives and Scope

The City recognises the importance of better practice waste management services and is seeking to devise a long-term direction for its waste services. The key objective of this Assessment is to provide an independent and objective assessment of the feasibility of the kerbside management options available to the City.

To achieve this objective, the scope included:

- Assessing the legislative and policy setting;
- Determining the City's potential waste volumes generated annually to 2032-33;
- Examining the existing waste management systems and kerbside services offered by the City;
- Consideration of the financial cost of each kerbside collection option;
- Evaluating the potential recovery rates achieved by each kerbside collection option;
- Assessing the current and future processing capacity of organics in WA;
- Reviewing the carbon emissions of each kerbside collection option;
- Evaluating the community support for each kerbside collection option;
- Assessing the risks associated with each kerbside service;
- Ranking of options using a multi-criteria analysis tool; and
- Providing the City with recommendations for their further consideration.

## 2 Legislative, Policy and Contract Framework

This section contains a brief overview of the current legislative and policy context surrounding local government waste management.

### 2.1 National Waste Policy

The National Waste Policy<sup>8</sup> was released in 2018 and asserts that a move towards a circular economy and away from a “take, make, use and dispose” system will allow us to preserve the value of our resources.

The aims of the National Waste Policy are to:

- Respond to the challenges facing waste management and resource recovery in Australia (excluding radioactive waste);
- Reflect the global shift towards a circular economy, including resource-efficient systems, products and services to avoid waste, conserve resources and maximise the value of all materials used; and
- Provide a framework for businesses to embrace innovation and develop technologies that create new opportunities.

A three-bin organics system is supported by strategy 12 of the National Waste Policy, which is to “reduce organic waste, including garden and food waste, by avoiding their generation and supporting diversion away from landfill into soils and other uses.”

### 2.2 Waste Avoidance and Resource Recovery Act 2007

The *Waste Avoidance and Resource Recovery Act 2007* (WARR Act)<sup>9</sup> is WA State Legislation that came into effect in June 2008. The objectives of the WARR Act are “to contribute to the sustainability, and the protection of human health and the environment, in WA and the move towards a waste-free society by:

- *Promoting the most efficient use of resources, including resource recovery and waste avoidance;*
- *Reducing environmental harm, including pollution through waste;*
- *The consideration of resource management options against the following hierarchy:*
  - *Avoidance of unnecessary resource consumption;*
  - *Resource recovery (including reuse, reprocessing, recycling and energy recovery); and*
  - *Disposal.”*

The WARR Act establishes the Waste Authority and its duty to “advise and make recommendations on the regulation of waste services,” which includes the avoidance of waste generation and increased resource recovery. To carry out this duty, the Waste Authority is required to prepare a waste strategy.

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<sup>8</sup> National Waste Policy - DCCEEW

<sup>9</sup> Waste Avoidance and Resource Recovery Act 2007 - Home Page ([legislation.wa.gov.au](http://legislation.wa.gov.au))

## 2.3 State Waste Strategy 2030

The State Waste Strategy 2030<sup>3</sup> was published in February 2019 and outlines a vision for WA to “become a sustainable, low-waste, circular economy in which human health and the environment are protected from the impacts of waste.”

The State Waste Strategy 2030 has three guiding concepts:

- Waste hierarchy;
- Circular economy; and
- Behaviour change.

The Waste Hierarchy (Figure 2-1) is an internationally accepted principle used to guide decision making surrounding waste management. It identifies waste management options in order of preference, with the most preferred options located at the top of the hierarchy. Avoiding the generation of waste is the highest priority, followed by various methods of recovery or reprocessing before waste is disposed.

A circular economy (Figure 2-2) is an alternative to a traditional “take, make, use, dispose” economy that aims to retain materials in the economy for as long as possible. This is achieved by recovering and reusing materials as set out in the waste hierarchy.

The State Waste Strategy 2030 aims to change waste management behaviours through a combination of knowledge, infrastructure, and incentives. It states that knowledge is important for starting behaviour changes but must be complemented with incentives to ensure that the decision to change behaviours can be acted upon. As part of this, the State Waste Strategy 2030 includes material recovery targets and has a headline strategy for all local governments in Perth and Peel to provide a three-bin FOGO service by 2025.

It also asserts that it is critical to have the appropriate infrastructure to facilitate behaviour changes. This includes having the facilities necessary to manage and process the different categories of waste that result from behaviour changes.

The State Waste Strategy 2030 has used these three guiding concepts to develop overarching targets for Western Australia under three objectives, “Avoid”, “Recover” and “Protect” (Figure 2-3). It states that a three-bin kerbside collection system, including the separation of food organics and garden organics (FOGO) from other waste categories, should be provided by all local governments in the Perth and Peel region by 2025.

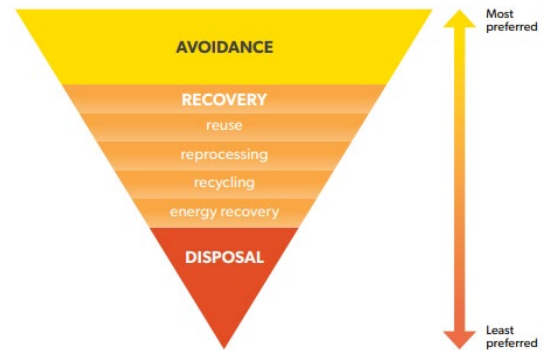


Figure 2-1: Waste Hierarchy



Figure 2-2: Circular Economy

Avoid	Recover	Protect
<i>Western Australians generate less waste.</i>	<i>Western Australians recover more value and resources from waste.</i>	<i>Western Australians protect the environment by managing waste responsibly.</i>
<ul style="list-style-type: none"> <li>2025 – 10% reduction in waste generation per capita</li> <li>2030 – 20% reduction in waste generation per capita</li> </ul>	<ul style="list-style-type: none"> <li>2025 – Increase material recovery to 70%</li> <li>2030 – Increase material recovery to 75%</li> <li>From 2020 – Recover energy only from residual waste</li> </ul>	<ul style="list-style-type: none"> <li>2030 – No more than 15% of waste generated in Perth and Peel regions is landfilled</li> <li>2030 – All waste is managed and/or disposed to better practice facilities</li> </ul>

**Figure 2-3: State Waste Strategy 2030 objectives and targets**

## 2.4 Better Bins Programs

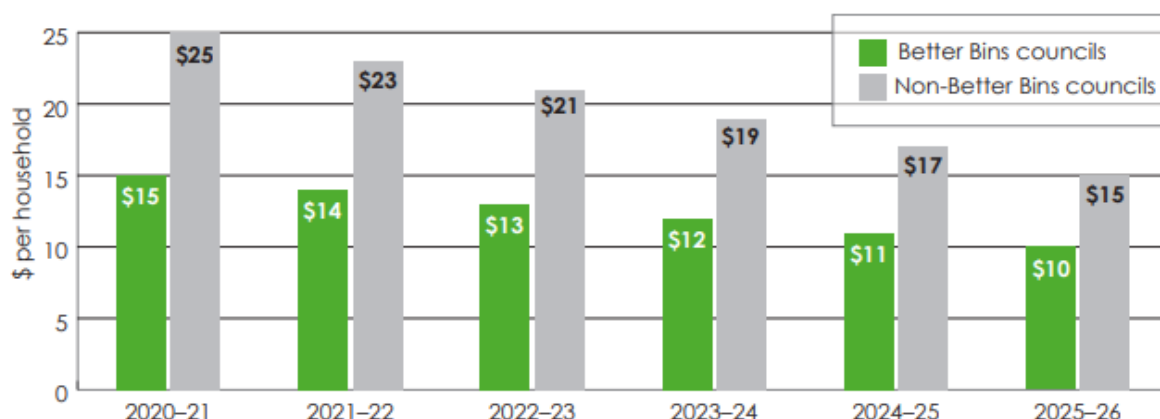
The original Better Bins program<sup>10</sup> operated between 2016 and 2019 and provided a total of \$16.8 million in funding for local governments that moved towards a three-bin kerbside collection system. The third bin could be for either GO or FOGO.

The Better Bins Plus: Go FOGO<sup>11</sup> (Better Bins Plus) program opened in 2020 for six years and is providing \$20 million in funding for local governments to move towards a three-bin FOGO system only. GO collections are not funded by this program.

The funding available for local governments reduces each year and depends on whether the local government has accessed the original Better Bins funding (Figure 2-4). The grey bars indicate the funding available to local governments (such as the City) that have not previously accessed funding, whereas the green bars indicate the funding available to those local governments that have accessed funding before. Applications are due by March 31 each year and the funding is released in the following financial year, meaning the current maximum funding a local government can receive is the rate for the 2023-24 financial year.

<sup>10</sup> Better Bins | Waste Authority WA

<sup>11</sup> Better Bins Plus: Go FOGO | Waste Authority WA



**Figure 2-4: Better Bins Plus Funding Rates for Local Government (per household)**

For the purpose of the sensitivity analysis, Talis has assumed that grant funding of \$17 per household would be available to the City.

## 2.5 Better Practice FOGO Collection Guidelines

To support the Better Bins Plus program, the Waste Authority has published a guideline for the current preferred bin service options that a local government is required to adhere to in order to receive funding. This document is called the Better Practice FOGO Kerbside Collection Guidelines<sup>12</sup> (FOGO Guidelines) and includes information on the preferred size and collection frequency of each bin type. It states that the guidelines apply to standard single-unit dwellings (SUDs) and recognises a three-bin FOGO service as 'better practice'.

The preferred bin types, size, and collection frequency are stated to be:

- Red-lidded residual waste bin, 140L and collected fortnightly;
- Yellow lidded commingled recycling bin, at least 240L and collected fortnightly; and
- Lime-green FOGO bin, at least 240L and collected weekly.

Additionally, the FOGO Guidelines state that it is better practice for a local government to provide kitchen caddies and compostable liners for residents when a FOGO service is provided, and minimum size and quality standards have been included.

Local governments have no obligation to provide FOGO services to dwellings not defined as SUDs by the FOGO Guidelines. This increases the complexity of delivering waste management services, as locations may have a variety of dwelling types, some of which may or may not have a third bin. The efficiency of collection routes may be impacted and the distance between bin lifts may be increased, which would impact collection costs. In addition to this, vehicle requirements would differ depending on the number of each dwelling type and their respective bin system, making the management of waste collection services more challenging.

<sup>12</sup> Better\_practice\_FOGO\_kerbside\_collection\_guidelines.pdf (wasteauthority.wa.gov.au)

Talis has used the FOGO Guidelines when undertaking modelling and has adopted the recommended bin size and collection frequency for a FOGO service. Talis has also assumed that the City will provide kitchen caddies and compostable liners.

## 2.6 City of Kwinana Waste Plan 2021-2025

In 2021, the City reviewed its Waste Management Strategy 2017–2021<sup>13</sup> and combined its obligations under the WARR Act to develop the new City of Kwinana Waste Plan 2021-2025<sup>5</sup> (Waste Plan). The Waste Plan supports the City's vision of *"A unique and liveable City, celebrated for and connected by its diverse community, natural beauty and economic opportunities"* and aligns with the City's objectives;

- *"Maintain and enhance our beautiful, natural environment through sustainable protection and conservation;*
- *Develop quality, financially sustainable infrastructure and services designed to improve the health and wellbeing of the community; and*
- *Provide a high standard of customer service with the community as a priority."*

The overarching objectives of the Waste Plan are consistent with those in the State Waste Strategy 2030 including avoid, recover and protect. The Waste Plan is also integral in assisting the City in achieving its aim *"to achieve a sustainable, cost effective and best practice approach to waste management that supports the Kwinana community, economy and environment"* through identifying areas of needing improvement, the constraints and measurable actions required. The Waste Plan did not commit to a 3-bin FOGO, but rather the undertaking of a feasibility assessment to support an informed decision making process on that factor. The results of this Assessment are therefore intended to satisfy the City's commitment within its Waste Plan and provide an objective assessment that can be used to inform the City's preferred position moving forward.

## 2.7 Australian Standard for Soil Conditioners and Mulches (AS4454)

The Australian Standard for Soil Conditioners and Mulches (AS4454) is currently the only existing standard applicable to compost produced from food and garden organics in Western Australia. It is a voluntary standard and only represents the minimum quality requirement for compost.

There is currently no industry standard for classifying the quality of different composts beyond the minimum standards set out in AS4454. This presents an issue when examining the market for compost as different sectors have different quality requirements but lack a suitable standard to determine the quality of compost.

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<sup>13</sup> City of Kwinana Waste Management Strategy 2017-2021

### 3 Current Waste Management System

This section provides details of the City's current waste management practices and associated waste volumes.

#### 3.1 Residential Waste Management Systems

As of January 2023, the City provides a 2-bin kerbside collection service to approximately 17,559 households. The service consists of a 240L residual waste bin collected weekly and a 360L/240L recycle bin collected fortnightly. Residents with an existing 240L recycle bin have the option to upgrade to a 360L bin, free of charge, if requiring additional capacity. Recyclables are transported to the Veolia materials recovery facility (MRF) in Bibra Lake for processing. Whereas materials from the residual waste bin are currently transported to Veolia's North Bannister landfill for disposal. The City is contractually committed to supply between 6,000 and 20,000 tonnes of residual waste per annum to Avertas WtE facility once operational. This will help increase the City's resource recovery and material recovery rates.

Households are also offered two bulk verge collections and three green verge collections per annum. The bulk green verge materials are fully recovered. However, only a small proportion of the bulk verge materials are currently recovered, being the proportion that is metals, electronic waste and mattresses.

The City does not have a landfill facility or transfer station for residents to take bulky items outside of the verge collections. Residents can use the City of Rockingham or City of Cockburn drop off facilities, noting that certain recyclable and household hazardous waste items are currently free of charge to deliver, but fees payable for waste material.

Until recently, the City provided three small scale "recycling hubs" in community spaces for the collection of particular household hazardous wastes. The overwhelming majority of material collected was batteries. With the introduction of the large-scale B-Cycle<sup>14</sup> battery stewardship scheme and Hello-Initiative<sup>15</sup> mobile phone scheme, the City's recycling hub receptacles became obsolete and were removed in 2022, with the City actively promoting the B-Cycle and Hello-Initiative schemes since. Collection and recovery of materials through non-City-managed schemes are not captured in the City's waste data reporting, nor in this Assessment.

Figure 3-1 below shows the proportions of waste by collections type. Based on the 2021-22 residential waste collected, the kerbside residual waste proportion at 66% was substantially higher than all other collection sources.

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<sup>14</sup> Australia's official battery stewardship scheme - B-cycle ([bcycle.com.au](https://bcycle.com.au))

<sup>15</sup> Home | Hello Initiative | Australian charities

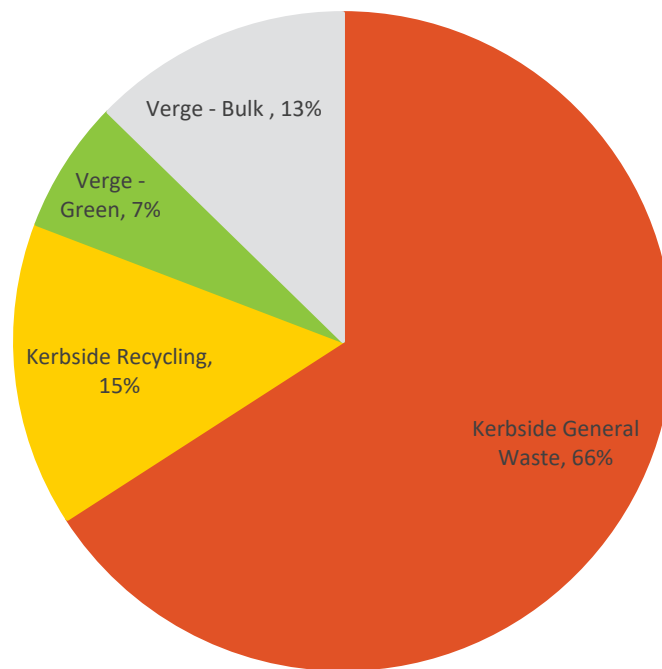


Figure 3-1: 2021-22 Waste Proportions

### 3.2 Waste Contracts

Collection and processing contracts play a pivotal role in the waste services provided by the City. Having contractors that align with the City's targets and objectives is essential for implementing waste management systems that steer the community and the City's vision of waste management. Each time a collection and processing contract requires renewing opportunities arise to integrate contract clauses that reflect the City's desired waste management outcomes. Currently the City has contracts with three different businesses to collect and process its waste (Table 3-1).

Table 3-1: Collection and Processing Contracts

Contractor	Service		Operation length
Veolia	Kerbside Collection and Processing	Residual waste	Commenced: July 2018
		Recycling waste	Expires: 2023 (New contract to commence with Veolia in July 2023)
		Bulk waste	Commenced: July 2021



Contractor	Service		Operation length
D&M Waste Management	Verge Collection and Processing	Green waste	Expires: 2024 (Option to extend to 2025)
Avertas WtE	Waste Processing	Residual waste	Waste Supply Agreement for 6,000 – 20,000 tonnes annually from operation commencement of WtE facility
		Residual waste from processed recyclables (optional)	
		Residual waste from bulk verge collections (optional)	
		Residual waste (contamination) from GO or FOGO (optional)	

## 4 Waste Composition

The City conducted waste compositional audits for the years 2016 to 2021<sup>16</sup>. The data from the audits has been averaged and summarised in this section.

The City has also maintained detailed records of waste types and volumes collected, which were utilised to project waste volumes based on population forecast data.

### 4.1 Kerbside Residual Waste Composition

The long-term data, collected directly from the City's residents, indicates that over half of the residual waste bin composition is FOGO material, with GO being the largest material type in the residual waste stream, followed by FO. Interestingly, the FO material is 6% less than what has been estimated in previous collection studies and the GO component was more by 8%<sup>6</sup>. The data also indicated that recycling materials incorrectly placed in the residual waste bin were a greater proportion than the actual residual waste materials, at just under a quarter (Figure 4-1).

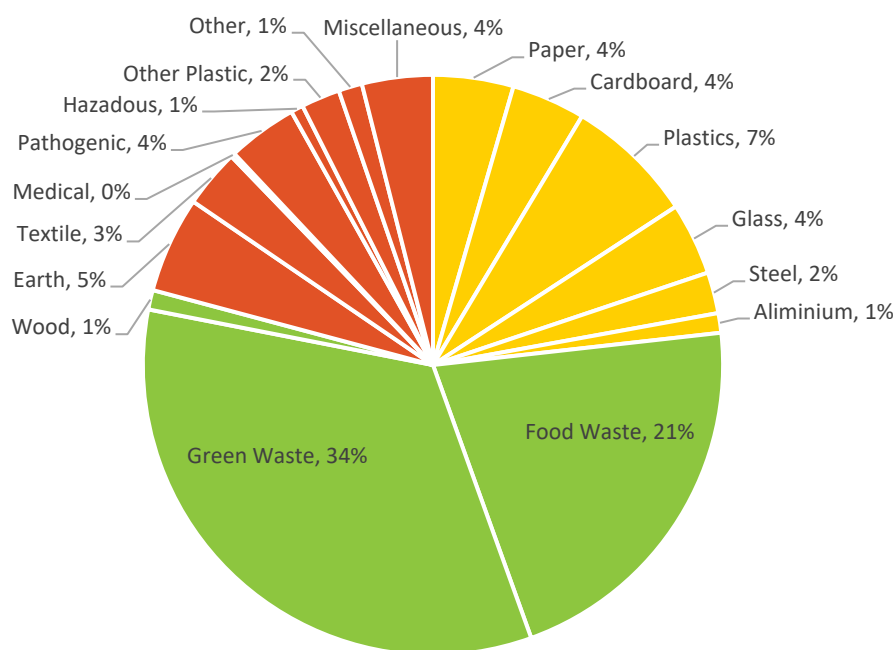


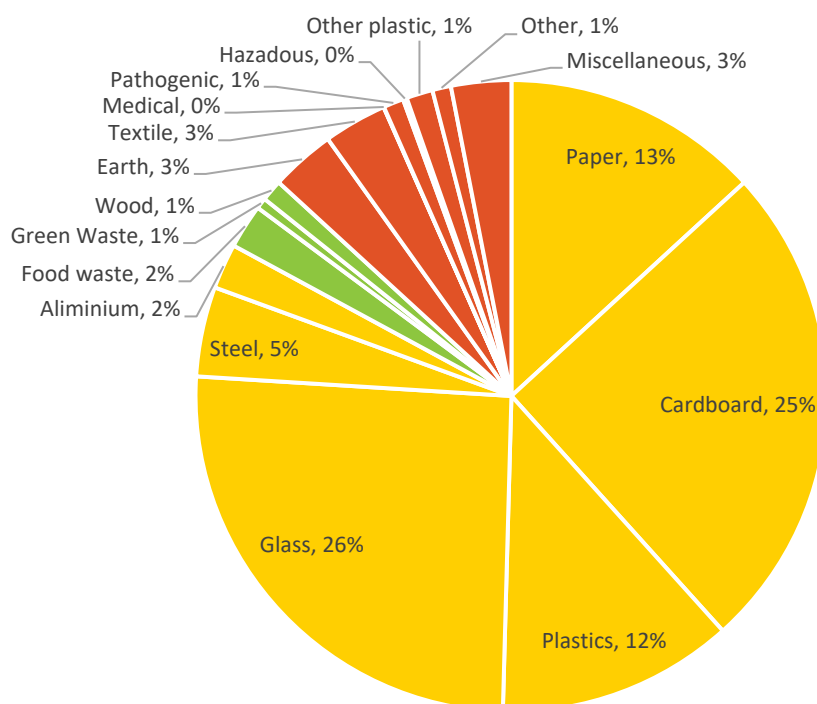
Figure 4-1: Residual Waste Kerbside Composition Data

### 4.2 Kerbside Recycling Bin Composition

Over 80% of the material in the kerbside recycling bin is recyclable with glass and cardboard being the largest material types found in the stream (Figure 4-2). The recycling bin composition showed a total

<sup>16</sup> City of Kwinana (2022)

of 17% contamination, with a small amount of FOGO waste (5%) present in the stream, and roughly one-eighth of the stream comprised of residual waste. Once again, these results vary from both the MRA and Talis FOGO report.



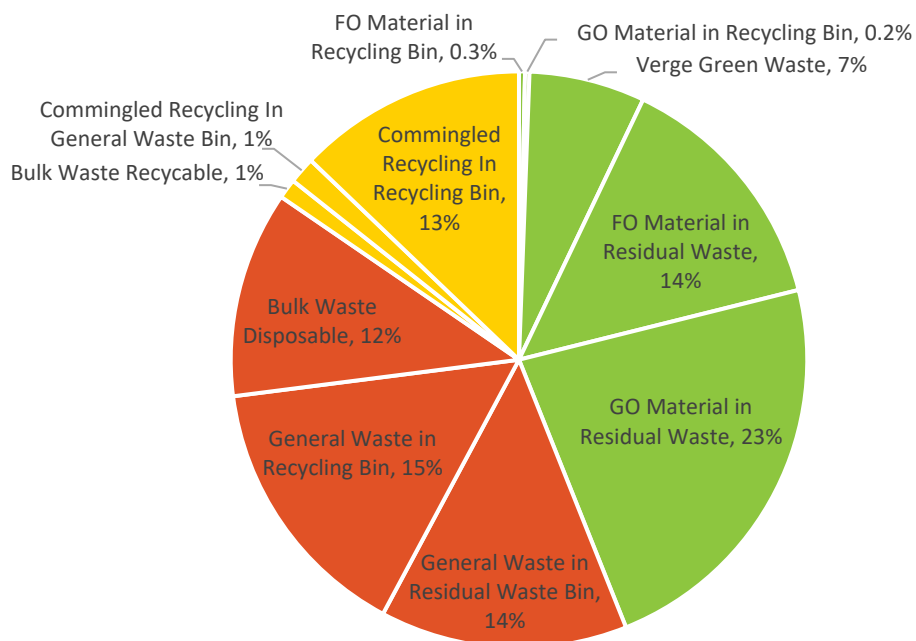
**Figure 4-2: Kerbside Recycling Composition Data**

### 4.3 Overall Waste Proportions

The compositional waste data for each collection waste stream within in the City was added together to understand the overall composition of waste generated.

On average, the City's residential waste (including kerbside and verge collections) is comprised of 44% FOGO material. When the FOGO material is combined with the recyclable material from all the waste collection avenues, it shows 59% of residential waste is recoverable as a material.

Only 29% of all materials is kerbside residual waste. This includes 15% of residual waste that is incorrectly placed into the recycling bin.

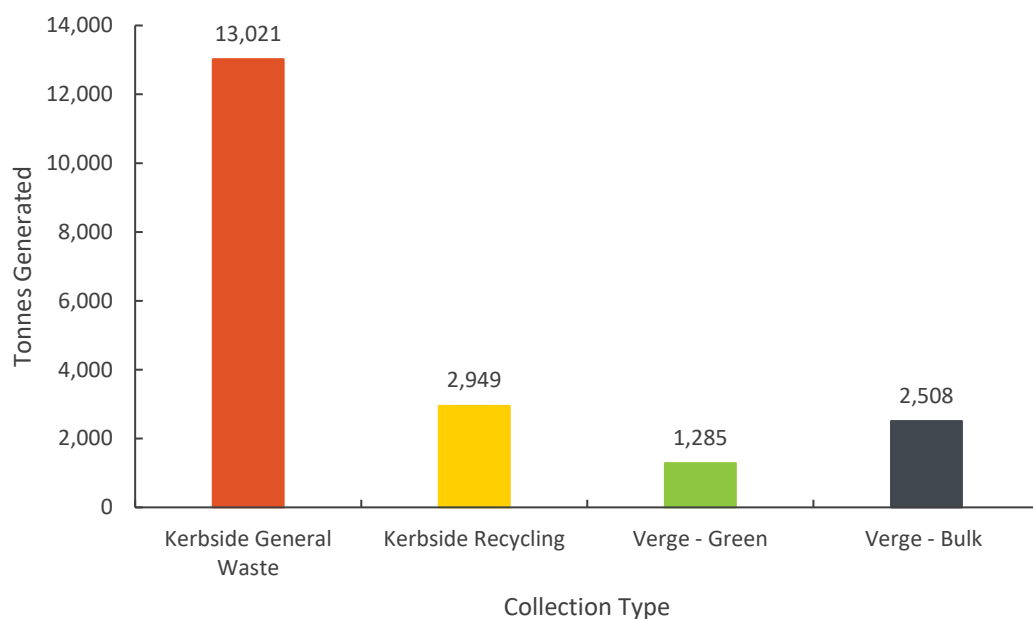


**Figure 4-3: Total Waste Proportions**

Figure 4-3 shows that of all the materials collected only 41% is waste. Therefore, additional education measures could help improve the City's material recovery rates.

#### 4.4 Residential Waste Quantities

In 2021-22, the City collected 19,764 tonnes of residential waste. Over 65% of the residential waste was collected from kerbside residual waste bins at 13,021 tonnes. With recycling included, kerbside waste collected tonnages equated to 80% of the City's waste (Figure 4-4). Bulk verge materials formed around 13% of the City's total waste volumes at 2,508 tonnes.



**Figure 4-4: Waste Generation 2021-22**

Based on the waste generated in 2021-22 and the kerbside composition averages, the amount of FO and GO material available in 2021-22 was estimated and has been displayed in Table 4-1.

**Table 4-1: Available FO and GO Materials in 2021-22**

Waste Stream	GO Amount (Tonnes)	FO Amount (Tonnes)	FOGO Amount (Tonnes)
Residual waste Kerbside	2,771	4,513	7,284
Recycling Kerbside	49	67	116
Green Verge	1,285	0	1,285

Whilst the above table shows all the FO and GO material available within the different waste streams of the City for 2021-22, it is assumed that not all of these materials will be captured in the correct bin if a GO or FOGO bin is introduced. Capture rates covered in Section 5.1.1 have been applied.

## 5 Options Conceptualisation

To understand the financial and environmental implications of a three-bin system, Talis will review the current system along with GO and FOGO kerbside collection services and treatment options. These options provide a comparison to assist with determining the key points of difference between the kerbside collection services. Table 5-1 provides a summary of the kerbside service options that were modelled.

**Table 5-1: Options Modelled**

Option #	Description	Bin Configuration	Recycling	Organics	Residual Waste
1	2 Bin, WtE		360L/240L yellow lid bin Emptied fortnightly Processed at MRF*	NA	240L red lid bin Emptied weekly WtE Conversion
2	3 Bin GO, WtE			240L lime-green lid bin Emptied fortnightly Processed at ORF^	140L red lid bin Emptied weekly WtE Conversion
3	3 Bin FOGO, WtE			240L lime-green lid bin Emptied <u>weekly</u> Processed at ORF^	140L red lid bin Emptied fortnightly WtE Conversion

Notes: \*MRF - materials recycling facility

^ORF - organics recycling facility

The City currently provides its residents with a 360L yellow-lid bin for recycling as standard with the option to downsize to a 240L bin if desired. For all three kerbside collection options, it was assumed that there would be no significant change to the distribution of yellow-lid bins, the recycling process or the composition of these bins. This ensures consistency in relation to recycling outputs in the modelling of the three options.

As covered in Section 2.5, the FOGO Guidelines recommend that in the 3-bin FOGO system, the red-lid residual waste bin is converted to a 140L bin to encourage increased material recovery. Reducing the size of the residual waste bin encourages residents to source separate household food organics for disposal in the 240L lime-green lid FOGO bin. The guidelines recommend that the FOGO bin with putrescible waste be collected weekly and the residual waste bin be emptied fortnightly.

For consistency, it has been assumed for the Assessment that in a 3-bin GO scenario, a new 140L red-lid bin would be introduced and emptied weekly. The new 240L GO bin with lime-green lid would be emptied fortnightly on alternating weeks with the yellow-lid recycling bin.

## 5.1 Forecast Waste Profiles

Waste generation was projected for each year until 2032-33 for a 2-bin WtE system, 3-bin GO WtE system and 3-bin FOGO WtE system, using population growth rates. All projections have been split by collection type and include verge bulk waste, verge green waste, kerbside recycling, kerbside residual waste and where appropriate, kerbside GO and kerbside FOGO.

### 5.1.1 Capture Rates

Table 5-2 below shows the proportion of FO and GO materials estimated to be placed in the GO or FOGO bins once introduced. This percentage is termed the capture rate. The model assumes movement of GO and FO from the residual waste bin only, with no additional capture of GO and FO from the recycling bin. These estimated capture rates are based on Talis' industry knowledge and experience with kerbside recycling systems and compositional audits. The National Waste Report 2022 have similar capture rates with FO achieving 70% capture<sup>17</sup>. The MRA Report has slightly higher capture rates with average achieving LGs capturing 80% of FO and 90% of GO<sup>6</sup>. However, MRA have also conducted a review of the FOGO systems in NSW and found that some local governments captured less than 50% of the available FO. The capture rates presented in Table 5-2 are based on City being an average performing council<sup>18</sup>.

**Table 5-2: Estimated Capture Rates**

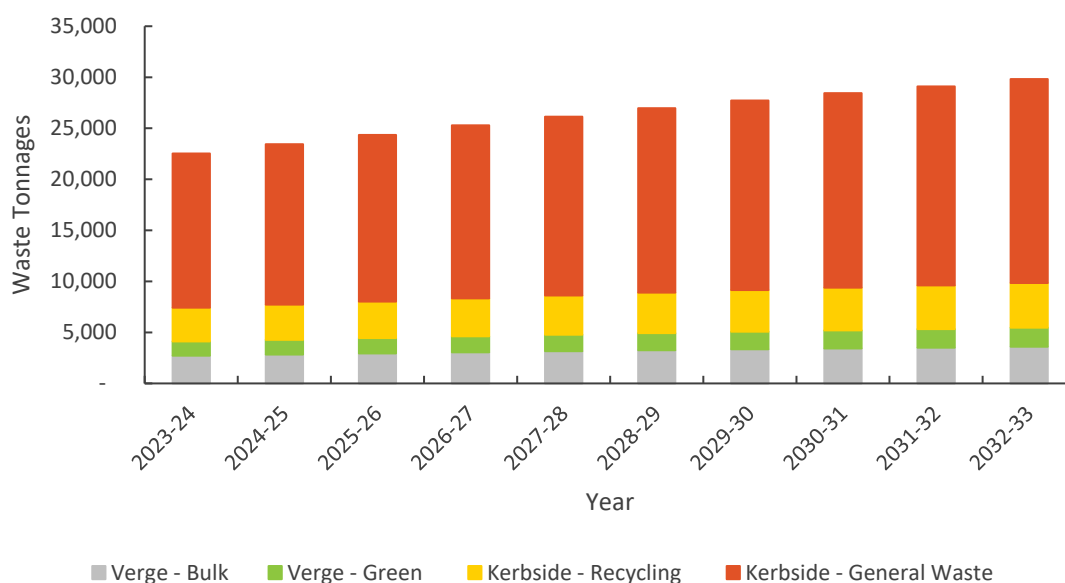
Waste Stream	Percent Captured	
	GO Bin	FOGO Bin
FO from residual waste bin	0%	75%
GO from residual waste bin	80%	80%
GO from green verge collections	15%	15%

## 5.2 2-Bin Waste Projections

Figure 5-1 shows the projected amount of material available in a 2-bin WtE system. In this scenario, the proportion of each waste type does not change over time. It is anticipated that by 2032-33, there will be 29,817 tonnes in total generation. This would consist of 19,972 tonnes of kerbside residual waste, 4,384 tonnes of kerbside recycling, 3,593 tonnes of verge bulk waste and 1,867 tonnes of verge green waste.

<sup>17</sup> Blue Environment (2022)

<sup>18</sup> MRA Consulting Group (2020)

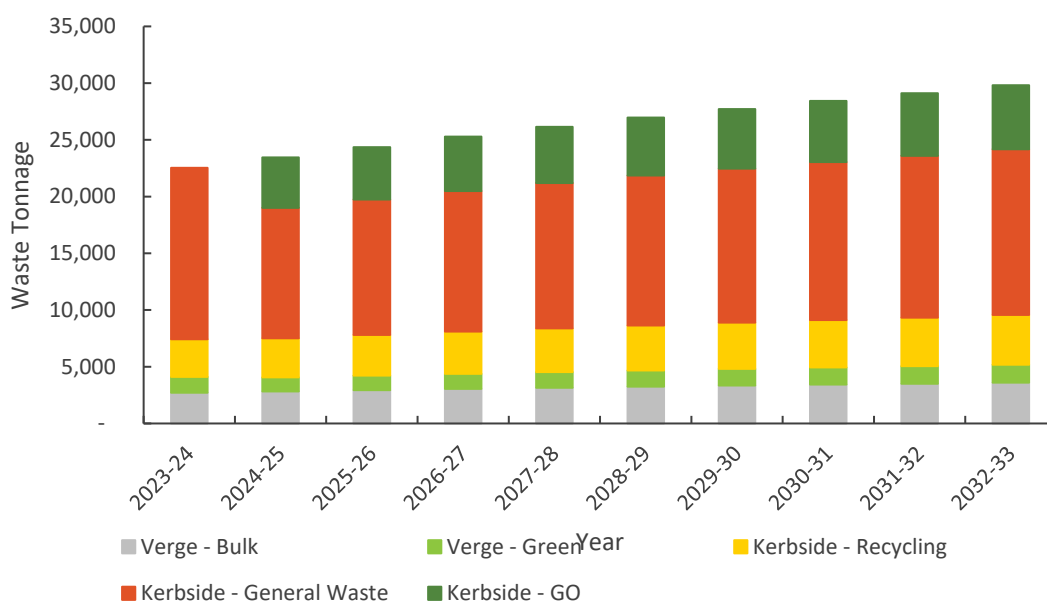


**Figure 5-1: Waste Generation Projections - 2-bin WtE**

### 5.3 3-bin GO Waste Projections

When the 3-bin GO system is rolled out it is anticipated that roughly 27% of the residual waste stream, at the 80% capture rate, shifts into to the new GO bin. It is also anticipated that 15% of the verge green waste will shift to the GO bin. The bulk waste and recycling stream proportions would remain consistent with current practices.

For this scenario, it is anticipated by 2032-33 there will be 29,817 tonnes in total including 5,649 tonnes of kerbside GO, 14,604 tonnes of kerbside residual waste and 1,587 tonnes of verge green waste (Figure 5-2).



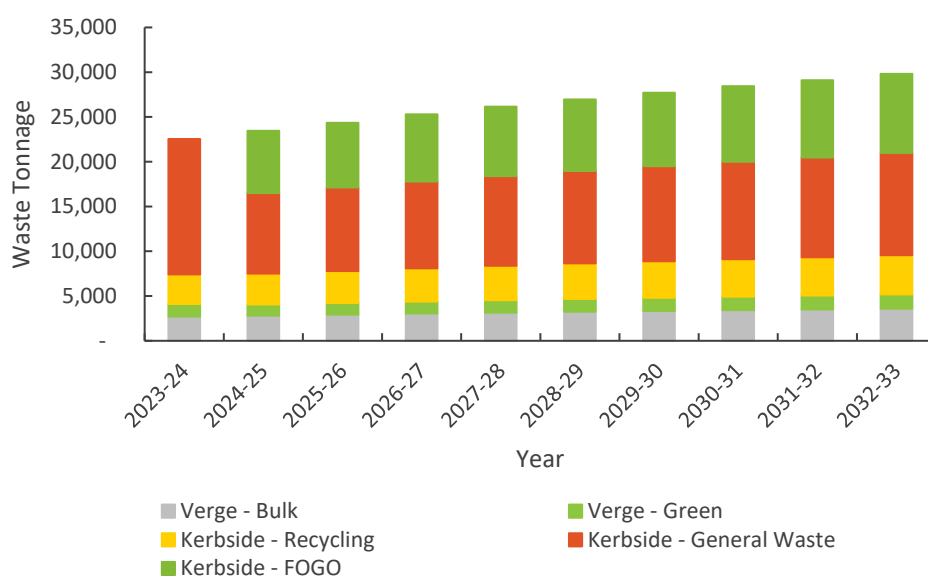
**Figure 5-2: Waste Generation Projections – 3-bin GO WTE**



## 5.4 3-bin FOGO Waste Projections

As per the 3-bin GO WtE system, once the 3-bin FOGO WtE system is introduced, it is anticipated that 80% of the GO material from the residual waste stream and 15% of the verge green waste will move to the new FOGO bin. Additionally, based on the 75% FO capture rate, the FOGO bin is anticipated to capture 16% of FO from the residual waste stream.

The same 29,817 tonnes of waste generated within the waste streams by 2032-33 is anticipated to consist of 8,839 tonnes of kerbside FOGO, 11,413 tonnes of kerbside residual waste and 1,587 tonnes of verge green waste (Figure 5-3). As with the other options, there are no changes to the kerbside recycling and bulk waste stream compositions.



**Figure 5-3: Waste Generation Projections – 3-bin FOGO WtE**

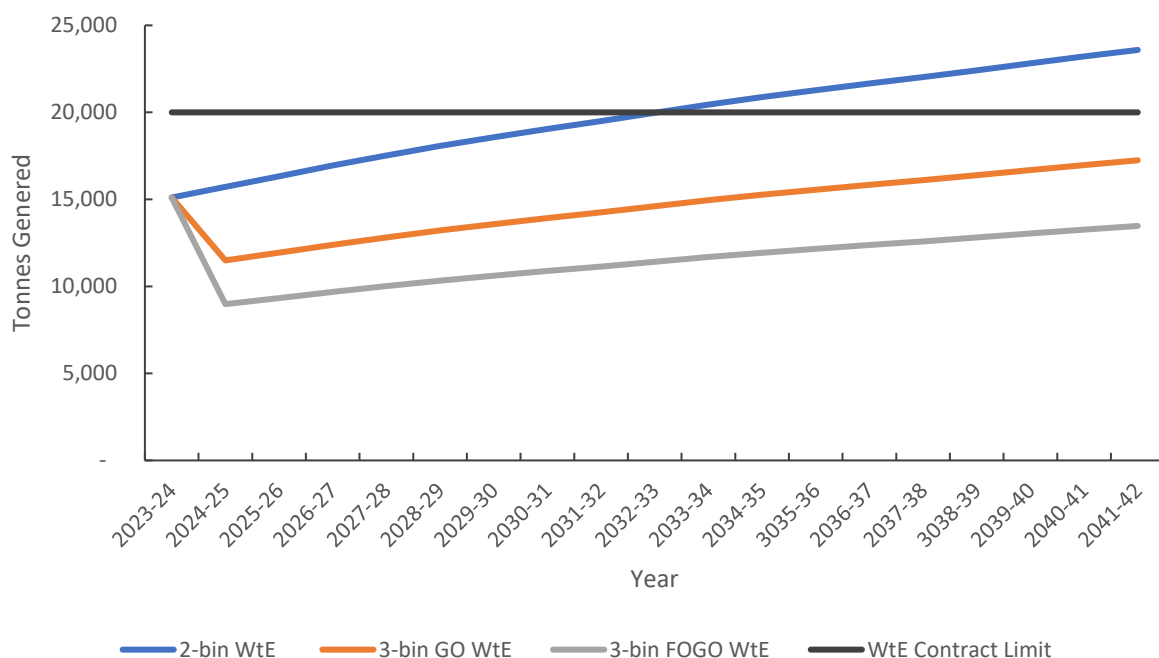
## 5.5 Key Findings

It is estimated that by 2032-33 the City will generate 29,817 tonnes of waste across all streams, with the kerbside residual waste stream remaining the largest across the kerbside collection options. The kerbside recycling and verge bulk volumes are projected to be the same each year for all three options. The residual waste tonnages decrease within the 3-bin options due to the increase in material being diverted from the residual waste bin to either the GO or FOGO bin. The verge green waste also decreases in the 3-bin options due to a proportion of this waste expected to be placed in the kerbside GO or FOGO bin (see Table 5-3).

**Table 5-3: Waste Projections**

	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33
<b>2-bin WtE</b>										
Verge - Bulk	2,718	2,828	2,937	3,049	3,152	3,251	3,341	3,427	3,507	3,593
Verge - Green	1,391	1,448	1,507	1,568	1,624	1,678	1,729	1,777	1,822	1,867
Kerbside - Recycling	3,316	3,450	3,583	3,720	3,846	3,966	4,075	4,181	4,279	4,384
Kerbside Residual	15,108	15,719	16,323	16,948	17,521	18,069	18,568	19,049	19,495	19,972
<b>3-bin GO WtE</b>										
Verge - Bulk	2,718	2,828	2,937	3,049	3,152	3,251	3,341	3,427	3,507	3,593
Verge - Green	1,391	1,231	1,281	1,333	1,380	1,426	1,470	1,511	1,549	1,587
Kerbside - Recycling	3,316	3,450	3,583	3,720	3,846	3,966	4,075	4,181	4,279	4,384
Kerbside Residual	15,108	11,494	11,935	12,392	12,811	13,212	13,577	13,929	14,255	14,604
Kerbside GO		4,443	4,614	4,791	4,953	5,109	5,250	5,387	5,513	5,649
<b>3-bin FOGO WtE</b>										
Verge - Bulk	2,718	2,828	2,937	3,049	3,152	3,251	3,341	3,427	3,507	3,593
Verge - Green	1,391	1,231	1,281	1,333	1,380	1,426	1,470	1,511	1,549	1,587
Kerbside - Recycling	3,316	3,450	3,583	3,720	3,846	3,966	4,075	4,181	4,279	4,384
Kerbside Residual	15,108	8,983	9,328	9,685	10,012	10,326	10,611	10,886	11,140	11,413
Kerbside FOGO		6,954	7,221	7,498	7,752	7,995	8,217	8,430	8,628	8,839
<b>Total For Each Bin System</b>	<b>22,533</b>	<b>23,446</b>	<b>24,349</b>	<b>25,286</b>	<b>26,143</b>	<b>26,964</b>	<b>27,713</b>	<b>28,434</b>	<b>29,103</b>	<b>29,817</b>

Within the modelled 10-year period the kerbside residual waste from none of the kerbside collection options exceed the City's supply limit agreement with the WtE facility. The 2-bin WtE option is the only option that gets close to the exceeding the limit in the last year modelled with 19,972 tonnes estimated to be in the residual stream (table). However, to understand when the options might exceed the WtE supply agreement, Talis projected the residual waste generation until 2041 (see Figure 5-4).



**Figure 5-4: Kerbside Residual Waste Projections**

From the modelling, the 2-bin WtE option is the only option that will exceed the 20,000 tonne Waste Supply Agreement limit before 2041. It is anticipated that the limit will be exceeded in 2033-34 and continue to increase. The 3-bin GO WtE option does come close to the limit in 2041-42 at 17,257 tonnes.

The City has planned to have residual waste from the recycling and organics processing operations as well as non-recyclable bulky verge materials processed for WtE. These optional sources of waste may need to be sent to landfill if the Avertas WtE facility does not accept waste tonnages from the City which are above the 20,000 tonne threshold.

Accordingly, switching to a 3-bin GO or FOGO system with WtE will provide the City with increased material and resource recovery, as covered in Section 6, while reducing the risk of oversupply of waste to the WtE facility.

## 6 Recovery Modelling

The following section outlines the recovery rates for each kerbside waste collection option, considering material recovery rates in relation to the State Waste Strategy 2030 targets for 2025 and 2030. The overall resource recovery rate is also examined to account for the material and energy recovery gained through thermal treatment techniques including WtE facilities. 'Material recovery' refers to the process of extracting materials through re-use, repurposing, reprocessing, or recycling. 'Resource recovery' refers to the combination of material recovery and recovery of energy from waste.

### 6.1 Methodology

As the City does not currently offer a 3-bin kerbside collection service, the existing data only provided recovery rates for the current kerbside recycling, vergeside bulk waste and vergeside green waste. All residual waste collections are currently landfilled with no material recovered from the stream. The various Facility Recovery rates applicable to GO, FOGO and WtE have been estimated based on Talis industry knowledge (Table 6-1).

**Table 6-1: Facility Recovery Rates**

Key Input	Value Used	Source
GO Facility Recovery Rate	99%	DWER Waste and Recycling in WA 2020-21 Report <sup>19</sup>
FOGO Facility Recovery Rate	93%	DWER Waste and Recycling in WA 2020-21 Report
WtE Facility Material Recovery Rate	20%	Avertas WtE
WtE Facility Energy Recovery Rate	75%	Avertas WtE

Material recovery rates for kerbside recycling, vergeside bulk waste and vergeside greenwaste have remained consistent with 2021-2022 performance values throughout the model. The recovery rates of each stream were assumed to remain consistent between each year. It was assumed that WtE facilities would contribute additional material recovery through bottom ash recovery as there are facilities specifically being built to recover this material.

The contamination rate within the FOGO bins will impact overall recovery rates. The contamination rates could have a substantial impact on recovery rates once contamination is above 10%, as processors may reject material and compel the City to send the contaminated FOGO to landfill or WtE. For the purpose of the recovery modelling, it is assumed that the contamination levels will remain below 10%. It also assumed for similar reasons that the GO contamination levels will remain below 2%.

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<sup>19</sup> Waste and Recycling in Western Australia 2020- 21

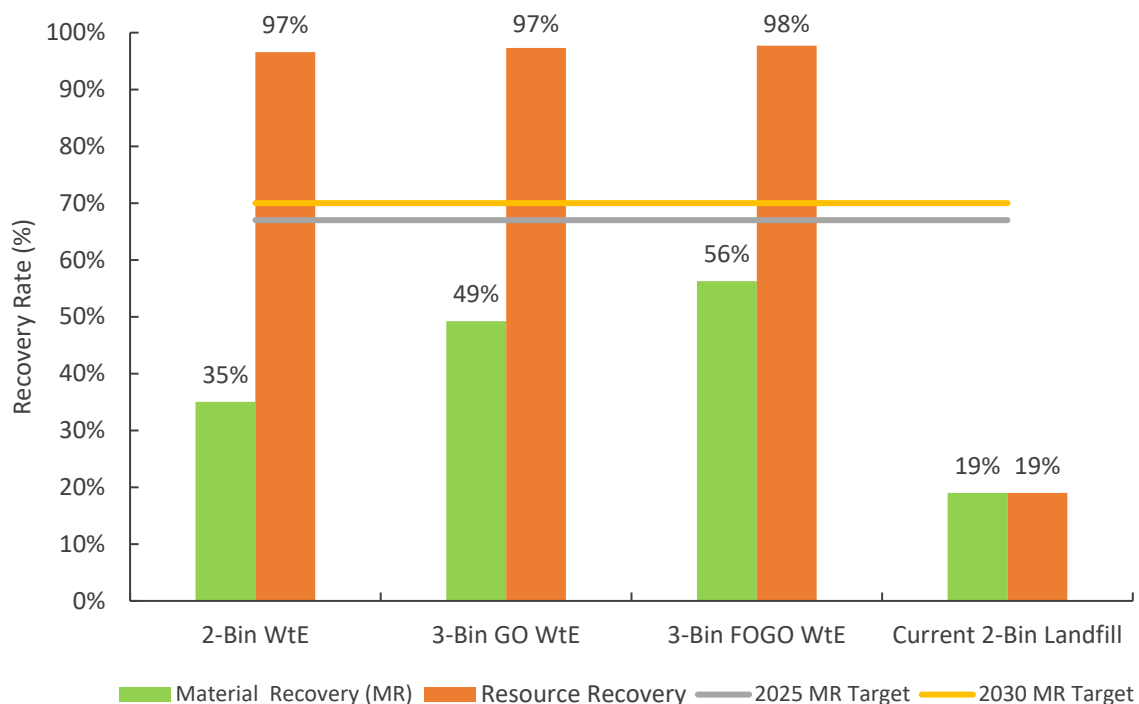
As covered previously in Section 2.5, it has been assumed that within the 3-bin GO WtE and 3-bin FOGO WtE kerbside collection options only SUDs of eligible land size (>350m<sup>2</sup>) would receive a third bin.

The model has been designed to present both the potential material recovery rates and resource recovery rates. The material recovery rates directly relate to the State Waste Strategy 2030 targets for 2025 and 2030 and have been displayed in Figure 6-1 as material recovery targets. There are currently no applicable resource recovery targets. These relate directly to the amount of waste diverted from landfill.

The results of the modelling indicated that the recovery rates of each scenario remain consistent each year following introduction of WtE and GO or FOGO collections.

## 6.2 Key Findings

Figure 6-1 shows the material and resource recovery rates for each kerbside collection option. Resource recovery rates include the recovery of waste as energy and reflects the landfill diversion rate for each kerbside collection option. The figure also shows the current material and resource recovery rates with waste sent to landfill.



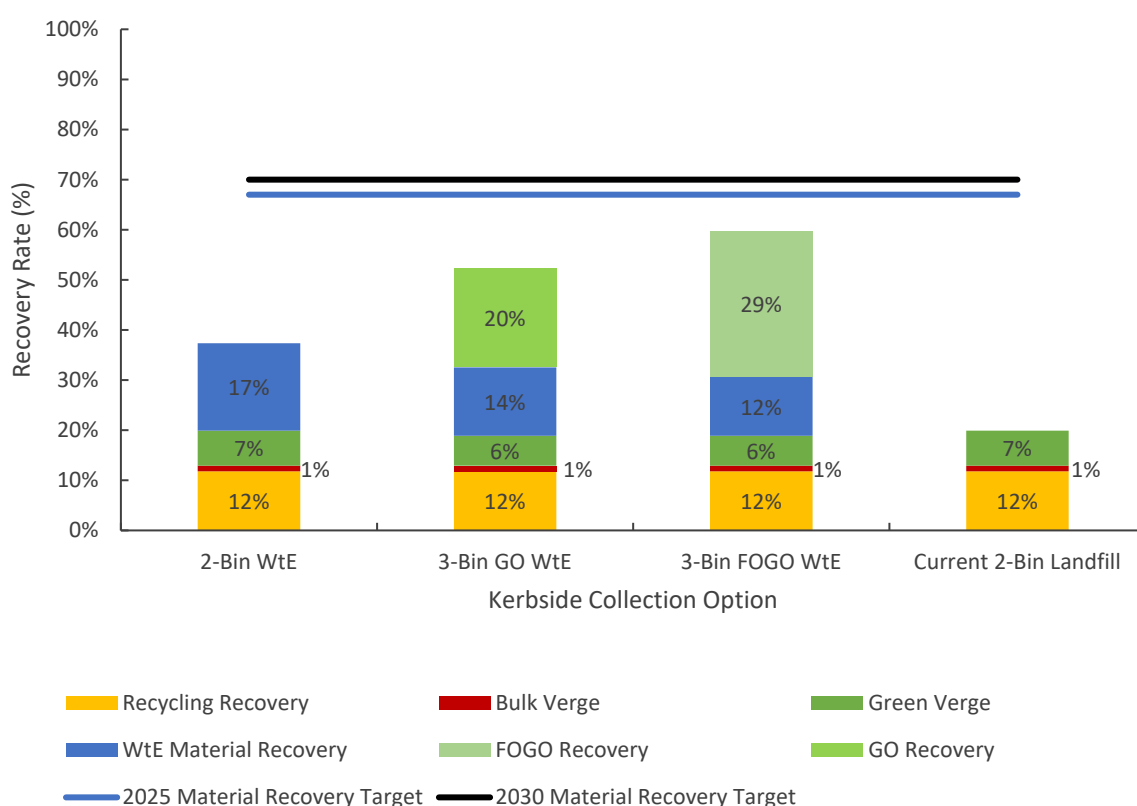
**Figure 6-1: Material and Resource Recovery Rates**

A 3-bin FOGO WtE kerbside collection achieves the highest material recovery rate of 56% and a resource recovery rate of 98%. The 2-bin WtE option would result in the lowest material recovery rate of 35%, 21% lower than the 3-bin FOGO WtE option. The 3-bin GO WtE option achieves the same resource recovery rate as the 2-bin WtE kerbside collection option. The 49% material recovery rate of the 3-bin GO WtE option is 14% greater than the 2-bin WtE option and 7% lower than the 3-bin FOGO WtE option.

The 2-bin WtE option compared to the current 2-Bin Landfill option results in a 16% increase in material recovery rates due to the recovery of bottom ash.

Resource recovery is extremely similar for each kerbside collection option, ranging from 97% to 98%. This indicates a high level of landfill diversion with only 2%-3% of waste going to landfill. This model accounts for the fact that the City has committed to ensuring that residual waste from the bulk vergeside collections, kerbside recycling and GO or FOGO processes are delivered to the WtE facility.

The material recovery contribution from each waste stream to the overall material recovery rate is shown in Figure 6-2. The total amount of waste generated is the same in each option, and the proportion of each stream is consistent with the waste projections. The WtE material recovery rate reflects the proportion of materials recovered from each options residual waste volumes including residual waste portions from the recycling and GO or FOGO processes.



**Figure 6-2: Material Recovery by Waste Stream**

The contribution of the recycling bin to the overall material recovery rate is consistently 12%. While the waste stream recovers 76% of its material, bin composition suggests that around a third of recyclable materials are incorrectly placed in the residual bin. This impacts the material recovery rates for recyclables.

As it has been assumed that 15% of the vergeside green materials would move to the GO or FOGO bin, the material recovery from this stream reduces from 7% in the 2-bin system to 6% in the GO and FOGO options.

The WtE material recovery differs between options due to the amount of residual material sent to the facility. Kerbside collection options with a third bin have lower WtE material recovery rates as organic material is source-separated and recovered reducing the overall volume of residual waste sent to WtE.

However, this is compensated for with higher material recovery rates from both the GO (20%) and FOGO (29%) collected materials.

The collection of GO can increase overall material recovery rates by 14%. GO represents 23% of the total kerbside waste volumes and the recovery rate of this material is generally high. Collecting FOGO material can increase recovery by 21% compared to a 2-bin system and 7% more than the 3-bin GO system.

The results show that based on the current recovery and modelled assumptions, the City will not be able to achieve the State Waste Strategy 2030 MSW targets of 67% or 70% material recovery with any of the kerbside collection options.

### 6.3 Sensitivity Analysis

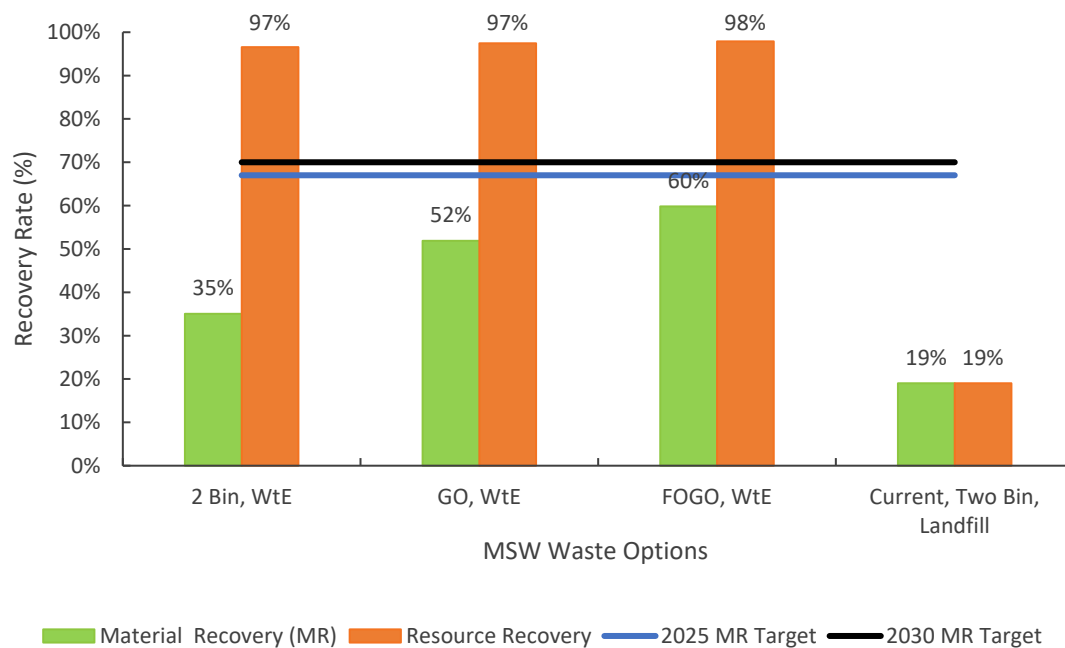
Sensitivity analysis was also carried out to examine the impact of higher GO and FOGO capture rates on the recovery rates from a high-performing kerbside collection system. The FO capture rate was increased from 75% to 85% and GO capture rate 80% to 95%. A summary of the rates are outlined in Table 6-2.

**Table 6-2: High Capture Rate Comparison**

Option Description	Material Recovery		Resource Recovery	
	Baseline	High Capture	Baseline	High Capture
3-Bin GO WtE	49%	52%	97%	97%
3-Bin FOGO WtE	56%	60%	98%	98%

The high capture rates result in material recovery rate increases in both the 3-bin Go WtE and 3 -bin FOGO WtE collection systems. The 3-bin FOGO WtE kerbside collection option has the largest increase of 4%, bringing the overall material recovery rate to 60%. As the 3-bin GO system includes only GO materials in the third bin, the increase in material recovery is 3% to 52%.

The results have been displayed visually in Figure 6-3, while including the 2-bin recovery rates for comparison.



**Figure 6-3: Recovery rates in high capture scenario**

Given that there is no change to the recycling service no additional recycling capture has been modelled across all options. Therefore, there is no increase in the material recovery rates applicable to the 2-bin system.

Most importantly even with high capture rates, the highest performing 3-bin FOGO system is likely to fall 7% short of the State Waste Strategy 2030 target for 2025 of 67%.



## 7 Carbon emissions

As part of the modelling works, Talis undertook a high-level carbon (greenhouse gas) emissions assessment over the modelled 10 year period. The modelling took into consideration the number of bin services (including household growth over this period) and their collection, transport and processing emissions for the three different kerbside waste collection options.

### 7.1 Methodology

Talis used the values specified within the (Perspektiv Carbon Assessment)<sup>20</sup> to determine carbon emission factors for use in the carbon emissions modelling (Figure 7-1). The Perspektiv Carbon Assessment considered the following six kerbside service options:

- Option 1: Two-bin system with recycling processing and residual waste sent to WtE;
- Option 2: Two-bin system with recycling processing and residual waste sent to landfill;
- Option 3: Three-bin system with recycling and GO processing and residual waste sent to WtE;
- Option 4: Three-bin system with recycling and GO processing and residual waste sent to landfill;
- Option 5: Three-bin system with recycling and FOGO processing and residual waste sent to WtE; and
- Option 6: Three-bin system with recycling and FOGO processing and residual waste sent to landfill.




















Scenario			Collection 	Recycle 	MRF Residual 	Compost 	Waste Energy 	Landfill 	IMPACT 
1	General		7.8kgCO2e	12.6kgCO2e	9.9kgCO2e	-	47.9kgCO2e	-	78.2kgCO2e
	Comingled		7.8kgCO2e	12.6kgCO2e	26.5kgCO2e	-	-	320.9kgCO2e	367.8kgCO2e
2	General		7.8kgCO2e	12.6kgCO2e	26.5kgCO2e	-	-	320.9kgCO2e	367.8kgCO2e
	Comingled		7.8kgCO2e	12.6kgCO2e	26.5kgCO2e	-	-	320.9kgCO2e	367.8kgCO2e
3	General		7.8kgCO2e	12.6kgCO2e	9.9kgCO2e	7.6kgCO2e	46.7kgCO2e	-	84.6kgCO2e
	Comingled		7.8kgCO2e	12.6kgCO2e	9.9kgCO2e	7.6kgCO2e	46.7kgCO2e	-	84.6kgCO2e
4	General		7.8kgCO2e	12.6kgCO2e	29.5kgCO2e	7.6kgCO2e	-	226.8kgCO2e	284.3kgCO2e
	Comingled		7.8kgCO2e	12.6kgCO2e	29.5kgCO2e	7.6kgCO2e	-	226.8kgCO2e	284.3kgCO2e
5	General		7.8kgCO2e	12.6kgCO2e	9.9kgCO2e	14.5kgCO2e	45.2kgCO2e	-	90.0kgCO2e
	Comingled		7.8kgCO2e	12.6kgCO2e	9.9kgCO2e	14.5kgCO2e	45.2kgCO2e	-	90.0kgCO2e
6	General		7.8kgCO2e	12.6kgCO2e	29.5kgCO2e	14.5kgCO2e	-	153.4kgCO2e	217.8kgCO2e
	Comingled		7.8kgCO2e	12.6kgCO2e	29.5kgCO2e	14.5kgCO2e	-	153.4kgCO2e	217.8kgCO2e

Figure 7-1: Waste Scenario Carbon Impacts (Perspektiv Australia 2022)

As Options 4 and 6 considered in the Perspektiv Carbon Assessment have no direct comparison within this Assessment, they have not been considered in the carbon emissions assessment.

<sup>20</sup> Waste Treatment Options – Carbon Assessment (Perspektiv Australia, 2022)

The 'Collection' values from the Perspektiv Carbon Assessment were not used in the modelling, as Talis obtained City relevant data to allow for a more specific assessment of the City's collection and transport emissions for each option. The values from Figure 7-1 were used to determine an emission factor for the recycling, composting, WtE and landfill aspects of each option. As the Perspektiv Carbon Assessment only considered kerbside services, the compost emission factor for a GO service was applied to vergeside greenwaste processing. Similarly, the recycling emission factor, which is the same for all bin service options, was applied to vergeside bulk waste.

Transport emissions were calculated according to the number of waste collection vehicles currently used by the City. All waste collection vehicles were assumed to use diesel fuel and vehicle movements encompass the entire journey of the vehicles, including the start and return to the truck depot each day. The key inputs used in the carbon modelling for the transportation are outlined in Table 7-1.

**Table 7-1: Carbon Modelling Transport and Collection Key Inputs**

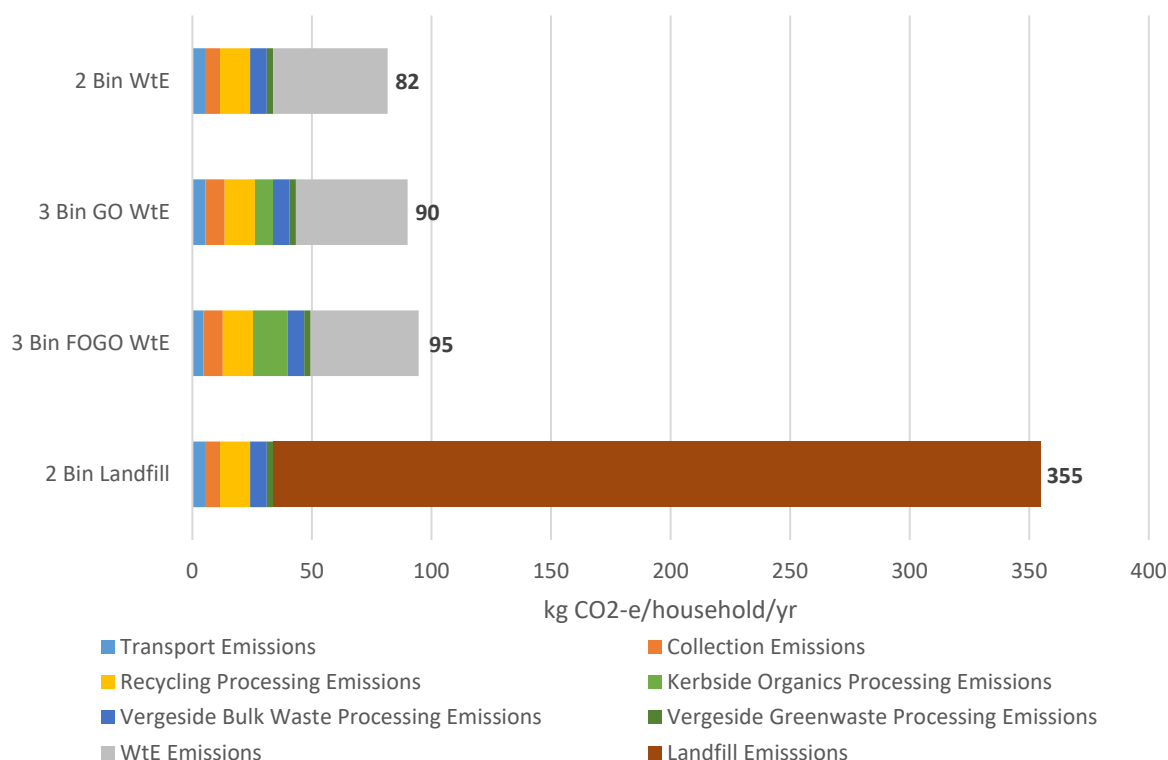
Key Input	Value Used	Source
Residual waste truck runs per week (Two bin and GO system)	18	City of Kwinana
Residual waste truck runs per week (FOGO system)	10	Talis Assumption
Recycling truck runs per week	5	City of Kwinana
GO truck runs per week	5	Talis Assumption
FOGO truck runs per week	15	Talis Assumption
Vergeside Greenwaste Collections per annum	3	City of Kwinana
Vergeside bulk waste collections per annum	2	City of Kwinana
Trips per truck each day	2	City of Kwinana
Distance between bin lifts (m)	70	MRA Consulting Group <sup>6</sup>
Average fuel use for a medium rigid vehicle (L/km)	0.35	Australian Trucking Association <sup>21</sup>
Diesel energy content factor (GJ/kL)	38.6	Department of the Environment and Energy <sup>22</sup>
Diesel emission factor (kg CO <sub>2</sub> -e/GJ)	69.9	Department of the Environment and Energy <sup>22</sup>

<sup>21</sup> Technical Advisory Procedure (Australian Trucking Association, 2018)

<sup>22</sup> National Greenhouse Accounts Factors (Department of the Environment and Energy, 2017)

## 7.2 Key Findings

Figure 7-2 shows the results of the carbon emissions modelling works for each bin service option. Estimated emissions for a two-bin landfill option have been included for comparison purposes.



**Figure 7-2: Estimated Carbon Emissions per Bin Service Option**

Figure 7-2 demonstrates that a 2-bin WtE option using landfill has significantly more carbon emissions than bin service options using WtE. Landfilling waste material, particularly putrescible wastes such as GO and FOGO, results in high volumes of carbon being released compared to more appropriate management options such as composting, which both reduces the volume of carbon released and allows for the material to be recovered and reused.

Both Figure 7-2 and Table 7-2 indicate that of the WtE bin service options, the modelling found that the 3-bin FOGO WtE option resulted in the highest volume of carbon emissions, primarily due to the processing of organic material, which is highest in a FOGO scenario due to the volume of organic materials processed.

**Table 7-2: Estimated Carbon Emissions per Bin Service Option**

Emission Source	Carbon Emissions (kg CO <sub>2</sub> -e/household/year)			
	2-bin Landfill	2-bin WtE	3-bin GO WtE	3-bin FOGO WtE
Transport	5	5	5	5
Collection	6	8	8	6
Recycling Processing	13	13	13	13
Kerbside Organics Processing	0	15	8	0
Vergeside Bulk Waste Processing	7	7	7	7
Vergeside Greenwaste Processing	3	3	3	3
WtE Processing	-	45	47	48
Landfilling	321	-	-	-
<b>Total</b>	<b>355</b>	<b>95</b>	<b>90</b>	<b>82</b>

From Table 7-2, carbon emissions for the 3-bin FOGO option are estimated to be approximately 95kg CO<sub>2</sub>-e per household per annum, which is the equivalent of approximately 2,332 tonnes of CO<sub>2</sub>-e per annum for the City. The 3-bin GO WtE option with less organics for processing, produces lower emissions than the 3-bin FOGO option at approximately 90kg CO<sub>2</sub>-e per household per annum, which is the equivalent of 2,218 tonnes of CO<sub>2</sub>-e per annum. The 2-bin WtE option was found to have the lowest carbon emissions at approximately 82kg CO<sub>2</sub>-e per household per annum or approximately 2,012 tonnes of CO<sub>2</sub>-e per annum in total.

## 8 Financial Modelling

This section details the methods used to undertake the cost modelling and presents the financial implications of adoption of the various bin systems covering all kerbside and vergeside collection costs. The modelling excludes all commercial, public bin and special event service costs.

### 8.1 Methodology

The financials for each kerbside collection option were modelled individually using cost data provided by the City. In October 2022, the City went to tender for a new waste collection and processing contract which considered pricing for each kerbside collection option, including potential 3-bin roll-out. The price schedule derived from the City's successful tender process was used to inform the majority of the costs in the model, thus representing current market tested contract pricing specific to Kwinana<sup>23</sup>. This has been listed as 'Contract Price' in the tables below, with the commercial in confidence full contract pricing details outlined in the Confidential Appendix. Census data and past invoices were also used for cost inputs in the model.

The cost modelling considers the collection, processing, bin maintenance and rollout costs of the kerbside collection options. It also includes the lump sum verge collection costs based on the last financial year.

The key collection and processing costs from 2022-23, which were utilised in the model are shown in Table 8-1.

**Table 8-1: Key Collection and Processing Costs**

Key Input	Value Used
Residual waste collection drive-by rate 240L (2 bin)	Contract Price
Residual waste collection drive-by rate 140L (GO)	Contract Price
Residual waste collection drive-by rate 140L (FOGO)	Contract Price
Recycling collection drive-by rate 240L	Contract Price
Recycling collection drive-by rate 360L	Contract Price
GO collection drive-by rate	Contract Price
FOGO collection drive-by rate	Contract Price
FOGO processing (\$/tonne)	Contract Price
GO processing (\$/tonne)	Contract Price
Recycling processing rate (\$/tonne)	Contract Price

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<sup>23</sup> Successful Contractor (2022)

Key Input	Value Used
Landfill cost (\$/tonne)	Contract Price
Landfill Levy (\$/tonne)	Contract Price
WtE processing cost (\$/tonne)	Contract Price
Verge bulk waste collection (\$/annum)	Contract Total
Verge bulk processing cost (\$/tonne)	Contract Price
Verge green waste collection (\$/annum)	Contract Total
Verge green processing cost (\$/tonne)	Contract Price

Annual collection costs consist of the collection frequency and number of bin services. These numbers of bin services have been projected to increase annually based on REMPLAN population growth rates for Kwinana. As is common industry practice, the City uses a drive by rate for its contracted kerbside service, which means that the City gets charged for the service visit, regardless of whether all the bins are presented. The kerbside and verge collection costs as well as processing costs have been increased annually using the contract stipulated rise and fall formula in the Confidential Appendix. An agreed average annual CPI increase has been applied to all other applicable costs. The average of the past four years for both rise and fall indices has been adopted in the Assessment. Table 8-3 shows the average annual CPI percentage increase used in the model, while the contract rise and fall percentage increase is presented in the Confidential Appendix.

**Table 8-2: Annual CPI Percentage Increases**

Input	Value Used	Source
Standard CPI	2.93%	ABS <sup>24</sup> average values over the last four years

Bin maintenance costs were assumed to rise annually with household growth and the kerbside contract rise and fall formula. However, once the new bins are rolled out for the GO and FOGO options, it is assumed that bin maintenance will be halved for the residual waste bins and organics bin. The price of the caddies and caddy liners required in the 3-bin FOGO WtE option has also been calculated to increase annually. Wages for additional employees required during the roll-out and other contracted rates were assumed to increase with CPI. It was assumed in the model that any additional employees needed for a role out would be employed the year of the role out. It is anticipated that the Project Officer role would commence in the year prior to the roll-out.

The key maintenance and roll out costs can be found in Table 8-3 with the commercial in confidence full contract pricing details outlined in the Confidential Appendix.

<sup>24</sup> Consumer Price Index, Australia, December Quarter 2022 | Australian Bureau of Statistics (abs.gov.au)

**Table 8-3: Key Maintenance and Roll Out Costs**

Key Input	Value Used	Source
Cost of 140L bin (Roll out)	Contract Price	Contract
Cost of 240L bin (Roll out)	Contract Price	Contract
Cost of 240L bin lid replacement	Contract Price	Contract
Annual bin maintenance (240L Waste)	\$66,645	Annual forecast
Annual bin maintenance (240L Recycling)	\$21,478	Annual forecast
Annual bin maintenance (360L Recycling)	\$52,999	Annual forecast
Initial Roll-out & Communications (\$/hhld)	\$8.00	Talis Value
Waste Education Officer annual salary incl. overheads (GO 0.5 FTE in first year, FOGO 1 FTE roll-out and ongoing)	\$120,000	City value
GIS Officer annual salary incl overheads (GO and FOGO 0.25 FTE for roll-out)	\$125,000	City value
Marketing Officer annual salary incl. overheads (GO 0.13 FTE for roll-out, FOGO 0.5 FTE for first three years)	\$120,000	City value
Administration Officer annual salary incl. overheads (GO 0.25 FTE for roll-out, FOGO 1 FTE for roll-out)	\$100,000	City value
Project Officer annual salary incl. overheads (GO and FOGO 0.5 FTE for 2 years starting in 2023-24)	\$135,000	City value
Mass roll out kitchen caddy (\$/hhld)	Contract Price	Contract
Compostable caddy liners (\$/hhld)	Contract Price	Contract

As per the FOGO Guidelines, the City is not required to issue FOGO bins to multiple density dwellings (MDDs), especially where bins are shared. Accordingly, it has been assumed that only SUDs and MDDs not sharing bins would transition to the designated kerbside collection option being modelled.

The modelling has been projected to 2032-33 to provide a ten-year forecast all costs of each kerbside option. The complete list of assumptions has been outlined in Appendix A.

## 8.2 Key Findings

The overall and per household costs for each kerbside collection option are presented in Table 8-4. The first-year costs are provided, as well as the projected costs for year two when WtE and GO or FOGO are hypothetically introduced, along with the year six (2028-29) and year ten costs (2032-33).

The annual operating and total costs of each option has also been included. The highest cost option is bolded, and the lowest cost option is italicised. As covered at the start of this section. The costs include internal overheads and exclude public bin and commercial services.

**Table 8-4: Modelled Costs**

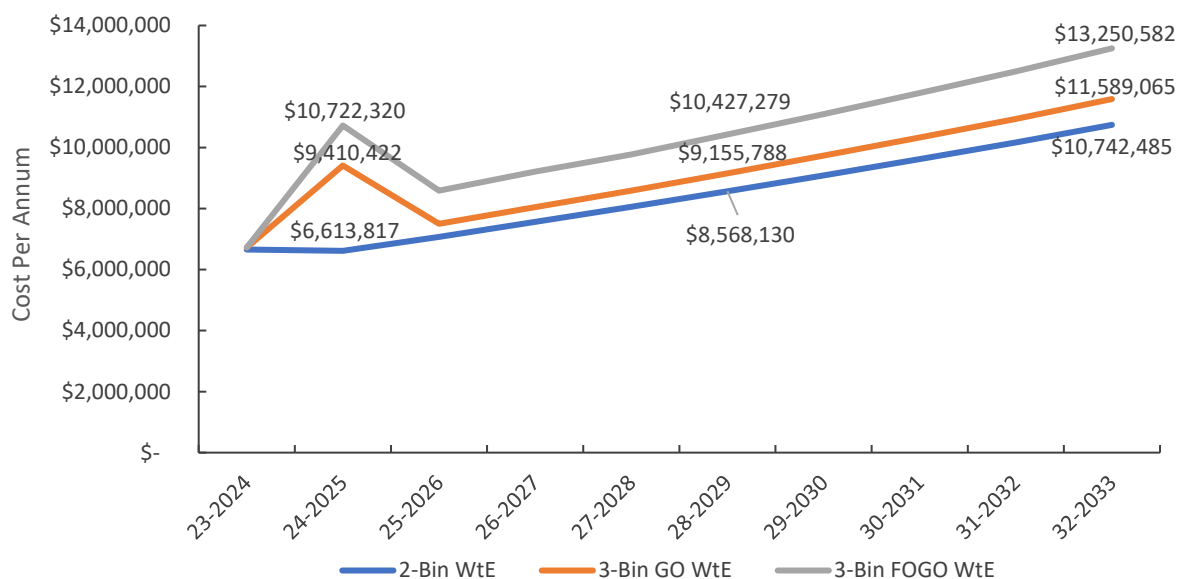
Option	2023-24 (\$/hhld)	2024-25 (\$/hhld)	2028-29 (\$/hhld)	2032-33 (\$/hhld)	Average Annual Cost (\$/hhld)	Average Annual Operating Cost	Total System Cost
2-Bin WtE	<i>\$341</i>	<i>\$325</i>	<i>\$364</i>	<i>\$410</i>	<i>\$363</i>	<i>\$8.4M</i>	<i>\$84.1M</i>
3-Bin GO WtE	<b>\$344</b>	<i>\$463</i>	<i>\$389</i>	<i>\$442</i>	<i>\$398</i>	<i>\$9.2M</i>	<i>\$92.0M</i>
3-Bin FOGO WtE	<b>\$344</b>	<b>\$528</b>	<b>\$443</b>	<b>\$506</b>	<b>\$449</b>	<b>\$10.4M</b>	<b>\$104.1M</b>

Overall, the 3-bin FOGO WtE option is the most expensive, with the total system costs expected to be \$104.1M over the 10-year lifetime of the model and an average of \$449 per household per year. The 3-bin GO WtE option is the less expensive of the 3-bin options with a total cost of \$92M over 10 years and an average of \$398 per household per year. The 2-bin WtE option is least expensive over 10 years, costing a total of \$84.1M and an average of \$363 per household per year.

The results demonstrate that either 3-bin system will result in increased costs for the City, due to the additional expenses involved in the initial rollout of a third bin and on an ongoing basis, such as supply of kitchen caddies, compostable liners, and additional waste education, collection and processing costs.

The changes to the estimated annual system costs have been graphically presented in Figure 8-1.





**Figure 8-1: Changes to Annual System Costs**

The 2024-25 financial year is modelled for roll-out of GO and FOGO bins and also the start of WtE for residual waste. Figure 8-1 shows that in 2024-25, when compared to the 2-bin WtE option, the 3-bin GO WtE option would increase by \$2.8M and the 3-bin FOGO WtE would increase by \$4.1M. In year 10 of the model (2032-33), the 3-bin GO WtE and 3-bin FOGO WtE costs are higher than the 2-bin WtE costs by \$846,580 and \$2.5M respectively.

### 8.3 Sensitivity Analysis

To better understand how different financial aspects may influence the costs of each kerbside service option, several sensitivity analyses have been completed. The sensitivity analysis individually considered the following changes from the baseline model:

- Application of higher capture rates (High Capture Rates);
- Use of post-consumer recycled new bin stock (Recycled Bins);
- Uptake of Waste Authority Better Bins grant funding (Better Bins Funding); and
- Application of higher recycling processing charges (High Recycling Gate Fee).

The key variations to the assumptions from the baseline model for the sensitivity analyses has been shown in Table 8-5 with the commercial in confidence contract pricing details outlined in the Confidential Appendix. The changes from the baseline model have been further explained along with the results in Subsections 8.3.1 to 8.3.4.

**Table 8-5: Sensitivity Analysis Variations**

Key Input	Baseline	Sensitivity Analysis Variation
GO capture Rate	80%	95%
FO Capture Rate	75%	85%

Key Input	Baseline	Sensitivity Analysis Variation
Recycled 140L Bin (replacement/maintenance)	Contract Price	Contract Price
Recycled 140L Bin (roll out)	Contract Price	Contract Price
Recycled 240L Bin (replacement/maintenance)	Contract Price	Contract Price
Recycled 240L Bin (roll out)	Contract Price	Contract Price
Better Bins Funding	\$0 per household	\$17 per household
Commingled Recycling Processing Rate	Contract Price	Contract Price + \$19

Changes to the total system costs based on application of each of the sensitivities individually has been captured below in Table 8-6. If the total system costs have decreased for a sensitivity, it is represented in brackets. To represent an increase in costs for a particular sensitivity, the total system costs have been underlined.

**Table 8-6: Total System Costs – Sensitivity Comparison**

Option Description	Baseline System Costs	High Capture Rates System Costs	Recycled Bins System Costs	Better Bins Funding System Costs	High Recycling Gate Fee System Costs
2-bin WtE	\$84.1M	\$84.1M	\$84.1M	\$84.1M	<u>\$85.0M</u>
3-bin FOGO WtE	\$92.0M	(\$91.5M)	(\$91.6M)	\$92.0M	<u>\$92.9M</u>
3-bin GO WtE	\$104.1M	<u>\$104.3M</u>	(\$104.0M)	(\$103.8M)	<u>\$105.0M</u>

Further explanation for the changes has been provided in the following subsections.

### 8.3.1 High Capture Rates

Talis modelled high capture rates for GO (95%) and FO (85%) waste streams to determine the resultant impact on the residual waste stream and subsequent processing costs. The total cost of the 3-bin FOGO WtE option increased slightly to \$104.3M or an average of \$450 per household per annum. This is due to the relatively high fees for FOGO processing charges compared to sending the materials to WtE. The 3-bin GO WtE option decreased slightly to a total of \$91.5M and an average of \$396 per household per year due to the lower GO processing charges compared to sending the materials to WtE. As the sensitivity did not impact the 2-bin WtE option, there were no changes to the costs.

### **8.3.2 Recycled Bins**

Talis has also considered pricing for the supply of recycled bin stock that contains at least 50% recycled plastic. The tender pricing received by the City for recycled bin stock was slightly less than non-recycled stock. This resulted in marginal savings for the City in both the GO and FOGO options. The total cost reduction for both 3-bin options decreased by \$58,024 over the 10 year period, which is less than 0.1% of the total costs.

### **8.3.3 Better Bins Funding**

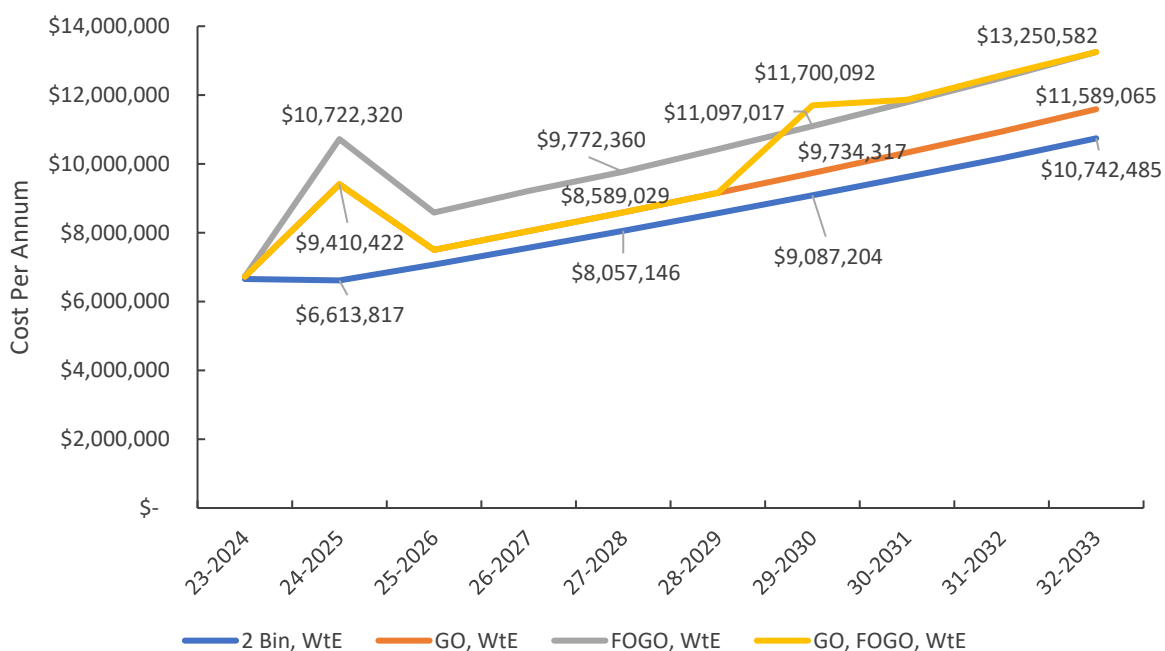
Local governments can access Better Bins Plus funding when providing a three-bin FOGO system to residents. Therefore, the funding is not available for the 3-bin GO WtE or the 2-bin WtE option. Access to the Better Bins funding was modelled at \$17 per household based on roll-out in 2024-25. Based on the number of households serviced by the City, the funding would contribute approximately \$318,028 to the 3-bin FOGO WtE option. When included in the model, this resulted in reduced total system costs of \$103.8M, which equates to a \$1 per household per annum saving when compared with the baseline model. This equates to a 0.35% reduction in costs over the 10 years of the model. This highlights that although the change to a 3-bin FOGO system is supported by a grant from the Waste Authority, it will have a negligible impact on the overall increased costs expected.

### **8.3.4 High Recycling Gate Fee**

An increase of \$19 per tonne to the recycling gate fee would result in increased costs to all three kerbside options. The total system costs in this scenario would be \$105M for the 3-bin FOGO WtE option, \$92.9M for the 3-bin GO WtE option and \$85M for the 2-bin WtE option. This equates to an annual increase of \$4 per household per annum for each of the three kerbside waste service options when compared to the baseline model.

## **8.4 Hybrid Option - GO then FOGO**

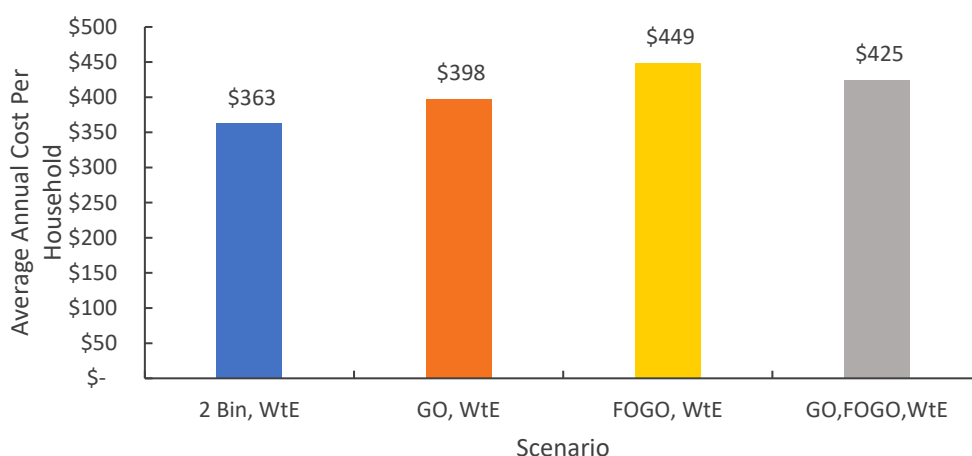
Following some discussions with the City, Talis also modelled an alternative kerbside option termed the hybrid option. The option considered an initial transition to a 3-bin GO WtE system in 2024-25 and then to a 3-bin FOGO WtE system in 2029-30. Figure 8-2 below shows that the option follows a similar cost trajectory to the 3-bin GO system until 2028-29. When the FOGO system is introduced in 2029-30, the additional FOGO roll-out costs make the costs for this hybrid option higher than the 3-bin FOGO WtE option. These roll-out costs for the hybrid option are similar to the annual costs associated with a FOGO roll-out in the 3-bin FOGO option in 2024-25. Finally, in 2032-33, the costs for the hybrid option will be the same as the 3-bin FOGO option.



**Figure 8-2: Annual Cost Flow by Option**

The cost flow analysis in Figure 8-2 shows that in the first year all options will cost the same as there is no change to the bin system. In 2027-28, three years after the relevant roll-outs and introduction of WtE for residual waste, the annual costs of the 2-bin option would be \$531,883 less than the 3-bin GO WtE and the hybrid option, and \$1.7M less than the 3-bin FOGO option. At the end of the 10-year modelled period in 2032-33, the annual costs of the 3-bin GO WtE would be \$1.7M less than the 3-bin FOGO and hybrid options.

Figure 8-3 below shows that the 3-bin FOGO WtE option remains the most expensive option with an anticipated average annual system cost of \$449 per household per annum. The 2-bin WtE option would cost the least at \$363. The 3-bin GO WtE option is next expensive at \$398 and the hybrid option due to the last four years of the model including additional FOGO roll-out and processing costs is at \$425 per household per annum.



**Figure 8-3: Annual Household System Cost Comparison**

As per the information in Table 8-7, the hybrid option resulted in a total cost of \$98.8M and an average annual cost of \$425 per household per annum. Accordingly, it would cost \$27 per household per annum more than the 3-bin GO option and \$24 per household per annum less than the 3-bin FOGO option.

**Table 8-7: Cost Summary with Hybrid Option**

Option	2023-24 (\$/hhld)	2024-25 (\$/hhld)	2029-30 (\$/hhld)	2032-33 (\$/hhld)	Average Annual Cost (\$/hhld)	Average Annual Operating Cost	Total System Cost
<b>2-Bin WtE</b>	\$341	\$325	\$374	\$410	\$363	\$6.8M	\$84.1M
<b>3-Bin GO WtE</b>	\$344	\$463	\$401	\$442	\$398	\$7.6M	\$92.0M
<b>3-Bin FOGO WtE</b>	\$344	\$528	\$457	\$506	\$449	\$8.8M	\$104.1M
<b>GO then FOGO</b>	\$344	\$463	\$482	\$506	\$425	\$8.3M	\$98.8M

Table 8-7 highlights that the hybrid option would save the City \$5.3 million over the 10 year period by delaying the transition from GO to FOGO by 5 years. This equates to a saving of just over \$1 million per annum that the transition between GO and FOGO is delayed.

## 9 Organics Processing Capacity

This section details the current and future organics processors located in and surrounding Perth and Peel. Their anticipated capacity is compared against the projected volumes of organic waste from domestic and commercial sources.

### 9.1 Methodology

A list of the existing organics processors was formed using the available online licence data from DWER, incorporating only facilities that are classified as category 67A prescribed premises<sup>25</sup>. These facilities are described under the category, “compost manufacturing and soil blending”. Processors that only shred or mulch organic material have been excluded from this review to avoid overstating the processing capacity available, as several of these facilities send material to a composter for processing after they have pre-treated it.

Only processors located in Perth, Peel, or the Wheatbelt have been included as contributing processing capacity that can service the Perth and Peel regions. Facilities in other regions are unlikely to process organic waste originating from Perth and Peel due to the significant distance and associated transportation costs. The licence data has been used to determine the GO and FOGO processing capacity for these facilities, stating their waste acceptance limit for GO or FOGO where the data was available. If this data was not available, the total licence capacity for the category 67A operations of the facility was used.

The works approvals for category 67A facilities that are available from the DWER website (as of December 2022), were used to determine the potential future facilities and their processing capacity. In addition to this, Talis has utilised industry knowledge to determine other facilities that may be able to process additional organic material in the future. It is important to note that these facilities may or may not become operational in the next ten years and their estimated opening dates are not certain. They have been included to allow a comprehensive discussion on future processing capacity.

The results of the information gathered has been used to determine the organics processing capacity available to Perth and Peel until 2030. As licence renewal is common and licence expiry rarely reflects when a facility will close, it was assumed that all current organics processing facilities and those facilities in a works approval stage will remain in operation until 2030.

### 9.2 GO Capacity Assessment

#### 9.2.1 GO Processors

According to licence data publicly available online<sup>25</sup>, there are currently 19 organic processors in or around the Perth, Peel and Wheatbelt regions. Processors that only accept farm waste or do not compost organic material have been excluded for the purposes of this review. Where the information was available, the licence capacity for each facility details the specific capacity for GO or FOGO feedstock, rather than the facility’s overall licenced capacity as a composter.

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<sup>25</sup> Licences and works approvals search - Department of Water and Environmental Regulation (der.wa.gov.au)(December 2022)

Having regard for the exemptions, 16 GO processors in the vicinity of Perth and Peel which have a combined licence capacity of 630,000 tonnes per annum have been considered. Processors that are not licenced to accept GO material have been excluded for the purposes of this review. However, two GO processors have also been excluded for the reasons below:

- The Atlas Composting Facility used to accept the organic materials extracted from the City of Stirling's one bin system which ceased in 2015 when it transitioned to a three bin (GO) system. The facility has not accepted any waste since then. Talis is unaware if Atlas has plans to enter the GO processing market.
- The Richgro anaerobic digester (AD) in Jandakot is known to receive source separated FO from selected sources within the commercial and industrial (C&I) sector. The facility does not intend to receive and process kerbside collected GO waste as the material can present problems to the AD process.

Table 9-1 details the location, processing technology, and licence capacity of each licenced GO processor excluded from the review.

**Table 9-1: Excluded GO Processing Facilities**

Facility Name	Region	Local Government	Processing Technology	Licensed Capacity (TPA)
Atlas Composting Facility	Wheatbelt	Victoria Plains	Open Windrow	50,000
Richgro Garden Products	Perth	Cockburn	Anaerobic Digestion	10,000

Table 9-2 lists GO processors near Perth and Peel. Although several of these facilities can also accept food waste as discussed in Section 9.3.1, their licence capacities in Table 9-2 are specific to GO processing.

**Table 9-2: Included GO Processing Facilities**

Facility Name	Region	Local Government	Processing Technology	Licensed Capacity (TPA)
Abercrombie Road Resource Recovery Centre (Eclipse Resources)	Perth	Kwinana	Open Windrow	50,000
Richgro Nowergup (Amazon Soils & Landscaping Supplies Previously)	Perth	Wanneroo	Open Windrow	50,000
Aussie Organics	Perth	Serpentine-Jarrahdale	Open Windrow	8,000
Baileys Fertilisers	Perth	Kwinana	Open Windrow	20,000
Red Hill Waste Management Facility	Perth	Swan	Aerated Static Pile	40,000
Waste Care	Perth	Bayswater	Open Windrow	9,000

Facility Name	Region	Local Government	Processing Technology	Licensed Capacity (TPA)
Northsands Resources	Perth	Wanneroo	Open Windrow	60,000
C-Wise	Peel	Murray	Open Windrow	90,000
Cullalla Feedlot	Wheatbelt	Gingin	Open Windrow	8,000
Garden Organics	Wheatbelt	Gingin	Open Windrow	32,000
Hopelands Farm	Wheatbelt	Brookton	Open Windrow	8,000
North Bannister Waste Facility	Wheatbelt	Boddington	Aerated Static Pile	110,000
Purearth Woottating Facility	Wheatbelt	Northam	Aerated Static Pile	55,000
Richgro Composting Facility	Wheatbelt	Boddington	Open Windrow	100,000

Of the facilities listed in Table 9-2, there are eight processors within Perth and Peel that accept GO, with a total licenced capacity for 327,000 tonnes per annum. No details on the greenwaste acceptance limit are available for Aussie Organics or Baileys Fertilisers, so their listed capacity represents the overall capacity of the facility.

Both domestic and commercial waste is accepted at these facilities and is primarily used to create compost. Mulch is also a common product, generated by four of the facilities. The products are used for either agriculture or urban amenity, and many facilities also have products for retail sale. Products from the Abercrombie Road and C-Wise facilities can also be used for environmental remediation and rehabilitation.

The six processors in the Wheatbelt are licenced to accept up to 303,000 tonnes of GO each year. As with the GO processors in Perth and Peel, these facilities accept both domestic and commercial waste as feedstock. Compost is again the most common product, and five facilities also generate mulch and fertiliser. The main market for each of these products is agriculture. All facilities sell some product to the public.

### 9.2.2 Future GO Processors

There are several work approvals for GO processors close to Perth and Peel, one of which is for the expansion of an existing facility. Table 9-3 shows each facility and the additional processing capacity it is expected to provide.

Of the four works approvals for GO processors, Aussie Organics consists of an expansion of the facility and an increase in licenced capacity. The other three works approvals are new facilities. As all of these work approvals have been validated by the DWER and are currently under assessment, Wannamal Road is assumed to be operational from mid-2023, Drainflow by 2024 and Boonanarring Composting



by 2027. They will potentially contribute an additional 186,500 tonnes of GO processing capacity each year.

**Table 9-3: Potential GO Processing Facilities**

Facility Name	Region	Local Government	Processing Technology	Expected Capacity
Aussie Organics	Perth	Serpentine-Jarrahdale	Open Windrow	2,500
Drainflow	Wheatbelt	Gingin	Open Windrow	10,000
Garden Organics Boonanning Composting Facility	Wheatbelt	Boddington	Open Windrow	124,000
Wannamal Rd Organics Pty Ltd	Wheatbelt	Gingin	Open Windrow	50,000

The main product of these facilities will be compost. Many of the products will be used in agriculture, although the products from Aussie Organics will be used in urban amenity and retail.

### 9.2.3 GO Volumes

As part of this analysis, Perth and Peel domestic and commercial GO waste volumes have been examined. The following sections outlines the forecast GO volumes generated and captured in the Perth and Peel regions up to and including 2030.

#### 9.2.3.1 Domestic GO Volumes

To determine the volume of domestic GO waste available the Waste Authority Waste and Recycling Dashboard 2020-21<sup>26</sup> (the Domestic Dashboard) was utilised. The Domestic Dashboard's categories garden organics, garden organics vergeside and green waste drop off, were used to establish the volume generated. The calculated GO volume is shown in Table 9-4.

**Table 9-4: Perth and Peel Domestic GO Volumes (2020-21)**

Key Input	Value Used	Source
Domestic GO generated in Perth and Peel (2020-21)	157,182	Domestic Waste and Recycling Dashboard 2020-21 <sup>26</sup>

To determine the volume of domestic organics generated in Perth and Peel up to and including 2030, the same method of tonnage projection based on population forecasts was used, as discussed in Section 5. On average the annual growth rate for the Perth and Peel region's population is estimated at 1.74%, unlike Kwinana REMPLAN growth rates which estimate that the City's population is to grow

<sup>26</sup> Domestic waste and recycling dashboard | Waste Authority WA

3.65% on average per annum until 2030. This method has also been applied to commercial volumes and FOGO volumes generated.

#### 9.2.3.2 Commercial GO Volumes

As part of the analysis, commercial GO has also been examined to understand the impacts of additional GO material on processing capacity. Table 9-5 shows the values from the Waste Authorities Recycling Dashboard<sup>27</sup> and the Waste and Recycling in Western Australia 2020-21 (WRWA) report<sup>19</sup> that have been used to determine the amount of commercial GO from Perth and Peel available for processing each year.

The Dashboard shows the amount of commercial waste recovered by waste type in 2020-21 and the WRMA illustrates the proportion of commercial waste recovered by waste type in 2020-21. The commercial organic material recovered in Perth and Peel is shown in Table 9-5, along with the reported commercial recovery rates of all the GO material generated.

**Table 9-5: Commercial GO Waste Generations Inputs**

Key Input	Value Used
Commercial GO recovered in Perth and Peel (2020-21)	25,519
Commercial GO recovery rate (2020-21)	51%

Based on the values in Table 9-5, the calculated tonnes of commercial GO generated is shown in Table 9-6 with the assumed capture rate.

**Table 9-6: Commercial GO Volume Assumptions**

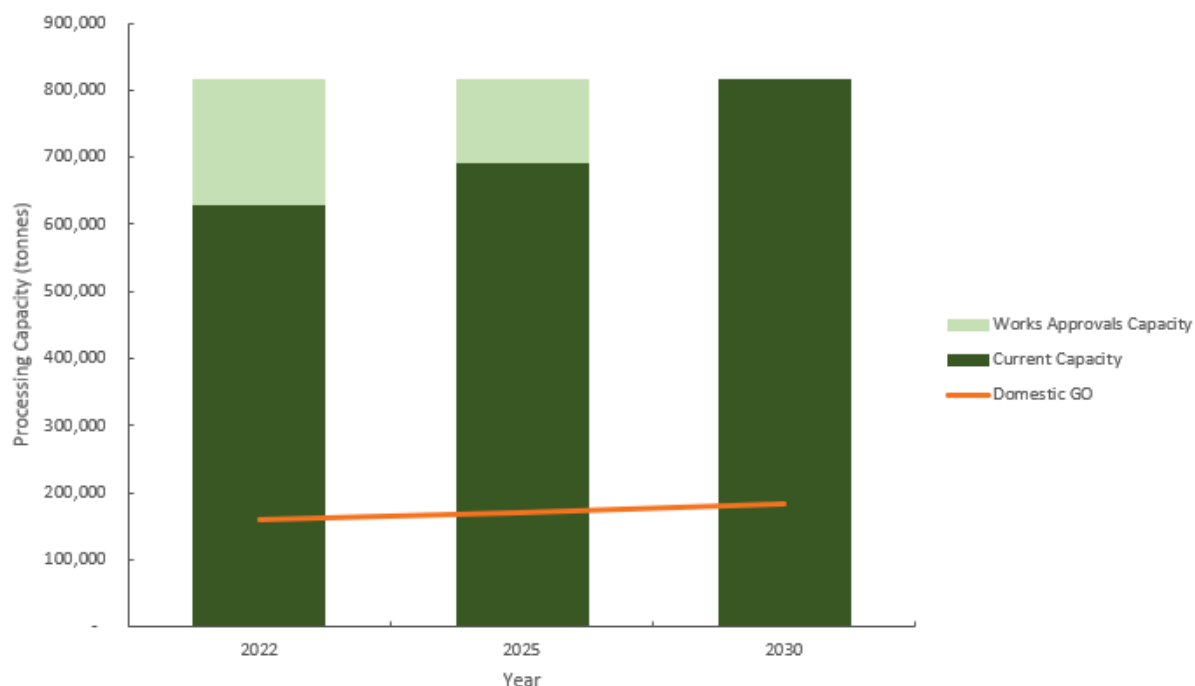
Key Input	Value Used	Source
Total commercial GO generated in Perth and Peel (2020-21)	50,037	Estimate based on Waste and Recycling in Western Australia 2020-21 <sup>27</sup> , Recycling Dashboard 2020-21 <sup>26</sup>
Average Commercial Organics capture rate (2021-22 onwards)	100%	Talis Value

#### 9.2.4 GO Processing Capacity

In 2020- 21, it was calculated that 157,000 tonnes of domestic GO was generated in Perth and Peel. Figure 9-1 shows that there is sufficient capacity to process the domestic GO through to 2030 as the available waste does not reach the operating capacity of the facilities in any year. The additional facilities that are currently at the works approval stage will provide a substantial increase in capacity.

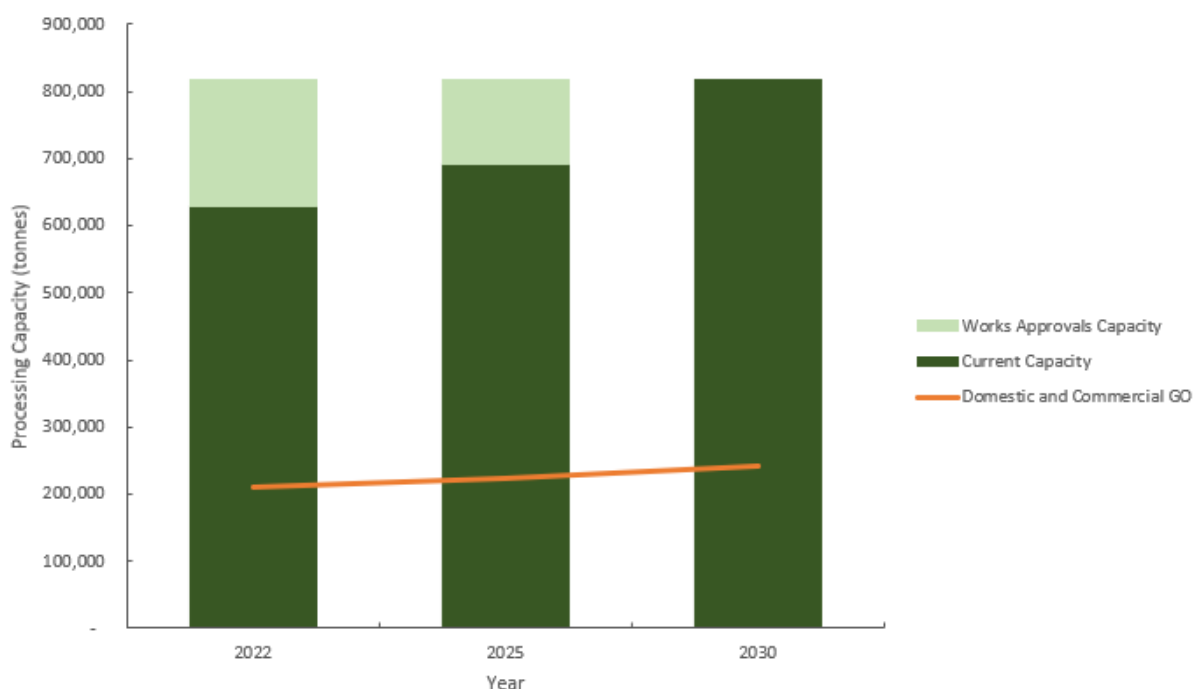
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<sup>27</sup> Waste Authority WA <https://www.wasteauthority.wa.gov.au/publications/view/recycling-dashboard>



**Figure 9-1: Domestic GO Processing Capacity.**

Most GO processing facilities will take both domestic and commercial GO. In 2020-21, it was calculated that 50,037 tonnes of commercial GO would be generated in Perth and Peel. Combined with domestic GO, this equates to over 200,000 tonnes of GO. Figure 9-2 shows that even when assuming all GO material will be recovered at a GO processing facility, there is abundant capacity through to 2030.



**Figure 9-2: Domestic and Commercial GO Processing Capacity**

The results of the assessment indicate that there is adequate processing capacity for both domestic and commercial GO. Additional facilities currently under construction will add further processing capacity to accommodate potential increases in waste generation.

## 9.3 FOGO Capacity Assessment

### 9.3.1 FOGO Processors

According to DWER licence data<sup>25</sup>, there are currently nine licenced FOGO processors in the Perth, Peel and Wheatbelt regions servicing the Perth and Peel region. Processors that are not licenced to accept FOGO material have been excluded for the purposes of this review. In some instances, the licence detailed specific capacity for FOGO feedstock.

There are currently nine processors that are licenced to accept FOGO material within or near the Perth metropolitan area. Together, they have a total licenced capacity of 274,000 tonnes per annum. However, five licenced FOGO processors have been excluded for the purposes of this review for the following reasons:

- The Atlas Composting Facility as discussed in Section 9.2.1 used to accept the organic materials extracted from the City of Stirling's one bin system which ceased in 2015 when it transitioned to a three bin (GO) system. The facility has not accepted any waste since then. Talis is unaware if Atlas has plans to enter the FOGO processing market.
- The Richgro anaerobic digester in Jandakot as discussed in Section 9.2.1 is known to receive source separated FO from selected sources within the Commercial and Industrial (C&I) sector. The facility does not intend to receive and process kerbside collected FOGO waste as the GO component along with contamination can present problems to the AD process.
- The Richgro facility in Nowergup is too small to accept FOGO from local governments.
- The Regional Resource Recovery Centre (RRRC) in Canning Vale is owned by the Resource Recovery Group (previously the Southern Metropolitan Regional Council [SMRC]). The facility currently accepts FOGO for pre-treatment before the material is transferred to Purearth or Garden Organics for composting. With work approvals for increased processing capacity the RRRC facility will have a total licence capacity of 120,000 tonnes per annum. The RRRC is a historical Bedminster facility that extracted the organic element of kerbside residual waste collections. However, that operation ceased several years ago. The RRG has indicated that it may resume composting operations, however the equipment and facility would need to be refurbished, which could take a significant time to deliver (potentially 2 years).
- The Western Metropolitan Regional Council (WMRC) operate the Brockwaste facility in Shenton Park. The licence allows the WMRC to process up to 60,500 tonnes per annum including FOGO and residual waste. The anaerobic digestion facility is currently not operational and residual waste is transferred to other destinations. GO and FOGO from participating member local governments is currently taken to the facility for transfer to the final composting facility.

Table 9-7 details the location, processing technology, and licence capacity of each licenced FOGO processor excluded from the review.

**Table 9-7: Excluded FOGO Processing Facilities**

Facility Name	Region	Local Government	Processing Technology	Licensed Capacity (TPA)
Richgro Nowergup (Amazon Soils & Landscaping Supplies Previously)	Perth	Wanneroo	Open Windrow	500
Richgro Garden Products	Perth	Cockburn	Anaerobic Digestion	10,000
Atlas Composting Facility	Wheatbelt	Victoria Plains	Open Windrow	50,000
RRG RRRC Facility	Perth	Canning	Pre-treatment/ Screening	120,000
WMRC Brockwaste Facility	Perth	Nedlands	Anaerobic Digestion	60,500

Excluding the above licenced FOGO processors, results in four FOGO processors for consideration in the current FOGO capacity assessment. Based on current data on licence capacities, the four FOGO processors can accept a total of 33,000 tonnes of FOGO per annum.

Table 9-8 details the location, processing technology, and licence capacity of each remaining FOGO processor.

**Table 9-8: Included FOGO Processing Facilities**

Facility Name	Region	Local Government	Processing Technology	Licensed Capacity (TPA)
Red Hill Waste Management Facility	Perth	Swan	Aerated Static Pile	10,000
GO Organics	Wheatbelt	Gingin	Open Windrow	8,000
North Bannister Waste Facility	Wheatbelt	Boddington	Aerated Static Pile	10,000
Purearth Woottating Facility	Wheatbelt	Northam	Aerated Static Pile	5,000

*\* Information compiled in December 2022*

The Eastern Metropolitan Regional Council (EMRC) operated Red Hill facility is licensed to accept 10,000 tonnes per annum. The facility predominantly produces soil conditioners and compost. The products are then typically used in the urban amenity market with a portion of their products being sold to the public.

Three processors are located in the Wheatbelt, possessing a combined licence capacity of 23,000 tonnes. These include the GO Organics in Gingin, the Veolia operated North Bannister site and Purearth in Woottating. Domestic FOGO waste is the majority of the feedstock for these facilities, and

each facility uses it to produce compost. Both GO Organics and Purearth produce mulch and fertiliser in addition to compost. The products from all three facilities are used in the agricultural market. As with the processors in Perth, some of GO Organics and Purearth products are sent for retail sale, which include up to 35% of FOGO derived materials.

### 9.3.2 Future FOGO Processors

There is currently one works approval for a new FOGO facility near Perth and Peel. In addition to this, there are facilities and operators that have either expressed interest in or have the potential to process additional FOGO material in the future. These facilities and their anticipated capacity are discussed below. As some facilities are already operating, only the additional processing capacity for each expansion is included in Table 9-9.

**Table 9-9: Potential Future FOGO Processing Facilities**

Facility Name	Region	Local Government	Processing Technology	Expected Expansion Capacity
Red Hill Waste Management Facility	Perth	Swan	In-vessel	140,000
Resource Recovery Facility (RRF)	Perth	Wanneroo	Unknown	110,000
North Bannister Waste Facility	Wheatbelt	Boddington	Aerated Static Pile	100,000
C-Wise FOGO Facility	Peel	Murray	Aerated Static Pile	100,000

The North Bannister Waste Facility is the only FOGO processor near Perth and Peel with a works approval. The work approval report is to increase the facilities FOGO processing ability from 10,000 to 100,000 tonnes per annum. At the time of preparing this Report in December 2022, Talis is of the understanding that the construction works for this facility is currently underway and should be completed in the near future. Therefore, it has been assumed that the North Bannister facility will be operational by the 2025 timeframe in the model. The facility will further increase acceptance of municipal and commercial organic waste volumes and continue to produce compost.

Recognising the lack of potential FOGO processing capacity, Talis has undertaken modelling on potential facilities to understand their impact on processing capacity. There are two existing facilities that have the potential to provide a large amount of FOGO processing capacity: the Red Hill Waste Management Facility and the Neerabup Resource Recovery Facility (RRF). Due to the extensive work involved in building or repurposing these facilities into FOGO processors, it is assumed that these facilities will not be in operation until at least 2025. It should also be noted that it is currently unclear whether these facilities will become operational, as none of them are committed projects at this stage. Regardless, these have been included within this Assessment to understand their potential impact on the processing capacity within Perth and Peel.

The EMRC is currently operating its temporary FOGO facility at Red Hill with a tonnage capacity of 10,000 tonnes per annum. The EMRC has obtained approval from the EPA for the construction of a permanent FOGO facility with a capacity range of up to 150,000 tonnes per annum. In 2021, the EMRC commenced a procurement process for the permanent FOGO facility. Talis is of the understanding that the EMRC has not entered into a contract for the permanent FOGO facility at this stage and are looking to retender these works in the near future. With the potential for significant demand for FOGO

processing services in the future, it is anticipated that the permanent FOGO facility will be delivered in the coming years.

The RRF is owned by the Mandarie Regional Council (MRC) and originally processed the organic fraction of kerbside residual waste collections. Recently, MRC and Suez (now Veolia) agreed to terminate their processing agreement for the facility. This presents an opportunity for the facility to be repurposed into a FOGO processing facility, which MRC is currently investigating. If the facility becomes operational it has been assumed the licenced capacity will remain the same, providing an additional 110,000 tonnes of FOGO capacity.

C-Wise currently operate a GO processing facility in Nambeelup and are looking to expand their operation to process FOGO. For the purpose of this assessment, it is assumed that C-Wise will be seeking approval to allow the facility to process 100,000 tonnes of FOGO per annum.

### 9.3.3 FOGO Volumes

As part of this analysis, Perth and Peel domestic and commercial FOGO waste volumes have been examined. The following sections outlines the forecast FOGO volumes generated and captured in the Perth and Peel regions up to and including 2030.

#### 9.3.3.1 Domestic FOGO Volumes

Table 9-10 shows the amount of kerbside domestic FOGO waste generated in Perth and Peel in 2020-21, along with estimated available FOGO from all local governments committed and/or transitioning to FOGO and the estimated FOGO of all Perth and Peel local governments<sup>11</sup>.

As per the Waste Authority website, Local Governments participating (committed and/or transitioning) in Better Bins Plus: Go FOGO program are:

- the cities of Albany, Bayswater, Belmont, Bunbury, Fremantle, Kalamunda, Melville, Nedlands, Subiaco, Swan and Vincent
- the shires of Augusta-Margaret River, Collie, Dardanup, Esperance, Harvey, Mundaring and Serpentine-Jarrahdale
- the towns of Bassendean, Claremont, Cottesloe, East Fremantle and Mosman Park

Local Governments delivering FOGO services but not currently participating in Better Bins Plus: Go FOGO program are:

- the shires of Capel and Donnybrook-Balingup

**Table 9-10: FOGO Processing Capacity Inputs**

Key Input	Value Used	Source
Domestic FOGO generated in Perth and Peel (2020-21)	32,537	Domestic Waste and Recycling Dashboard 2020-21 <sup>26</sup>
Domestic estimated available FOGO from all committed local governments (2020-21)	79,883	Talis value derived from the Waste and Recycling Dashboard 2020-21 <sup>26</sup>

Key Input	Value Used	Source
Domestic estimated available FOGO from all Perth and Peel local governments	240,172	Talis value derived from the Waste and Recycling Dashboard 2020-21 <sup>26</sup>
FO capture rate from residual waste stream	75%	Talis Value
GO capture rate from residual waste stream	80%	Talis Value

To determine the volume of commercial organics generated in Perth and Peel up to and including 2030, the same waste projection method as discussed in Section 5 was adopted.

### 9.3.3.2 Commercial FOGO Volumes

Table 9-11 shows the values from the Dashboard and the WRWA report that have been used to determine the amount of commercial FOGO from Perth and Peel available for processing each year.

The Dashboard shows the amount of commercial waste recovered by waste type in 2020-21 and the WRMA report illustrates the proportion of commercial waste recovered by waste type for the same period. The commercial organic material recovered in Perth and Peel is shown in Table 9-11, along with the reported commercial recovery rates of all the FO material generated.

**Table 9-11: Commercial FOGO Generation Assumptions**

Key Input	Value Used	Source
Commercial FO recovered in Perth and Peel (2020-21)	13,521	Recycling Dashboard 2020-21 <sup>26</sup>
Commercial food organics recovery rate (2020-21)	6%	WRWA Report <sup>27</sup>

The commercial 'food organics' recovery rate from the WRMA report was assumed to apply to the FO material type only. Based on these values, the calculated tonnes of commercial FO generated is shown in Table 9-12 along with the assumed average capture rates adopted for these modelling works.

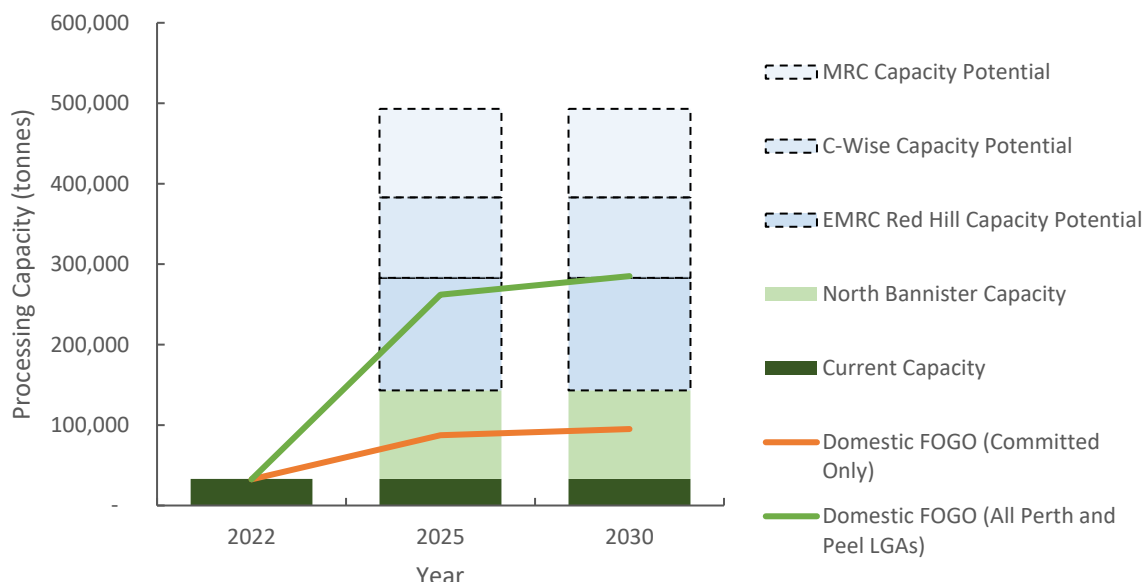
**Table 9-12: Commercial FOGO Volume Assumptions**

Key Input	Value Used	Source
Total commercial FO generated in Perth and Peel (2020-21)	225,350	Estimate based on WRWA Report <sup>27</sup> and Recycling Dashboard 2020-21 <sup>26</sup>
Average commercial organics capture rate (2021-22 onwards)	25%	Talis value



### 9.3.4 FOGO Processing Capacity

Figure 9-3 has been generated to show the current domestic generated FOGO tonnages against the licence capacities in 2022, 2025 and 2030. The domestic tonnages include the incidental FOGO waste collected from commercial businesses within the participating local governments.



**Figure 9-3: Domestic FOGO Processing Capacity**

Figure 9-3 demonstrates that there is insufficient capacity available within the currently licenced processing facilities to process the FOGO material anticipated to be generated by all local governments in Perth and Peel. The results suggest that if the Veolia North Bannister facility, which currently holds a works approval, were to become operational, there would be sufficient processing capacity for the domestic FOGO generated by the local governments committed or transitioning to a FOGO system. The Red Hill Waste Management Facility has the potential to offer an additional 140,000 tonnes of FOGO processing capacity, which as demonstrated in Figure 9-3, would provide sufficient additional capacity to allow all of the FOGO expected to be generated by all local governments in Perth and Peel to be processed at an appropriate facility in 2025. By 2030, the additional capacity offered by the expansion of the Red Hill Waste Management Facility's operations would be insufficient to allow all of the anticipated domestic FOGO to be processed, however approximately only 2,000 tonnes additional processing capacity would be required.

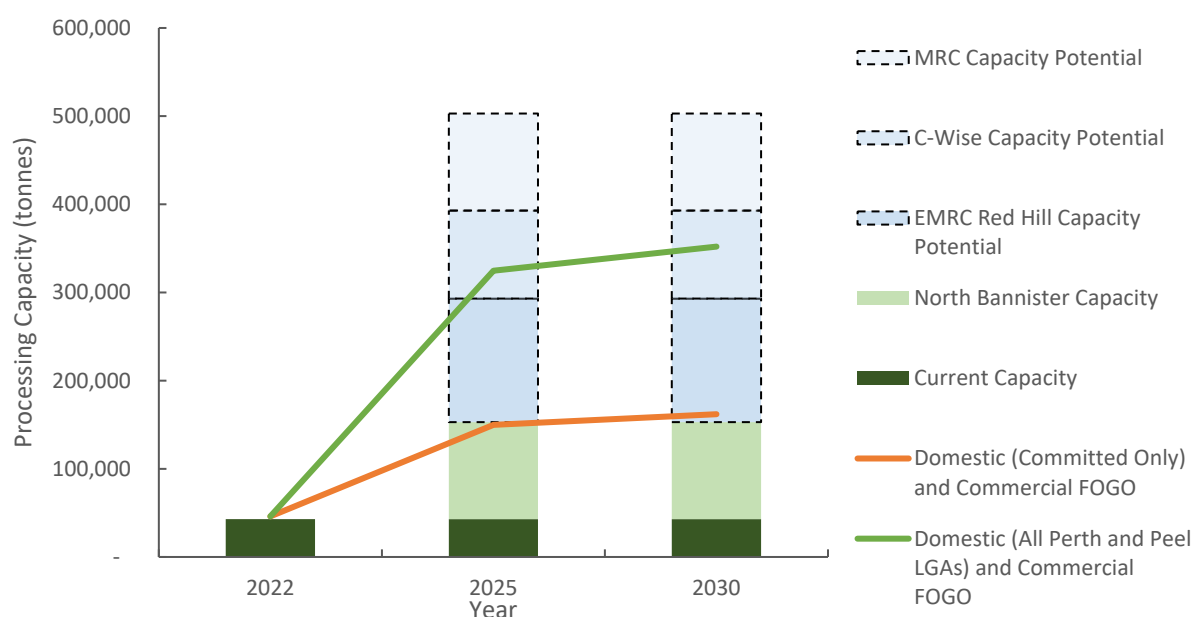
If only one of the other two potential future FOGO processing facilities (MRC or the C-Wise) became operational, the additional capacity that could potentially be offered would be insufficient to process all FOGO material anticipated to be generated if all local governments in Perth and Peel provided a FOGO system. It is assumed that the shortfall would be 40,000 tonnes per annum. This demonstrates a severe lack of existing and planned capacity and means that there is limited contingency if one or more facilities become nonoperational for a period of time.

It is also important to note that the delivery of FOGO processing facilities, including the design, procurement, approval and construction stages, can be a complex and time-intensive process. The delivery of the potential FOGO processing facilities outlined in Table 9-9 by 2025 is therefore, while possible, considered to be optimistic. These challenges highlight that any delays to the potential FOGO processing facilities may impact the ability to achieve the State Waste Strategy 2030 targets due to an

inability to process the FOGO materials expected to be generated if all local governments in Perth and Peel provided a FOGO system.

Further supporting the results of the Organics Processing Assessment, the Australian Organics Recycling Association (AORA) undertook an assessment in 2021 of the processing capacity for FOGO waste in Australia, including a separate analysis for each State. The report states that there is a processing capacity deficit compared to the capacity required to achieve a 70% material recovery rate. Recognising that the majority of WA's population resides in the Perth and Peel regions which therefore generate the majority of the State's waste, it is considered that AORA's statement relates strongly to these regions.

For the purpose of the capacity analysis with commercial tonnages included, the capacity of the Richgro Cockburn facility was included, which currently processes FO waste from commercial sources. The results of the combined domestic and commercial tonnages are shown in Figure 9-4.



**Figure 9-4: Domestic and Commercial FOGO Processing Capacity**

The results suggest that, when both commercial and domestic FOGO is considered, there is sufficient capacity within the existing facilities and those with works approvals for the committed and transitioning local governments to provide a FOGO system in 2025 only. By 2030, the results suggest that there will be insufficient capacity to accept the anticipated volumes of domestic and commercial FOGO demonstrated if only the committed and transitioning local governments provided a FOGO system.

This further emphasises the requirement for up to two of the potential FOGO processing facilities to become operational to ensure there is sufficient capacity to recover both the domestic and commercial tonnages anticipated to be generated. As previously stated, Talis believes that it would be optimistic to assume that these facilities will be operational by 2025 due to the significant works, hurdles and timeframes associated with their delivery.

## 9.4 Relevance to the City

It has been estimated that by 2029-30, the City would likely generate 5,250 tonnes of GO in a 3-bin GO system or 8,217 tonnes of FOGO in a 3-bin FOGO system. These are relatively small volumes when

considering the size of the Perth market and also the volumes that would be expected from larger local governments. Further, the City is strategically located, not far from a number of existing and planned FOGO processing facilities. These factors reduce the risk of the City being able to find a suitable contractor to process FOGO.

If the City re-engages the current contractor Veolia for processing of GO or FOGO materials. These materials once collected, would be processed at the North Bannister facility, and therefore, the risk of the City's GO and FOGO not being processed, has been lowered.

The assessment shows that there is more than sufficient future capacity to process GO in 2020 and beyond. However, there is some uncertainty about the FOGO processing capacity. Fortunately for the City, the North Bannister facility can accept the City's FOGO and additional processing facilities are anticipated to come online in the coming years. However, if larger local governments transition to FOGO and C-wise, EMRC or MRC do not have an operational organics facility, then it may be difficult for the City to find somewhere for the FOGO waste to be processed in subsequent years. Accordingly, there is a low to medium risk that there will not be capacity to process the City's FOGO in coming years.

The City could best manage this risk of processing capacities by continuing to plan ahead and ensuring that longer-term contracts are in place for optional processing of GO and FOGO.

## 10 Risk Assessment

The kerbside waste collection services are used by all residents and therefore, the City receives a lot of interest from its residents about these services. There are inherent risks associated with each kerbside collection option. The risks have been described, assessed and evaluated for residual risk levels after applying suitable treatments in a comprehensive risk assessment included in Appendix B. The key risks of each kerbside collection option have been summarised in this section.

### 10.1 2-bin WtE

Residents are familiar with the current 2-bin system. However, many have expressed the need for change after seeing neighbouring local governments implement 3-bin systems. The key risks associated with retaining the 2-bin system have been detailed below.

#### 10.1.1 Non-Alignment – State Waste Strategy 2030

The State Waste Strategy 2030 sets a specific requirement for all local governments in the Perth and Peel region to provide consistent 3-bin kerbside collection system that includes separation of FOGO. Local governments in the Perth and Peel Region were further required to implement waste plans, aligning with the local government waste planning processes and the State Waste Strategy 2030. DWER only approved waste plans from local governments that included an action to change to a 3-bin FOGO system before 2025.

Ministerial statement 1093<sup>28</sup> has also been issued (March 2019) requiring the Kwinana WtE facility to accept only residual waste. Residual waste is defined in the State Waste Strategy 2030 as waste that remains after the application of a better practice source separation processes and recycling systems. This could potentially be enforced on local governments through changes to the current waste levy that would have financial penalties on residual waste to WtE from a 2-bin system.

Accordingly, the best way for the City to avoid non-alignment risks associated with the State Waste Strategy 2030 is for the City to introduce a 3-bin FOGO system that complies with the FOGO Guidelines. However, as modelled within this Assessment, this would equate to a \$86 annual increase to existing waste services charges.

#### 10.1.2 Inferior Material Recovery

The 2-bin WtE kerbside collection option does not separate GO and FO from the residual waste bin for recovery, unlike the other bin system options. While the shift from landfill disposal to WtE results in a 16% increase to the amount of material recovered in this system, it would remain 14% less than the 3-bin GO WtE kerbside collection option and 21% less than the 3-bin FOGO WtE kerbside collection option, as discussed in Section 6.

The State Waste Strategy 2030 sets out a target for Perth local governments to reach a 70% material recovery by 2030. With a 2-bin WtE kerbside collection, the City is able to achieve a 35% material

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<sup>28</sup> Ministerial Statement 1093

recovery rate. Consequently, the State Government could then enforce penalties, on local governments that do not appear to be striving to achieve the target.

The collection system is not a waste management better practice approach as both the 3-bin GO WtE and 3-bin FOGO WtE kerbside collections provide greater material recovery and divert more waste away from landfill. Increasing material recovery and ensuring materials are in use is also in keeping with the circular economy principles.

### **10.1.3 Negative Public Opinion - Environmental Credentials**

In recent years public concern for the environment has grown to unprecedented levels across the globe. This is reflected within the City's community from the survey results covered in Section 11. The survey found, 'wanting a more sustainable future for our kids' was the top reason residents wanted a third bin, and the focus group ranked environmental outcomes to be the most important factor. This is further supported by other recent community engagements undertaken by the City, particularly with regard to its Strategic Community Plan, where sustainability is a clear, and increasing, priority to the community.

Not adopting a system that meets the community's environmental expectations, can create the risk of a disconnect between residents and the City. This disconnect is likely to continue to intensify when surrounding local governments have/bring in these systems, thus deepening a scepticism within environmentally conscious residents. The Cities of Cockburn and Rockingham have already transitioned to a 3-bin GO service.

The City can reduce this risk by transitioning to a 3-bin GO or FOGO system.

### **10.1.4 WtE Contract Limit Exceedance**

The City has a Waste Supply Agreement in place with Avertas WtE facility to supply between 6,000 tonnes and 20,000 tonnes of residual waste per annum, as discussed in section 3.2. The waste projections have estimated that by 2032-33, the City will be very close in exceeding this agreement, with the agreement being exceeded the following year onwards. Breaking the agreement has unknown financial risk for the City. The City may have to pay the facility a penalty for the provided excess material or pay for the material to hauled to a landfill to be landfilled. If the extra material needs to be landfilled it could cause operational disruption as well as financial implications.

The City can reduce this risk by transitioning to a 3-bin GO or FOGO system.

## **10.2 3-bin GO WtE**

The introduction of a 3-bin GO system introduces new risks that have been described below.

### **10.2.1 Non-Alignment – State Waste Strategy 2030**

As discussed in section 10.1.1, the State Waste Strategy requires all Perth and Peel Local Governments to transition to consistent FOGO system. Therefore, adopting a 3-bin GO WtE system leaves the City vulnerable to any financial penalties potentially enforceable by the State Government.

### 10.2.2 Increased Service Costs

Implementing a 3-bin GO WtE kerbside collection increases the waste collection and processing service cost. As per Section 8, the 2-bin WtE kerbside collection is expected to cost households an average of \$363 per annum over 10 years. In comparison, when implementing a 3-bin GO WtE kerbside collection the cost is expected to increase by \$138 per household for the initial roll-out year, then remain slightly higher in cost (\$21-\$32 per household) than the 2-bin WtE option in the subsequent years. The 3-bin GO WtE average annual costs per household over the 10 years is \$35 more than the 2-bin WtE option.

The City's residents have encountered socio-economic challenges being the most disadvantaged population in the Perth metropolitan region with a Socio-Economic Indexes for Areas (SEIFA) score of 972<sup>2</sup>. The unemployment rate was 7% in 2021, 2% higher than WA's average<sup>29</sup>. These socio-economic challenges will potentially limit some residents' ability to pay extra for a 3-bin GO service.

The City may be able to reduce the impact of the roll-out costs if reserve funds are available for the roll-out. Higher recovery rates through increased education will also result in some savings due to lower GO processing charges, compared to residual waste disposal.

### 10.2.3 Modest Environmental Outcomes

The 3-bin GO kerbside collection option has greater material recovery than the 2-bin WtE kerbside collection option but lower material recovery than the 3-bin FOGO kerbside collection option, as discussed in Section 6.2. The 3-bin GO WtE collection option increases material recovery to 49%, which is 21% short of the State Strategy 2030 material recovery target of 70% by 2030. As discussed above The State Government could potentially enforce penalties to local governments not shown to be striving towards their targets.

The Australian Federal Government and State Government are pushing for a more circular economy that involves maximising resources as much as possible. Although, the 3-bin GO WtE kerbside collection option separates and recovers GO, the FO material will still be lost to the WtE facility. Thus, material recovery is not being maximised from the residual waste bin. This option also limits the City's capability of meeting its objective to *"recover more value and resources from waste"*.

The City can manage this risk by continuing to promote the use of and subsidise the price of Bokashi buckets, home-composting kits and worm-farms. These incentives encourage at home food waste recovery and helps to reduce costs associated with disposal or processing FO diverted from the kerbside collection system.

### 10.2.4 Negative Public Opinion – Choice of Option

The 3-bin GO WtE option as discussed above is more expensive than the 2-bin WtE kerbside collection option. The option also does not result in as much potential material recovery as the 3-bin FOGO WtE kerbside collection option. This could be seen negatively by residents who do not wish to pay for an additional service. On the flipside, it falls short of the expectations of those residents wanting to

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<sup>29</sup> Australian Bureau of Statistics (2021)

maximise material recovery and willing to source separate their FO. Lastly, residents in MDDs who do not receive a GO bin could also express their disappointment.

Should the City choose to pursue this option, the risk of negative public opinion could be managed through effective communication with the community, explaining the merits of the 3-bin GO system and reasons for the City's decision. Residents of MDDs could opt in for GO bins as per their needs.

### **10.2.5 Public Backlash - Reduced Residual Waste Bin Size**

When the 3-bin GO WtE kerbside collection is introduced, the size of the residual waste bin is intended to be reduced from 240L to 140L. This practice encourages residents to place GO (34% of all the City's current waste) into the provided 240L lime-green GO bin. However, reducing the size of the residual waste bin can raise concerns with some residents, as they will lose 100L of residual waste bin space in the residual waste bin.

It is important to note that with the reduced residual waste bin size and the additional GO bin emptied fortnightly, residents will have an additional 20L in weekly bin capacity.

The City could opt to manage the needs of residents that need extra residual waste capacity by providing them with an additional 140L bin and charging extra for the service.

## **10.3 3-bin FOGO WtE**

The key risks associated with the introduction of the FOGO system have been detailed below.

### **10.3.1 Increased FOGO Service Costs**

The 3-bin FOGO WtE option is the most expensive. The option is on average per household per annum \$51 higher than the 3-bin GO WtE option and \$86 higher than the 2-bin WtE option. When introducing the option costs are expected to jump significantly by almost \$203 per household, and then remain higher in cost than the other two kerbside collection options in subsequent years (\$72-96 per household per annum), as discussed in Section 8.2.

As discussed in section 10.2.2, the City's residents are limited in their ability to pay for additional kerbside services. The annual increases could place significant pressure on households already struggling financially.

If the City does opt for this option, some of the roll-out costs could be covered using any available reserves. The City would be eligible for the Better Bins grant funding. However, this would only result in a \$1 reduction in the annual charges. Therefore, the City may also wish to opt to lobby DWER to subsidise the increased costs by providing additional funding or financial support in order to introduce FOGO.

### **10.3.2 Public Backlash - Reduced Bin Size and Collection Frequency**

When the 3-bin FOGO WtE kerbside collection is introduced, in accordance with the FOGO Guidelines, the residual waste bin is reduced from 240L to 140L and goes from being emptied weekly to fortnightly. This change in the residual waste bin size and collection frequency is due to the organic waste now being placed in the FOGO bin, which is collected weekly. As with the GO system, this shift helps encourage residents to change their current practices and maximise recovery by source-separating their FOGO.



The change in bin size can raise concerns within the community, especially those with young families as items such as nappies build up quickly and will be collected less regularly. Nevertheless, the new bin system gives residents an extra 70 litres of additional capacity per week, and the compositional audits show over 55% of the residual waste bin is FOGO, which will potentially move to the new FOGO bin. Furthermore, the audit showed that less than 25% of materials in the residual waste bins was actual residual waste.

This risk can be reduced by maintaining the existing 240L bin for residual waste. However, this will not comply with FOGO Guidelines and will disqualify the City from receiving any Better Bins grant funding. It will also most likely result in low material recovery rates due to the reduced incentive to change waste behaviour, with some residents continuing to place FO and GO in the residual waste bin. This approach would increase weekly capacity by 120L which is considered highly excessive.

As a better alternative, the City could manage individual household needs by providing an additional 140L bin with a charge.

### **10.3.3 Negative Public Opinion - Increased Cost and Complexity**

As discussed in Section 10.3.1, the FOGO bin system is the most expensive option. This system also gives residents the greatest opportunity to source-separate their waste to create greater material recovery. This further separation of waste makes the 3-bin FOGO WtE option the most complex to use, which can cause frustration amongst residents, as it also means a change to the collection frequency of the residual waste bin from weekly to fortnightly.

To counter this risk, a strong FOGO education campaign is required to inform residents of the merits of the change. The campaign must also raise awareness of what can and cannot go into each bin to help ease residents with the transition. There is now a plethora of information and resources available from the Waste Authority's Waste Sorted website to assist the City with the process.

### **10.3.4 Limited FOGO Processing Options**

The City currently has a contractor who is willing to collect and process the FOGO material at the North Bannister facility. Therefore, this risk has been lowered. However, as shown in Section 9.3.2, FOGO processors in or near the Perth and Peel regions are limited. More local governments in Perth and Peel are moving to a 3-bin FOGO kerbside collection, which will create competition for processors. Fortunately, the North Bannister facility is likely to increase its licensed processing capacity in future years and additional processing facilities are anticipated to come online in the coming years. Accordingly, there is a low risk that there will not be capacity to process the City's FOGO waste, particularly considering the City generates small volumes in comparison to larger local governments. In addition, there is a low risk as to whether the price for processing FOGO will increase significantly for the City in coming years.

This risk is best managed by continuing to ensure through long-term contracts that there is a viable FOGO processing solution for the City.

### **10.3.5 Increased Contamination**

The complexity of the 3-bin FOGO WtE kerbside collection option can create high contamination levels due to lack of awareness and understanding. High levels of contamination impact the FOGO processors' ability to develop a cost-conductive FOGO derived product. Accordingly, FOGO loads with high contamination may be rejected from the processing facility and the City may be charged additional costs.



As discussed above, a strong FOGO education campaign is required to minimise contamination. This will need to continue on an ongoing basis, which contributes to the additional cost of this option.

## 10.4 Risk Assessment Summary

The 2-bin WtE kerbside collection option has minimal risks when compared to the other options (Table 10-1). However, this option does not align with the State Waste Strategy 2030 which could create greater unknown risks in the future depending on the State Governments potential policy and legislative requirements. It is also not aligned with the communities expectations. Further, as per the waste projection data, it is anticipated that kerbside residual waste in a 2-bin system would exceed the maximum tonnages to be supplied to the Avertas WtE facility before the 10-year period. These risks can only be addressed by taking up one of the 3-bin options.

The 3-bin GO WtE kerbside collection option risks are all moderate or low as this option tends to lie in the middle of the other two options. The option is arguably better value for money and easier to use than a 3-bin FOGO WtE option and has greater recovery than the 2-bin WtE option. However, it could fall short of the community's expectations. The risks could be managed with a good marketing and education campaign that effectively conveys the City's decision-making rationale.

The 3-bin FOGO WtE option has the highest risk profile, with the most significant being the increased system costs. The option is also most complicated due to the shift of FO from the residual waste bin to the FOGO bin, requiring changes to the collection frequency combined with the reduced bin size. Lack of sufficient education and buy-in from the residents could also lead to high levels of contamination, which could result in additional costs and negative public opinion. Some of these risks can be minimised with a comprehensive and ongoing education and communication campaign. However, the risks associated with the significantly higher costs cannot be reduced and will need to be continually managed.

Table 10-1 shows the risk levels of the key risks and other risks associated with each kerbside collection option.

**Table 10-1: Risk Summary**

Risk Type	Risk Level		
	2-bin WtE	3-bin GO WtE	3-bin FOGO WtE
Non-alignment with State Waste Strategy	High	Moderate	NA
Complexity of bin system	Low	Moderate	High
Negative public opinion	Moderate	Moderate	Moderate
Increased costs	NA	Moderate	High
Organics contamination	NA	Low	High
Processing capacity	NA	Low	Moderate

## 11 Community Engagement Outcomes

The City values community feedback and input on important changes, as it allows informed decision making. Therefore, community input on the three-bin feasibility assessment, which would impact all households was considered essential.

As part of the Assessment, the City engaged the community via an extensive community-wide survey and a focus group workshop with a cross section of the survey participants. The following section details the methodology and outcomes of the engagement process.

### 11.1 Community Survey

The City composed a survey with Talis to engage residents and the broader Kwinana community. The purpose of the survey was to provide basic information on the three kerbside waste collection options and understand the community's level of support for each option and willingness to pay extra for an amended service. The information provided to respondents included a basic understanding of each system including benefits such as increased material recovery along with the estimated costs of introducing a change.

#### 11.1.1 Approach/ Methodology

The City engaged with the community in the early stages of this assessment through an online survey, collecting 896 responses. The following methods were used by the City to engage the community:

- Distribution of over 12,000 postcards to households;
- Advertisements in –
  - the Adventitial; and
  - the Spirit eNewsletter;
- Emails to pre-registered residents;
- Six boosted social media posts on the City's Facebook page; and
- For those unable to complete the survey online, placement of hard copies of the survey at:
  - the City's Library; and
  - the City's Administration building.

##### 11.1.1.1 Facebook Campaign Stats

The Community Survey was promoted by the City on Facebook to engage residents in the project and encourage their taking part. The Facebook campaign ran for four weeks with six boosted (paid) Facebook posts being released in the timeframe. Table 11-1 shows the key stats derived from the Facebook campaign.

**Table 11-1: Facebook Campaign Stats**

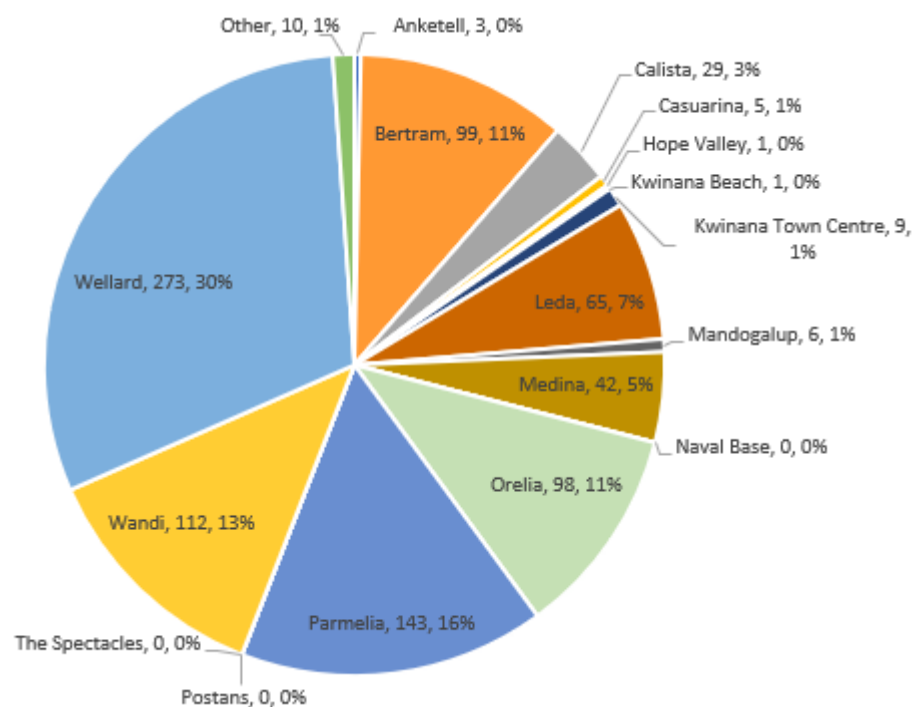
	Cost	Impression	Reach	Engagement	Clicks
Average Per Post	\$50	15,385	10,089	342	64
Total	\$300	107,697	70,620	2,394	448

Notes: 1 – Cost – the amount it cost to run the campaign  
 2 – Impression – the number of times the content is displayed, regardless if clicked or not  
 3 – Reach – the total number of unique users that were exposed to the content  
 4 – Engagement – how many people interact with the post (clicked, liked, shared etc)  
 5 – Clicks – how many people clicked on the post

The Facebook campaign also ignited a range of discussions in the comments section with people providing their views on the potential new bin systems. It is important to note that in some cases the comments did not reflect the results of the survey. Many residents were strongly against any change due to potential cost increases.

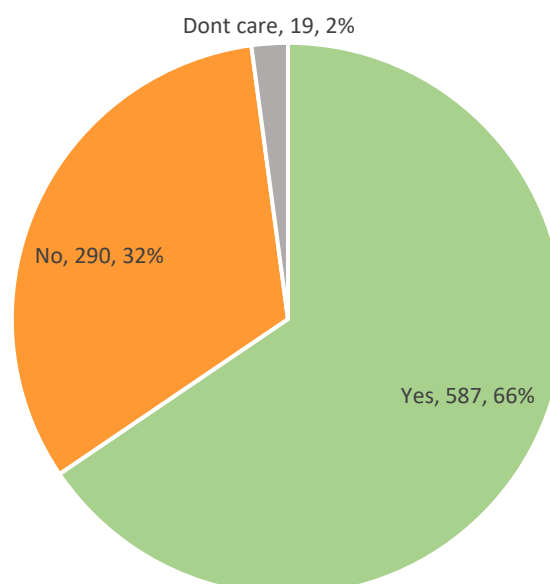
## 11.2 Survey Key Findings

The online survey was completed by 896 respondents across the City's jurisdiction. The respondents were mainly from Wellard, Wandi and Parmelia. There were no respondents from The Spectacles, Postans and Naval Base (Figure 11-1). Comparison of the survey respondent population to the most recent census data is outlined in Appendix C.



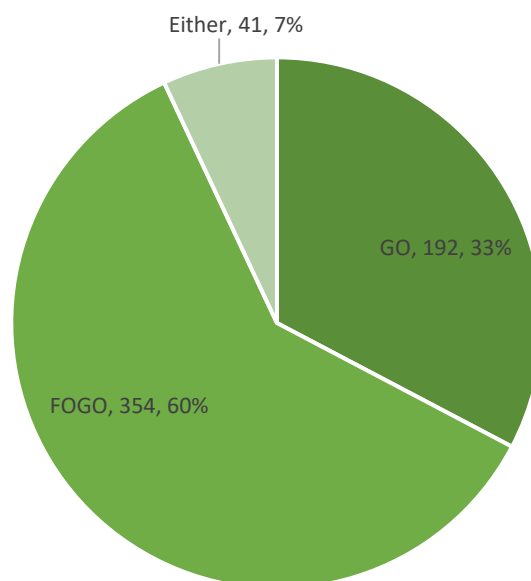
**Figure 11-1: The Suburbs Where Participants Live**

Respondents were asked, 'Do you want a third kerbside bin to recover organic waste in Kwinana?'. To this question, 66% of residents stated they wanted a third kerbside bin to recover organics, 32% did not want a change and 2% did not mind either way (Figure 11-2).



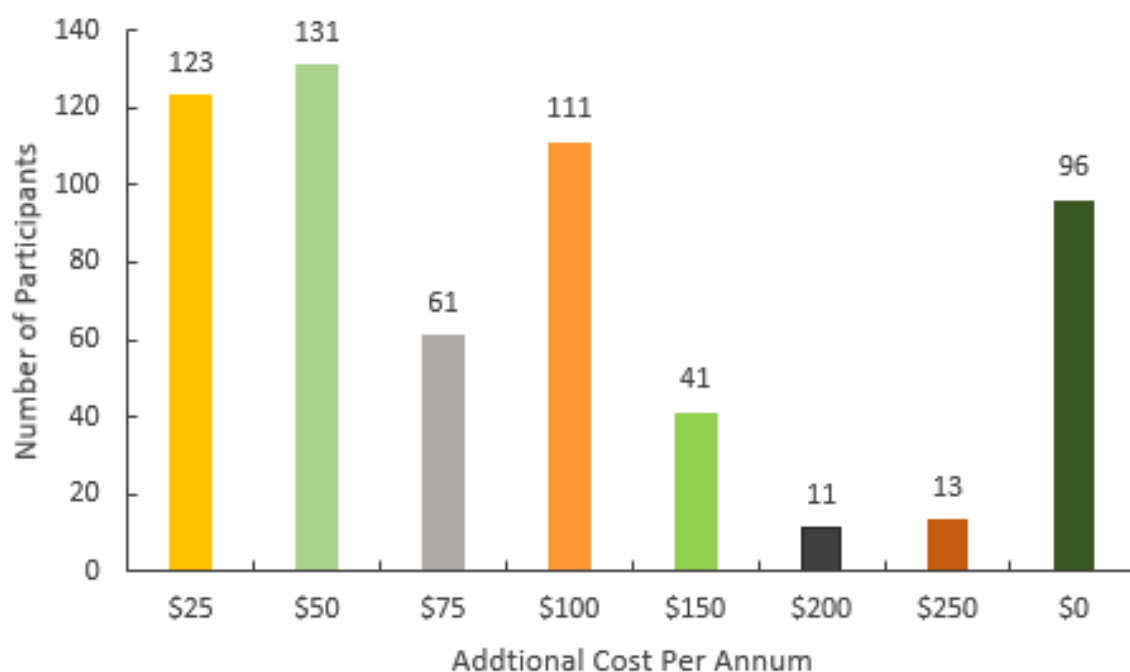
**Figure 11-2: Preference for 3<sup>rd</sup> bin**

Of the respondents who wanted a third bin, nearly two thirds wanted a FOGO system and just under a third wanted a GO system (Figure 11-3). 41 respondents (7%) indicated that they would be happy with either of the three bin systems (Figure 11-3).



**Figure 11-3: The Type of Three-Bin System Preferred By Participants**

Of the respondents in favour of a three-bin system, 84% were willing to pay an additional \$25 or more per annum for the additional service. 63% were willing to pay \$50 or more annually. A handful (13) were willing to pay up to \$250 annually. However, 16% did not want to pay any extra for the service. Figure 11-4 shows the distribution of respondents and based on their willingness to pay extra.



**Figure 11-4: Respondents with Preference for 3<sup>rd</sup> Bin Willing to Pay Extra**

The detailed results of the online survey can be found in Appendix C.

### 11.3 Focus Group

From the 896 respondents of the survey, 132 stated they would like to attend the focus group. 68 invites for the focus group were sent to respondents from different parts of Kwinana, who varied in age and their opinion on the preferred bin system. This ensured a mix of views at the focus group. 18 respondents agreed to attend the focus group, with three absentees on the evening.

The attendees of the focus group were presented with summarised information on a range of different issues that needed to be considered in relation to each the three scenarios. These issues were grouped into criterion under broader environmental, social, economic and governance factors. Following presentation of information, questions and groups discussions on each of the factors, the attendees used an online application (Mentimeter) to rank the criterion. Table 11-2 below shows the results of which factors and criteria the attendees viewed most important when determining which kerbside waste service option to proceed with.

**Table 11-2: Focus Group Ranking of Factors and Criteria**

Factor	Rank	Criteria	Rank
Environmental	1	Greenhouse Gas Emissions	1
		Material Recovery	2
Social	2	Waste Awareness and Behaviour Change	1
		Simplicity of System	2
		Accessibility to all Households	3
		Public Demand for Bin System	4
		Opportunities for Partnerships/ Collaboration	5
Economic	3	Value for Money	1
		Employment Opportunities	2
		Risk of Contaminated Organics	3
		Increase to Household Waste Service Cost	4
Governance	4	Organics Processing Options	1
		Impact to Collection Service	2
		Alignment with State Waste Strategy 2030 and Policy	3
		Public Perception	4

The results of the focus groups ranking of these factors and criteria were considered by the City in determining the final criteria and their weighting for the multi-criteria assessment, covered in detail in Section 12.

## 12 Multi-Criteria Assessment

A range of different aspects have been considered in this Assessment relevant to the different kerbside collection options. These aspects include policy alignment, mode of service, material recovery, carbon emissions, cost, risks, popularity/expectation of service, etc. When considering these aspects, there are various advantages and disadvantages applicable to each of the three kerbside waste service options. The aspects were grouped into factors and criteria that were used during the focus group (Table 11-2) to determine how strongly participants felt about each of them.

Following the focus group and discussions with key stakeholders at the City, including Elected Members and Executive, Talis developed a multi-criteria assessment (MCA) tool tailored for the City's requirements. The four main factors include– Environmental, Economic, Social and Governance. The factors along with the weighting of each of the criteria that make up the factors are outlined below in Table 12-1.

**Table 12-1: MCA Factors and Criteria**

Factors	Criteria	Weighting %
<b>Environmental (30%)</b>	Material Recovery	12
	Greenhouse gas emissions	18
<b>Economic (30%)</b>	Increase to household waste service costs	12
	Risk of contaminated organics	7.5
	Value for money	10.5
<b>Social (20%)</b>	Public demand and perception of bin system	7
	Simplicity and accessibility	8
	Waste awareness and behaviour change	5
<b>Governance (20%)</b>	Alignment with State Waste Strategy 2030 and policy	10
	Processing options	10
<b>Total</b>		100

A three-level scoring system was utilised to evaluate the three different kerbside waste service options against each of the criteria. The scoring of 3 (advantageous), 2 (neutral) or 1 (disadvantageous) was based on the evaluated responses to the key descriptive questions used for each criterion as listed in Table 12-2.

**Table 12-2: Criteria Description and Scoring**

Criteria	Description	Scoring		
		3	2	1
Material Recovery	What levels of material recovery can the City achieve?	Highest	Moderate	Lowest
Greenhouse gas emissions	What levels of greenhouse gas emissions can be expected?	Lowest	Moderate	Highest
Increase to household waste service costs	What is the expected annual household waste service increase?	<\$25 pa	\$25 - \$50 pa	>\$50 pa
Risk of contaminated organics	What is the inherent level of risk of collecting contaminated organic waste through this bin system?	Lowest	Moderate	Highest
Value for money	Which bin system represents best value for money for the City?	Highest	Moderate	Lowest
Public demand for bin system	Which bin system is most popular with the residents?	Highest	Moderate	Lowest
Simplicity and accessibility	How user friendly is the bin system? Are there any areas which will be excluded from accessing the bin system? How equitable is this service?	Simple/ Lowest	Neutral/ Moderate	Complex/ Highest
Waste awareness and behaviour change	Which bin system introduces the most waste education, thus raising community awareness?	Minimal	Moderate	Significant
Alignment with State Waste Strategy 2030 and policy	Which bin system will best achieve the State targets?	Preferred system	Neutral	Least preferred
Processing options	What is the availability for processing options with this bin system?	Abundant	Available	Scarce

Table 12-3 below provides a snapshot of the MCA scoring out of 3 and the weighted score for each criterion for the kerbside waste service option. The weighted score for each criterion is the weighting multiplied by the awarded score.



**Table 12-3: MCA Scoring and Weighting**

Factor	Criteria	Weighting %	Awarded and Weighted Score by Option					
			2-bin WtE		3-bin GO WtE		3-bin FOGO WtE	
			Awarded	Weighted	Awarded	Weighted	Awarded	Weighted
Environmental	Material Recovery	12	1	12	2	24	3	36
	Greenhouse gas emissions	18	3	54	2	36	2	36
Economic	Increase to household waste service costs	12	3	36	2	24	1	12
	Risk of contaminated organics	7.5	3	22.5	2	15	1	7.5
	Value for money	10.5	1	10.5	3	31.5	2	21
Social	Public demand and perception of bin system	7	2	14	2	14	3	21
	Simplicity and accessibility	8	3	24	2	16	1	8
	Waste awareness and behaviour change	5	1	5	2	10	3	15
Governance	Alignment with State Waste Strategy 2030 and policy	10	1	10	2	20	3	30
	Processing Options	10	3	30	3	30	2	20
Total		100		218		220.5		206.5

A breakdown of MCA results from Table 12-3 has been provided in the subsections below.

### 12.1 3-bin GO WtE

The 3-bin GO WtE option scored the highest weighted total at 220.5 points, which equates to 73.5% of potential scores. The contributions to the scores have been further explained below with the applicable weighted score in brackets:

- 3 for value for money (31.5) and processing options (30);
- 2 for material recovery (24), greenhouse gas emissions (36), increased costs (24), risk of contaminated organics (15), public demand (14), simplicity and accessibility (16), behaviour change (10) and alignment with the strategy and policy alignment (20); and
- 1 for none of the criteria.

### 12.2 2-bin WtE

The 2-bin WtE option was a close second to the 3-bin GO WtE option with 218 points or 72.67%. The contributions to the scores have been further explained below with the applicable weighted score in brackets:

- 3 for greenhouse gas emissions (54), household service costs (36), risk of contaminated organics (22.5), simplicity and accessibility (24) and processing options (30);
- 2 for public demand (14); and
- 1 for material recovery (12), value for money (10.5), waste awareness and behaviour change (5) and alignment with the State Waste Strategy 2030 and policy (10).

### 12.3 3-bin FOGO WtE

The 3-bin FOGO WtE option scored the lowest with 206.50 points or 68.83%. The contributions to the scores have been further explained below with the applicable weighted score in brackets:

- 3 for material recovery (36), public demand (21), waste awareness and behaviour change (15), alignment with the State Waste Strategy 2030 and policy (30);
- 2 for greenhouse gas emissions (36), value for money (21), processing options (20); and
- 1 for increased costs (12), risk of contaminated organics (7.5) and simplicity and accessibility (8).

### 12.4 Summary of MCA Findings

As covered above, the findings were discussed with the focus group and the City's key stakeholders to tailor a set of weighted criteria for the MCA. The weighted scores for each option were tallied as per Table 12-3. The three options ranked in order, are shown in Table 12-4.

**Table 12-4: MCA Ranking Results**

Option	Score	Ranking
3-bin GO WtE	220.5	1
2-bin WtE	218	2
3-bin FOGO WtE	206.5	3

Based on the weighted scores, all three kerbside waste collection service options are acceptable. The analysis also showed that no option is ideal and no option is completely unfavourable (in so much as it could not be considered a good option for the City). However, the best option as per the MCA scores, is the 3-bin GO WtE option.

## 13 Business Cases

This section summarises the key findings, including strengths and weaknesses associated with each kerbside waste collection options.

### 13.1 2-bin WtE

The City's residents currently use a 2-bin system. This option, as with the other two options is based on residual waste being diverted to WtE in 2024-25. This does not have any direct impact on the residents in relation to any changes. However, WtE increases material recovery and significantly reduces greenhouse gas emissions for the option. It also reduces the costs marginally due the lower gate fee for WtE when compared with landfill disposal.

#### 13.1.1 Strengths

##### Costs

The total system cost over the modelled 10-year period is \$84.1M. This equates to an annual average of \$8.4M or \$363 per household per annum. These costs are significantly lower than 3-bin FOGO WtE option, which in comparison would cost \$449 per household per annum or \$20M over the 10-year period. This is important when having regard for the City's residents excessive unemployment rate and for households that may be struggling to meet their current financial liabilities.

##### Simplicity and Accessibility

The 2-bin WtE system is the simplest of all three options as there are only two bins, and as covered above it requires no change for residents from current practices. All households will continue to be able to access both residual waste and recycling services. Associated waste education messaging therefore can be consistently applied for all residents.

##### Greenhouse Gas Emissions

When residual waste is sent to WtE, 82kg of CO<sub>2</sub>-e per household per annum is estimated to be generated, these emissions would be lower than all other options. As with the other options, the calculated emissions are around a quarter of those that could be expected from landfill disposal of residual waste.

#### 13.1.2 Weaknesses

##### Material Recovery

The modelling suggests that the 2-bin WtE option can achieve a material recovery rate of 35%. This is exactly half of the State Waste Strategy 2030's material recovery target in 2030 of 70%. WtE introduction results in a material recovery rate of 20% of the materials processed through the recovery of bottom ash. Lower material recovery also goes against the globally accepted circular economy principles, with organic material not returned to the soil.

##### Value for Money

While the cheapest option, the material recovery is significantly lower than the 3-bin options. The system offers no new opportunities to educate residents. Therefore, this limits participation and involvement in circular economy outcomes.

### **13.1.3 Key Risks**

#### **Non-Alignment -State Waste Strategy 2030 and Policy**

The 2-bin WtE is the least preferred option when considering the three guiding concepts outlined in the State Waste Strategy 2030 - the waste hierarchy, the circular economy and behaviour change. As covered in Section 10.1.1, there is a potential risk that the Waste Authority could introduce changes to the waste levy that make it cost-prohibitive to take residual waste from a 2-bin system to a WtE facility. There could also be restrictions placed on the WtE facility to accept residual waste only from a 3-bin system.

#### **Negative Public Opinion – Environmental Credentials**

In recent years, public concern for the environment has grown. More residents are aware that change is required for better environmental outcomes. Residents are also aware that other local governments including the neighbouring Cities of Cockburn and Rockingham have already made the switch to a 3-bin GO system. Therefore, persisting with a 2-bin system, can create the risk of a disconnect between the growing number of environmentally conscious residents and the City. This could in-turn lead to increased dissatisfaction with the service and requests for change.

#### **WtE Waste Supply Contract Exceedance**

As per Section 5.2, it is anticipated that in 2032-33 the total kerbside residual waste tonnages will be around 19,972 tonnes. As the City is also intending to supply optional volumes of recycling residual waste and verge bulk materials, the 20,000 tonne Waste Supply Agreement WtE contract threshold is likely to be exceeded. Extended projections suggest that kerbside residual waste will most likely exceed the limit in 2033-34 with this option. As discussed in section 5.5 exceeding the tonnage limits could have significant operational and/or financial implications for the City.

## **13.2 3-bin GO WtE**

The 3-bin GO WtE provides a good intermediate option between the extremes of the 2-bin WtE and 3-bin FOGO WtE options. This was evident from the MCA with this option scoring neutrally for most criteria.

### **13.2.1 Strengths**

#### **Value for Money**

The cost increase between the 3-bin GO WtE option and the 2-bin WtE option equates to \$35 per household per annum on average. For the additional cost, which includes the roll-out of new bins, the City could achieve a significant increase in material recovery at 49%. With good education and behaviour change resulting in higher capture rates, the City's material recovery could be as high as 52%.

A change of system would involve a marketing campaign, increasing public attention on waste matters and in-turn possible enquiries from the community. This could provide new opportunities to further engage and educate residents on waste related matters.

### **Processing Options**

As covered in detail in Section 9.2.4, there are numerous operational facilities with capacity as well as facilities with works approvals for processing GO. The total processing capacities of these facilities in 2030 equates to 816,500 tonnes per annum, with only 243,189 tonnes of GO waste expected to be generated in Perth and Peel. Therefore, there is abundant capacity available to process the City's GO with no risks in the long term. This is further supported by the City receiving a competitive price for processing of GO.

### **Simplicity and Accessibility**

The change from a 2-bin system to a 3-bin GO system is not complex. A new GO bin is provided to eligible residents and is emptied fortnightly along with the residual waste bin on the weeks that the recycling bin is currently not presented. There is no change to management of household residual waste, FO and recycling. Only GO placed in the residual waste bin, moves to the GO bin.

For smaller blocks and MDDs with garden organics and space, the GO bin could be made available without impacting the collection services.

### **Greenhouse Gas Emissions**

As with the 2-bin WtE option, at 90kg of CO<sub>2</sub>-e per household per annum estimated to be generated, the greenhouse gas emissions are a quarter of those for the current system with disposal to landfill. The emissions are slightly higher than the 2-bin WtE emissions due to the additional emissions applicable to composting of GO. There are also some additional emissions applicable to the collection and transport of GO from the GO bin. However, these are offset, although not completely, by the reduced emissions applicable to incineration of residual waste at the WtE.

### **Increased Material Recovery**

The 3-bin GO option enables the City to achieve material recovery rates of 49%, which is 14% higher than the 2-bin WtE option. The material recovery rate could be further increased to up to 52% with additional education leading to more GO placed in the GO bin.

## **13.2.2 Weaknesses**

### **Increased Service Costs**

The City would need to cater for the additional cost of bins and staffing during the roll-out of GO bins. Ongoing service costs will also increase due to the additional collection and processing of GO. These costs are somewhat offset by the reduced costs of processing of residual waste at the WtE facility. The average annual increase in costs expected with a 3-bin GO WtE system is \$35 per household.

## **13.2.3 Key Risks**

### **Non-Alignment - State Waste Strategy 2030 and Policy**

The State Waste Strategy 2030 and the FOGO Guidelines only promote the 3-bin FOGO system as the better practice kerbside bin collection system. Therefore, there is still some risk that changes to the waste levy could also be applied to residual waste going to WtE from a 3-bin GO WtE system. There could also be restrictions placed on the WtE facility to accept residual waste only from a 3-bin FOGO system. Should this occur after the City had implemented a GO system, the City would have the

logistical capability to rapidly transition to a FOGO system if it chose to, as the infield bin stock would already be in place.

### **Negative Public Opinion – Community Expectations**

As per the community engagement results in Section 11, a third of the respondents that wanted a third bin opted for the GO bin. Accordingly, the 3-bin GO WtE option is not the most popular option. However, there are also limited strong opinions against the option. It is possible that a change to a 3-bin GO system will result in increased calls from residents that feel the costs are higher than the current 2-bin system and also from residents that want a FOGO bin.

### **WtE Waste Supply Contract Exceedance**

As per Section 5.3, it is anticipated that in 2032-33 the total kerbside residual waste tonnages in a 3-bin GO system will be around 14,604 tonnes. These kerbside residual waste volumes along with the optional residual bulk verge and residual waste from the recycling and GO processing operations may exceed the 20,000 Waste Supply Agreement limit either within the modelled 10-year period or in subsequent years. Accordingly, the City will need to monitor the volumes to determine whether to continue sending optional waste volumes to the WtE facility or to switch to a 3-bin FOGO system, which will yield lower kerbside residual waste volumes.

## **13.3 3-bin FOGO WtE**

The 3-bin FOGO system is the State's recommended system and the preferred system of the surveyed residents.

### **13.3.1 Strengths**

#### **Alignment with State Waste Strategy 2030 and Policy**

A 3-bin FOGO WtE system with a smaller residual waste bin emptied fortnightly, a new FOGO bin emptied weekly, along with the fortnightly recycling service is recommended by the FOGO Guidelines. The system facilitates maximum source separation of household material, encourages behaviour change and could result in the highest possible material recovery of all options.

The FOGO system aligns with the State Waste Strategy 2030 targets and outcome of all Perth and Peel local governments providing a 3-bin FOGO system, as well as the National policy and the circular economy principles.

#### **Material Recovery Rates**

As the 3-bin FOGO WtE system maximises source separation of all recyclable and organic waste including FO, the material recovery rates could be as high as 56%. With on-going education and more residents correctly source separating higher capture rates can be achieved and material recovery could be as high as 60%. This is the best material recovery outcome for the City, however it would still fall short of the State Waste Strategy 2030 target of 70% by 2030.

#### **Public Support**

The online survey results showed that 354 out of 896 respondents wanted a FOGO bin. A further 41 respondents would prefer either the FOGO or GO system. This equates to 44%, and the majority of respondents who preferred a 3-bin FOGO system.

These numbers are supported by the increasing number of calls received from residents about why the City is still on a 2-bin system.

### **13.3.2 Weaknesses**

#### **Increased Service Costs**

The overall modelled costs to introduce a 3-bin FOGO WtE system (\$104.1M) over the 10-year modelled period are significantly higher than both the 2-bin WtE (\$84.1M) and 3-bin GO WtE (\$92M) options. The change from the current 2-bin system to a 3-bin FOGO WtE system represents an annual average increase of \$2M in costs or \$86 per household per annum.

Given the socio-economic challenges faced by some of the City's residents, it is anticipated that such an increase in costs would have a substantial impact on residents.

#### **Complexity of Service**

For effectiveness, the 3-bin FOGO service requires placement of FO from the current residual waste bin into the new FOGO bin. As the FO is to be sent for composting it needs to be held using only compostable liners and separated from other non-organic waste using kitchen caddies.

The new FOGO bin would need to be collected weekly and the residual waste bin would need to be emptied on a fortnightly basis. This represents a significant shift in methodology and has the potential to lead to confusion and contamination of the organics stream.

### **13.3.3 Key Risks**

#### **Contaminated Organics**

The complexity of the service changes, combined with incorrect practices can potentially result in materials from the FOGO bin being highly contaminated. If the FOGO derived compost is to comply with the Australia Standards for composts, the contamination needs to be almost completely removed. From the experience of other local governments, removal of contamination has been challenging. It is common for composters to blend FOGO materials with other cleaner organic streams to further reduce potential contamination levels.

However, the current contractor has suggested a maximum contamination level, above which the FOGO collected may be too contaminated to be processed and may need to be sent to landfill.

Therefore, ongoing education and provision of compostable liners would be required to minimise contamination levels.

#### **FOGO Processing Options**

The City has been able to secure a contract for processing FOGO. The analysis in Section 9.3, shows that although available, there is limited capacity in the market to process additional FOGO. As more local governments make the switch to FOGO, there could be less FOGO processing capacity and greater pressure on the market. This could lead to greater difficulty in securing subsequent contracts and higher FOGO processing costs in the future.



### **Further Increased Costs**

The risks of contaminated organics and limited FOGO processing options, as discussed above could lead to risks of further increased costs. These costs could be above and beyond the modelled costs.

### **Negative Public Opinion – Costs and Complexity**

As covered above, the increase in costs with a 3-bin FOGO WtE system is estimated to be \$86 per household per annum more than the 2-bin WtE system. This could lead to an outcry from the City's residents in relation to additional costs.

Residents required to switch to a smaller residual waste bin collected fortnightly may also be unhappy with the change. Most residents are accustomed to weekly residual waste collection services. Even with a strong media campaign, some level of pushback can be expected, especially from families that require the weekly service for disposal of nappies and other sanitary wastes.

If the City were to use larger 240L bins for residual waste or have the bins emptied weekly, it would not encourage as much behaviour change and could result in lower material recovery rates. This could defeat one of the main purposes of introducing a 3-bin FOGO system and increase costs.

## **13.4 Preferred Solution**

Based on this Assessment and the consideration of the environmental, economic, social and governance factors, Talis' preference is that the City initially change to a 3-bin GO WtE system and then to a 3-bin FOGO system.

The findings of the Assessment and the results of the MCA demonstrate that the business case for changing to a 3-bin FOGO WtE system at this time is not compelling. While transitioning to a 3-bin FOGO WtE system would see the City directly aligned with the Waste Strategy 2030 along with a 7% material recovery gain over a 3-bin GO WtE system, this is outweighed by the 6% higher carbon emissions, \$1.2M higher annual cost and the increased level of risk associated with certain aspects of FOGO in WA at present.

Initial transition to a 3-bin GO WtE system represents better value for money to the City at this time. Compared to the 2-bin WtE system, the 3-bin GO system would see progression towards alignment with the Waste Strategy 2030 and a 14% increase in material recovery; albeit at the expense of 10% higher emissions and \$0.8M higher annual costs than continuing with a 2-bin system. In addition, changing to a 3-bin GO WtE system maintains a low to moderate risk profile.

The change to a 3-bin GO system could be more widely accepted by the community including, those wanting a 3 bin system as well as those opposed, given that the financial burden will not be as significant compared to a FOGO system.

This would set the City up well both financially and from the governance perspective to change to a 3-bin FOGO WtE system in future years once the business case to do so becomes more viable.

## 14 Recommendations

Based on the works and findings from the Assessment, Talis puts forward the following recommendations for the City's consideration:

### 2023-24

- Engage with DWER to inform them of the findings of the Assessment.

### 2024-25

- Subject to the discussions with DWER, consider changing to a 3-bin GO WtE kerbside collection service, with the following bin configuration to properties above 350m<sup>2</sup>:
  - 140L red lid bin emptied weekly for residual waste including FO sent to WtE;
  - 240L/ 360L yellow lid bin emptied fortnightly for recycling sent for processing; and
  - 240L lime-green lid bin emptied fortnightly for GO sent for processing.
- Allow properties that do not receive a GO bin to opt in.
- Introduce the new GO bins to residents following a thorough community engagement and marketing campaign to inform residents of the changes.

### 2029-30

- If not required earlier, in 2029-30 consider changing to a 3-bin FOGO WtE kerbside collection service, with the following configuration of standard service to all SUDs and MDDs not sharing bins:
  - 140L red lid bin emptied fortnightly for residual waste sent to WtE;
  - 240L/360L yellow lid bin emptied fortnightly for recycling sent for processing; and
  - 240L lime-green lid bin emptied weekly for FOGO sent for processing, along with a kitchen caddy and an annual supply of compostable caddy liners.
- Consider the best options for properties that do not receive a FOGO service.
- Introduce the new FOGO kerbside collection system to residents following a thorough community engagement and marketing campaign to inform residents of the changes.

### General

- Provide on-going community engagement and education to ensure optimum material recovery.
- Advocate for the DWER to provide additional funding for the introduction of GO and FOGO services, to offset the additional costs incurred by local governments and subsequently rate payers.
- Closely monitor kerbside residual waste volumes and future projections against the Waste Supply Agreement thresholds with Avertas WtE. Take appropriate actions to ensure all kerbside residual waste volumes have appropriate treatment and/or disposal services.
- Regularly review changes to legislation, industry activities and market conditions for their implications to the City waste services.

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# **APPENDIX A**

## **Financial Modelling Assumptions**

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### **A.1 General Assumptions**

- Number of services used rather than number of households when calculating cost
- Recycling residual is sent to WTE
- GO residual is sent to WTE
- FOGO residual is sent to WTE
- Bulk verge residual sent to WTE
- Number of bin services growth consistent with REMPLAN yearly housing growth rate
- Costs go up with CPI (consumer price index) each year or using Veolia's rise and fall formula.
- CPI is based on ABS average increase of last four years (March 22 – March 19)
- Collection cost = Number of bin services \* cost per bin \* collections per annum
- Waste tonnes generated increase consistent with REMPLAN population growth
- Total waste tonnes generated each year remains consistent between each option
- All households utilise verge collections
- Verge collection cost increases with population and CPI
- WtE cost increases with CPI
- Recycling recovery rate stays at 76.17% as per the 21-22 census data
- The performance of the recycling bin remains consistent each year and between each option
- WTE material recovery 20%
- WTE residual waste 5%
- WTE energy recovery 75%
- Bulk waste recovery remains at 8.73% the recovery from the census bulk waste data for the years between 2021-22
- Verge Green waste recovery remains at 100%
- Residual waste going to WtE above 20,000 tonnes assumed same processing cost

### **A.2 2-bin Specific Assumptions**

- Residual waste collected weekly
- Recycling fortnightly
- Bin maintenance costs goes up with CPI and housing growth

### **A.3 General 3-bin GO and FOGO Assumptions**

- Verge green waste drops by 15%

- Kerbside greenwaste increases by 15%
- Service only provided for SUDs
- Each household gets a 140L bin for residual waste
- 1,500 bins get a 240L lid change for the new GO or FOGO bin
- 15,108 new 240L FOGO or GO bins are distributed

#### **A.4 3-bin GO Specific Assumptions**

- A Project Officer starting 12-18 months prior to the roll-out
- An Education Officer is required for 6 months
- An admin person is required for 3 months
- A GIS officer required for 3 months
- A Marketing/Communication Officer for 3 months part time
- A Project Officer is required for 6 months full time
- Residual waste collected weekly
- GO collected fortnightly
- Recycling collected fortnightly
- GO recovery 95%
- 80% of GO is diverted from the residual waste stream and into the GO bins
- GO rolled out in 2024-25
- Residual waste bin maintenance halved due to new bins from roll out
- GO bin maintenance halved due to roll out

#### **A.5 3-bin FOGO Specific Assumptions**

- A Project Officer starting 12-18 months prior to the roll-out
- A new Waste Education Officer is required, and the position is permanent full time
- An additional admin person is required for a year
- A GIS officer is required for 6 months part time
- A Marketing/Communication Officer is required for three years part time
- A Project Officer is required for 6 months full time
- Two rolls of 75 compostable liners per household are given out per year
- Each serviced household gets a kitchen caddy and education/communication pack
- FOGO collected weekly
- Residual waste collected fortnightly
- Recycling collected fortnightly
- FOGO recovery 85%
- 75% of FOGO is diverted from the residual waste stream into the FOGO bin
- FOGO rolled out in 2024-25
- General bin maintenance halved due to new bin from the roll out
- FOGO bin maintenance halved due to new bins

## A.6 Sensitivity Assumptions

- **High capture rate sensitivity**
  - GO waste diverted from the residual waste stream increased from 80% to 95%
  - FOGO waste diverted from the residual waste stream increased from 75% to 85%
  - High capture rates were derived from MRAs Impacts and benefits of a kerbside collection systems Perth and Peel for a high-performance bin
- **Recycled plastic bin sensitivity**
  - Bin replacement or roll outs will use recycled plastic bins
- **FOGO Funding (Waste Authority Better Bins Plus) sensitivity**
  - Funding for the FOGO system is utilised in 2024-25 at \$17 per household.
- **High commingled recycling processing sensitivity**
  - Assumed a commingle processing cost increased by \$19 per tonne

# **APPENDIX B**

## Risk Assessment

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# Risk Register

Kwinana 3-Bin Feasibility Assessment

Bin System	Risk Event	Risk Themes	Risk Theme Description	Risk Effect/ Impact	Risk Assessment Context	Consequence	Likelihood	Rating (before treatment)	Risk treatments in place	Risk treatments required/Response (Opportunities for Improvement List)	Consequence	Likelihood	Rating (after treatment)	Risk Status	Risk owner/ author	Comments
Two-bin System	Non-alignment with the State Waste Strategy 2030 leading to State Government intervention after 2025	Failure to fulfil statutory regulations or compliance requirements	Failure to correctly identify, interpret, assess, respond and communicate laws and regulations as a result of an inadequate compliance framework. This could result in fines, penalties, litigation or increase scrutiny from regulators or agencies. This includes, new or proposed regulatory and legislative changes, in addition to the failure to maintain updated legal documentation (internal and public domain) to reflect changes. This does not include Occupational Safety and Health Act (refer "Inadequate safety and security practices") or any Employment Practices based legislation (refer "Ineffective Employment practices") It does include legislative based obligations for Local Government, such as the Local Government Act 1995.	Financial	Strategic	Major	Possible	High	Avoid - remove cause of risk	Choose to switch to a better practice 3-bin system in line with the WA Waste Avoidance and Resource Recovery Strategy 2030 (State Waste Strategy) before 2025.	Insignificant	Rare	Low	Open	Elected Members Senior Management	It is possible that the Waste Authority may impose a levy on residual waste to energy (WtE) from a 2-bin system. The WtE licence acceptance criteria stipulate a restriction to accept residual waste only from a Better Practice kerbside collection system.
	Inferior environmental outcomes (35% material recovery rates) as a result of the decision to remain with a 2-bin kerbside collection system	Inadequate environmental management	Inadequate prevention, identification, enforcement and management of environmental issues.	Environment	Strategic	Moderate	Almost certain	High	Avoid - remove cause of risk	Choose to switch to a 3-bin GO or 3-bin FOGO system	Minor	Possible	Moderate	Open	Elected Members Senior Management	Change to a 3-bin GO system will result in 49% material recovery, compared with 56% in a 3-bin FOGO system. However, this is balanced with the carbon emissions from the compost process, which have the 3-bin FOGO system with the highest emissions for the scenarios modelled.
	Total waste tonnes sent to the waste to energy (WtE) facility exceeds the contract supply requirements of 20,000 tonnes per annum within the contract term	Inadequate supplier/contract management	Inadequate management of External Suppliers, Contractors, IT Vendors or Consultants engaged for core operations. This includes issues that arise from the ongoing supply of services or failures in contract management and monitoring processes.	Financial	Operational	Minor	Almost certain	High	Avoid - remove cause of risk	To increase material and resource recovery while eliminating the risk, the City could switch to a 3-bin GO system and then a 3-bin FOGO system	Insignificant	Unlikely	Low	Open	Elected Members Senior Management	Change to a 3-bin GO system initially and sending optional tonnes to WtE would be the preferred method of managing this risk.
	Increased negative public opinion on the City's environmental stance if a 2-bin kerbside collection system is maintained	Inadequate environmental management	Inadequate prevention, identification, enforcement and management of environmental issues.	Reputation	Strategic	Moderate	Almost certain	High	Avoid - remove cause of risk	Choose to switch to a 3-bin GO or 3-bin FOGO system	Insignificant	Unlikely	Low	Open	Elected Members Senior Management	There may also be negative feedback during any changes to the system, which will need be effectively managed.
Three-bin GO System	Non-alignment with the State Waste Strategy 2030 leading to State Government intervention after 2025	Failure to fulfil statutory regulations or compliance requirements	Failure to correctly identify, interpret, assess, respond and communicate laws and regulations as a result of an inadequate compliance framework. This could result in fines, penalties, litigation or increase scrutiny from regulators or agencies. This includes, new or proposed regulatory and legislative changes, in addition to the failure to maintain updated legal documentation (internal and public domain) to reflect changes. This does not include Occupational Safety and Health Act (refer "Inadequate safety and security practices") or any Employment Practices based legislation (refer "Ineffective Employment practices") It does include legislative based obligations for Local Government, such as the Local Government Act 1995.	Financial	Strategic	Moderate	Unlikely	Moderate	Reduce - mitigate risk	Choosing to switch to a better practice 3-bin FOGO system in line with the State Waste Strategy before 2025 would eliminate this risk.	Insignificant	Rare	Low	Open	Elected Members Senior Management	It is possible that a smaller levy than a 2-bin system levy could be applied to residual waste from a 3-bin GO system. The WtE licence acceptance criteria stipulate a restriction to accept residual waste only from a Better Practice kerbside collection system, which only includes a 3-bin FOGO system.
	Increased waste service costs as a result of changing to a 3-bin GO system	Inadequate project/change management	Inadequate analysis, design, delivery and/or status reporting of change initiatives, resulting in additional expenses, time requirements or scope changes.	Financial	Strategic	Major	Almost certain	Extreme	Prepare Contingent Plans - in event risk occurs	Some costs of the 3-bin GO service can be reduced through effective contracts and procurement processes. However, as the 3-bin service additional collections and processing for improved material recovery, the modelled additional costs cannot be avoided.	Moderate	Likely	High	Open	Elected Members Senior Management	Cost estimates show that changing to a 3-bin GO system will cost the City an additional \$7.9 million over 10 years, or an increase of \$35 per household.
	Increased contamination within kerbside bins as result of introducing a 3-bin GO system leading to increased disposal costs	Inadequate engagement practices	Failure to maintain effective working relationships with the Community (including Local Media), Stakeholders, Key Private Sector Companies, Government Agencies and/or Elected Members. This invariably includes activities where communication, feedback and/or consultation is required and where it is in the best interests to do so. This does not include instances whereby Community expectations have not been met for standard service provisions such as Community Events, Library Services and/or Bus/Transport services.	Financial	Project	Minor	Possible	Moderate	Reduce - mitigate risk	Plan effectively for the roll-out of GO bins to single unit dwellings (SUDs) and MUDs on-demand. Effectively communicate changes and requirements before, during and after the roll-out of new bins.	Minor	Rare	Low	Open	Manager	GO contamination is generally low and the messaging required for residents is simple to follow. A Marketing Officer has been budgeted for in the model.
	Modest environmental outcomes (49% material recovery rates expected) by switching to a 3-bin GO system	Inadequate environmental management	Inadequate prevention, identification, enforcement and management of environmental issues.	Environment	Strategic	Minor	Possible	Moderate	Avoid - remove cause of risk	Choose to switch to a better practice 3-bin FOGO system	Minor	Likely	Moderate	Open	Elected Members Senior Management	Changing to a 3-bin FOGO system will result in a 56% material recovery rate, which is still lower than the target of 67% by 2025.
	Community backlash due to lack of space for Multi-Unit Dwellings (MUDs) to store a third GO bin.	Inadequate project/change management	Inadequate analysis, design, delivery and/or status reporting of change initiatives, resulting in additional expenses, time requirements or scope changes.	Reputation	Project	Minor	Possible	Moderate	Reduce - mitigate risk	Plan effectively for the roll-out of GO bins to single unit dwellings (SUDs) and MUDs on-demand. Effectively communicate changes and requirements before, during and after the roll-out of new bins.	Minor	Rare	Low	Open	Manager	Most SUDs have sufficient space for an extra bin.
	Community backlash if residual waste bin size is reduced to 140L and emptied weekly within a 3-bin GO system	Inadequate project/change management	Inadequate analysis, design, delivery and/or status reporting of change initiatives, resulting in additional expenses, time requirements or scope changes.	Service Delivery	Project	Minor	Possible	Moderate	Reduce - mitigate risk	Effectively communicate changes and requirements before, during and after the roll-out of new bins.	Minor	Possible	Moderate	Open	Director Manager	A 140L for residual waste is the model recommended in the Better Bins guidelines to encourage behaviour change and maximise material recovery. Effective planning and on-going communications are crucial to an smooth transition. Additional staffing resources have been budgeted for in the modelling.
	Reduced material recovery rates by maintaining a weekly emptied 240L bin for residual waste in a 3-bin GO system	Inadequate environmental management	Inadequate prevention, identification, enforcement and management of environmental issues.	Service Delivery	Project	Minor	Possible	Moderate	Avoid - remove cause of risk	Downsize the waste bin to a 140L red lid bin during or after the roll-out of a new GO bin.	Minor	Rare	Low	Open	Director Manager	A smaller residual waste bin with education assists with the desired behaviour change to maximise material recovery.
	Total waste tonnes sent to the waste to energy (WtE) facility exceeds the contract supply requirements of 20,000 tonnes per annum within the contract term	Inadequate supplier/contract management	Inadequate management of External Suppliers, Contractors, IT Vendors or Consultants engaged for core operations. This includes issues that arise from the ongoing supply of services or failures in contract management and monitoring processes.	Financial	Operational	Minor	Possible	Moderate	Avoid - remove cause of risk	To increase material and resource recovery while eliminating this risk, the City could switch to a 3-bin FOGO system before the tonnes to be supplied are likely to exceed the 20,000 tonne threshold.	Insignificant	Unlikely	Low	Open	Elected Members Senior Management	Change to a 3-bin GO system initially and sending optional tonnes to WtE would be the preferred method of managing this risk.
	Negative public opinion on the City's change to a 3-bin GO system due to some increased costs and falling short of expectations	Inadequate project/change management	Inadequate analysis, design, delivery and/or status reporting of change initiatives, resulting in additional expenses, time requirements or scope changes.	Reputation	Strategic	Moderate	Possible	Moderate	Reduce - mitigate risk	Educate the community on the decision making process and the reason for change.	Minor	Possible	Moderate	Open	Elected Members Senior Management	The 3-bin GO system attracted the least passionate responses against the system.

Three-bin FOGO System	Increased costs as a result of changing to a 3-bin FOGO system	Inadequate project/change management	Inadequate analysis, design, delivery and/or status reporting of change initiatives, resulting in additional expenses, time requirements or scope changes.	Financial	Strategic	Major	Almost certain	Extreme	Prepare Contingent Plans - in event risk occurs	Some costs of the 3-bin FOGO service can be reduced through effective contracts and procurement processes. However, the modelling shows that by changing initially to a 3-bin GO system and then a FOGO system, the City would save \$1 million annually	Major	Possible	High	Open	Elected Members Senior Management	Preliminary cost estimates show that changing to a 3-bin FOGO system will cost the City an additional \$20 million over 10 years when compared with a 2-bin system, or an average increase of \$86 per household per annum.
	Increased contamination of bins as result of introducing a 3-bin FOGO system leading to increased disposal costs	Inadequate engagement practices	Failure to maintain effective working relationships with the Community (including Local Media), Stakeholders, Key Private Sector Companies, Government Agencies and/or Elected Members. This invariably includes activities where communication, feedback and/or consultation is required and where it is in the best interests to do so. This does not include instances whereby Community expectations have not been met for standard service provisions such as Community Events, Library Services and/or Bus/Transport services.	Financial	Project	Minor	Possible	Moderate	Reduce - mitigate risk	Plan effectively for the roll-out of FOGO bins restricted to SUDs and MUDs not sharing bins. Effectively communicate changes and requirements before, during and after the roll-out of new bins. Maintain waste education communications following roll-out.	Minor	Possible	Moderate	Open	Manager	Effective planning and on-going communications are crucial to a smooth transition and maintenance of an effective ongoing 3-bin FOGO service. Additional staffing resources have been budgeted for in the modelling.
	Community backlash due to lack of space for MUDs to store a third FOGO bin	Inadequate project/change management	Inadequate analysis, design, delivery and/or status reporting of change initiatives, resulting in additional expenses, time requirements or scope changes.	Reputation	Project	Minor	Likely	Moderate	Reduce - mitigate risk	Plan effectively for the roll-out of FOGO bins to SUDs and MUDs not sharing bins. Effectively communicate changes and requirements before, during and after the roll-out of new bins. Ensure residual waste bins are collected weekly at MUDs not receiving the FOGO bin.	Minor	Rare	Low	Open	Manager	This the FOGO Guideline preferred methodology for restricted roll-out of FOGO bins to minimise this risk.
	Community backlash due to change in management of putrescible waste in a 3-bin FOGO system	Inadequate engagement practices	Failure to maintain effective working relationships with the Community (including Local Media), Stakeholders, Key Private Sector Companies, Government Agencies and/or Elected Members. This invariably includes activities where communication, feedback and/or consultation is required and where it is in the best interests to do so. This does not include instances whereby Community expectations have not been met for standard service provisions such as Community Events, Library Services and/or Bus/Transport services.	Service Delivery	Project	Moderate	Possible	Moderate	Reduce - mitigate risk	Effectively communicate changes and requirements before, during and after the roll-out of new bins. Maintain waste education communications following roll-out.	Minor	Possible	Moderate	Open	Manager	Effective planning and on-going communications are crucial to a smooth transition and maintenance of an effective ongoing 3-bin FOGO service. Additional staffing resources have been budgeted for in the modelling.
	Public backlash if the residual waste bin is reduced to 140L and emptied fortnightly within a 3-bin FOGO system	Inadequate engagement practices	Failure to maintain effective working relationships with the Community (including Local Media), Stakeholders, Key Private Sector Companies, Government Agencies and/or Elected Members. This invariably includes activities where communication, feedback and/or consultation is required and where it is in the best interests to do so. This does not include instances whereby Community expectations have not been met for standard service provisions such as Community Events, Library Services and/or Bus/Transport services.	Service Delivery	Project	Moderate	Likely	High	Reduce - mitigate risk	Effectively communicate changes and requirements before, during and after the roll-out of new bins. Maintain waste education communications following roll-out.	Minor	Possible	Moderate	Open	Manager	A 140L for residual waste is the model recommended in the FOGO guidelines to encourage behaviour change and maximise material recovery. Effective planning and on-going communications are crucial to a smooth transition and maintenance of an effective ongoing 3-bin FOGO service. Additional staffing resources have been budgeted for in the modelling.
	Reduced material recovery rates due to maintaining a 240L residual waste bin emptied fortnightly in a 3-bin FOGO system	Inadequate environmental management	Inadequate prevention, identification, enforcement and management of environmental issues.	Environment	Project	Minor	Likely	Moderate	Reduce - mitigate risk	Ensure that residual waste bins are converted to 140L red-lidded bins and are emptied fortnightly.	Minor	Rare	Low	Open	Manager	A 140L for residual waste is the model recommended in the FOGO guidelines to encourage behaviour change and maximise material recovery.
	Negative public opinion on the City's change to a 3-bin FOGO system due to increased costs and complications with the system	Inadequate project/change management	Inadequate analysis, design, delivery and/or status reporting of change initiatives, resulting in additional expenses, time requirements or scope changes.	Reputation	Strategic	Moderate	Possible	Moderate	Avoid - remove cause of risk	If this risk outweighs all the others do not change to a 3-bin FOGO system until required.	Insignificant	Unlikely	Low	Open	Elected Members Senior Management	Costs and complications with the system are unavoidable due to the required changes and collections. Residents that completed the community survey showed strongest support for change to a 3-bin FOGO system.
	Difficulties with securing contractors to process FOGO produced by the City due to limited market capacity	Inadequate supplier/contract management	Inadequate management of External Suppliers, Contractors, IT Vendors or Consultants engaged for core operations. This includes issues that arise from the ongoing supply of services or failures in contract management and monitoring processes.	Service Delivery	Strategic	Major	Possible	High	Reduce - mitigate risk	Seek to understand the current market capacity to accept FOGO produced by the City, through the kerbside waste collection contract. Establish contingencies for failure of contractor to provide the required services. Plan ahead to secure on-going FOGO processing contracts.	Moderate	Possible	Moderate	Open	Elected Members Senior Management	There is restricted market capacity and acceptance to process kerbside collected FOGO. The City has secured a contract for processing of FOGO.

# **APPENDIX C**

## Community Survey Report

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# Community Survey Report

## Three Bin Feasibility Assessment

November 2022



The City of Kwinana values community feedback and input on important changes, as it allows informed decision making. Therefore, community input on the three-bin feasibility assessment, which would impact all households was considered essential.

As part of the Assessment, the City engaged the community via an extensive community-wide survey and a focus group workshop with a cross section of the survey participants. The following section details the methodology and outcomes of the engagement process.

## 1.1 Background

The City composed a survey with Talis to engage residents and the broader Kwinana community. The purpose of the survey was to provide basic information on the three kerbside waste collection options and understand the community's level of support for each option and willingness to pay extra for an amended service. The information provided to respondents included a basic understanding of each system including benefits such as increased material recovery along with the estimated costs of introducing a change.

## 1.2 Methodology

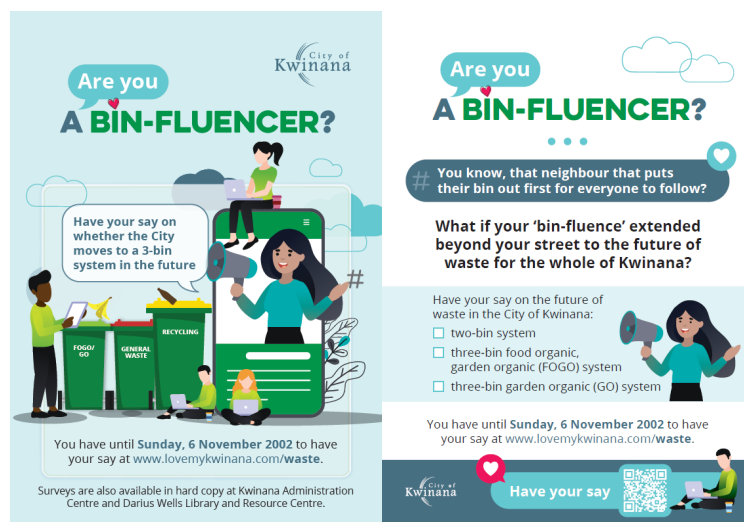
The City created a comprehensive Marketing Action Plan as well as a Community Engagement Plan, outlining desired outcomes, key stakeholders, risks, key messages, action plan, posting schedules and budget in the early stages of this project.

The survey was created on Love My Kwinana, an online tool used for engaging with residents. For those unable to complete the survey online, hardcopies were placed at:

- the City's Library; and
- the City's Administration building.

### 1.2.1 Postcards

The City designed and printed 22,000 A6 postcards, and distributed postcards to all households through direct mailout, advising residents how to participate and encouraging them to have a say on their waste system.



**Image 1:** Flyer distributed to households within City of Kwinana

## 1.2.2 Advertisements

Numerous advertisements were published through the City's Advertorial and the Spirit eNewsletter, with direct emails being sent to pre-registered residents.



**Image 2:** Left: Email sent to pre-registered residents as well as within City's eNewsletter.  
Right: Advertorial distributed 19 October

## 1.2.3 Social Media

The Community Survey was promoted by the City on Facebook to engage residents in the project and encourage their taking part. The Facebook campaign ran for 36 days, from 2 October 2022 to 6 November 2022, with six boosted (paid) Facebook posts being released in the timeframe.

The Facebook campaign also ignited a range of discussions in the comments section with people providing their views on the potential new bin systems. It is important to note that in some cases the comments did not reflect the results of the survey. Many residents were strongly against any change due to potential cost increases.

**Table 1:** Facebook Campaign Statistics

10/10-06/11	Cost	Impression	Reach	Engagement	Clicks
Average Per Post	\$50	15,385	10,089	342	64
Total	\$300	107,697	70,620	2,394	448

**Notes:** Cost – the amount it cost to run the campaign

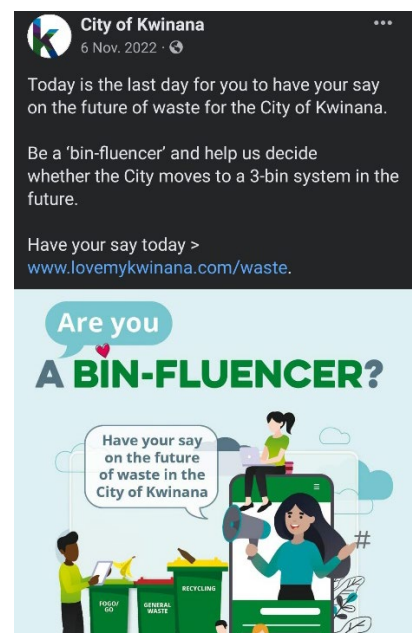
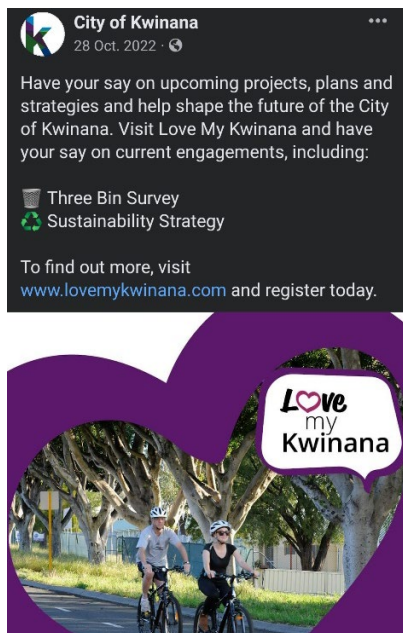
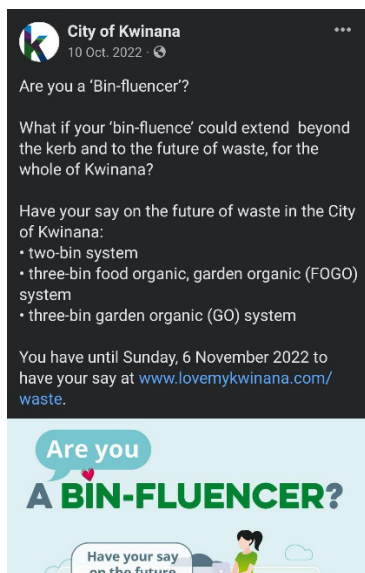
Impression – the number of times the content is displayed, regardless if clicked or not

Reach – the total number of unique users that were exposed to the content

Engagement – how many people interact with the post (clicked, liked, shared etc)

Clicks – how many people clicked on the post





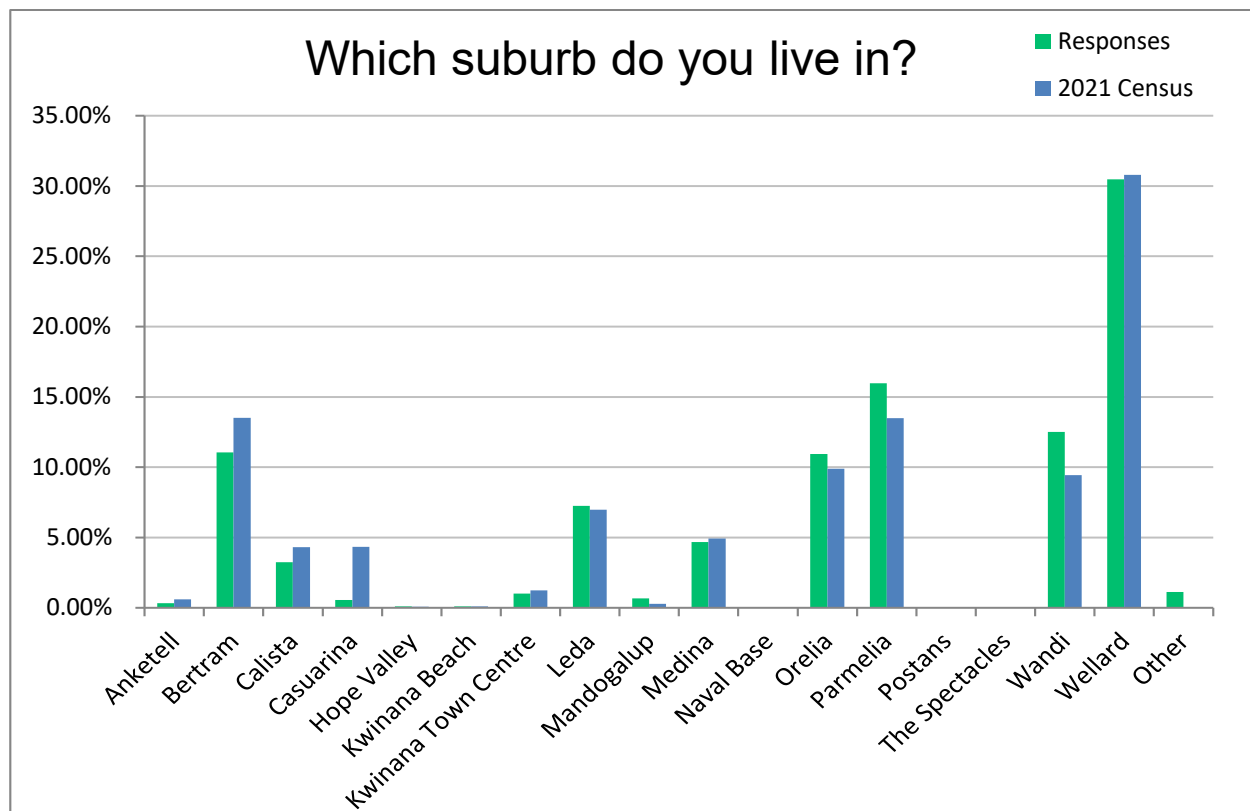
*Image 3: Social Media posts publicised via Facebook*

## 1.3 Results

### Which suburb do you live in?

	Responses	2021 Census	Count	2021 Census Count
Anketell	0.33%	0.61%	3	280
Bertram	11.05%	13.51%	99	6196
Calista	3.24%	4.31%	29	1975
Casuarina	0.56%	4.33%	5	1987
Hope Valley	0.11%	0.09%	1	39
Kwinana Beach	0.11%	0.09%	1	42
Kwinana Town Centre	1.00%	1.24%	9	567
Leda	7.25%	6.98%	65	3202
Mandogalup	0.67%	0.28%	6	128
Medina	4.69%	4.93%	42	2260
Naval Base	0.00%	0.04%	0	20
Orelia	10.94%	9.89%	98	4535
Parmelia	15.96%	13.48%	143	6184
Postans	0.00%	0.00%	0	0
The Spectacles	0.00%	0.00%	0	0
Wandi	0.00%	0.00%	0	0
Wellard	12.50%	9.43%	112	4324
Other	30.47%	30.80%	273	14126
	1.12%	0.00%	10	
<b>Answered</b>			<b>896</b>	<b>45865</b>

\*reference - search census quick stats for each suburb <https://www.abs.gov.au/census/find-census-data/community-profiles/2021/LGA54830>

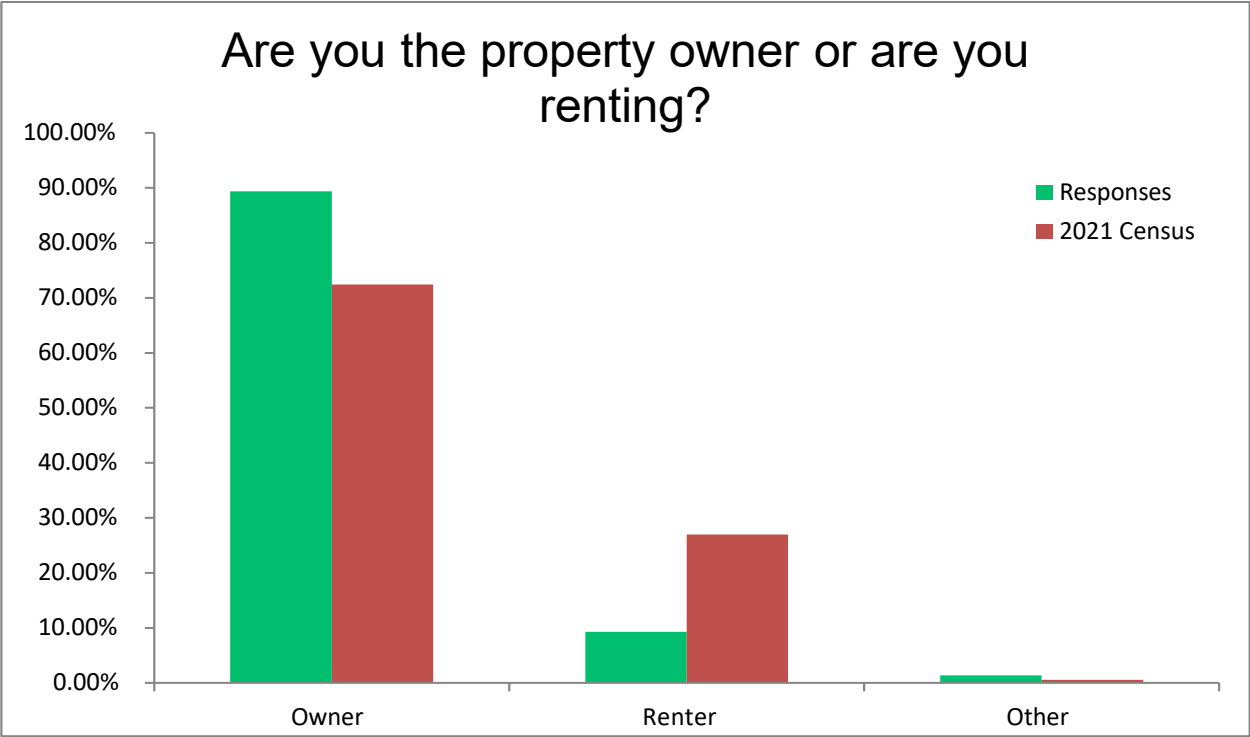




Are you the property owner or are you renting?

	Responses	2021 Census	Count
Owner	89.40%	72%	801
Renter	9.26%	27%	83
Other	1.34%	1%	12
Answered			896

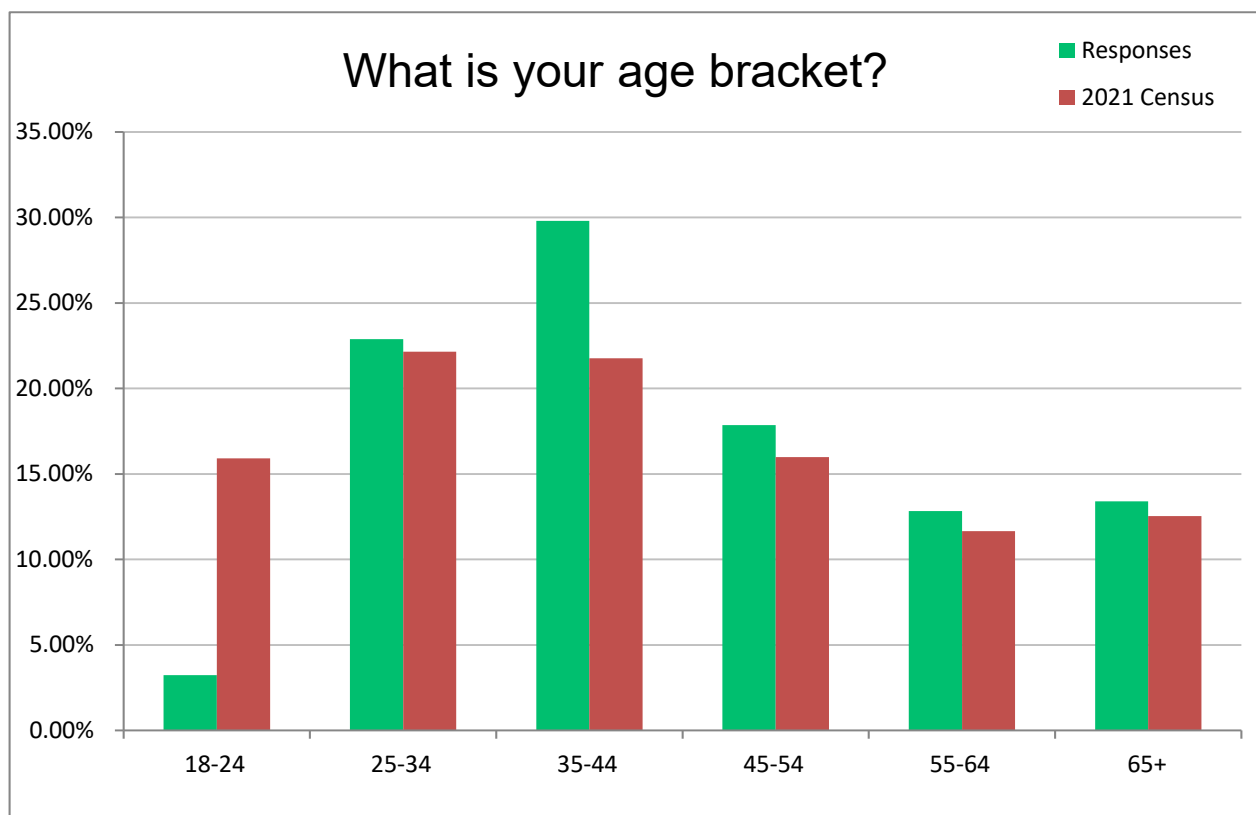
	2021 Census	
Owner	29940	72%
Renter	11159	27%
Other	231	1%
41330		



## How old are you?

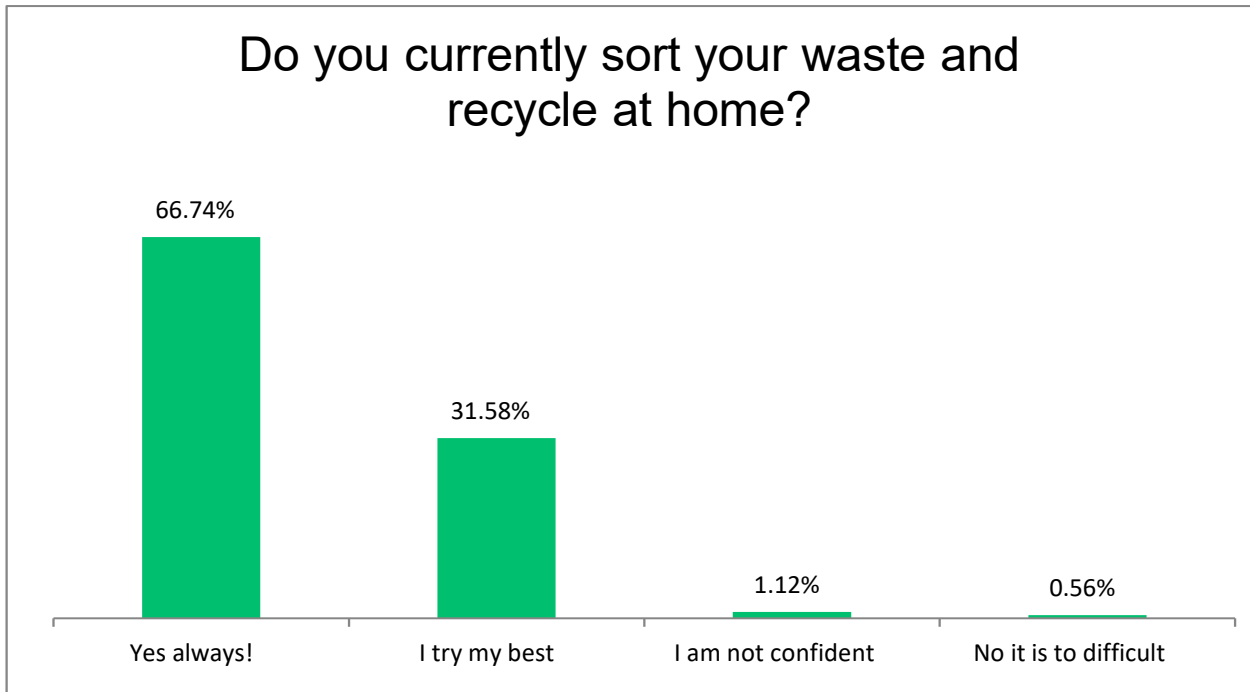
	Responses	2021 Census	Count
18-24	3.24%	15.91%	29
25-34	22.88%	22.16%	205
35-44	29.80%	21.77%	267
45-54	17.86%	15.99%	160
55-64	12.83%	11.66%	115
65+	13.39%	12.54%	120
	<b>Answered</b>	<b>100.03%</b>	<b>896</b>

	2021 Census	
15-19 years	2620	7%
20-24 years	3020	9%
25-34 years	7857	22%
35-44 years	7718	22%
45-54 years	5670	16%
55-64 years	4134	12%
65-74 years	2717	8%
75-84 years	1314	4%
85 years +	416	1%
	<b>35457</b>	



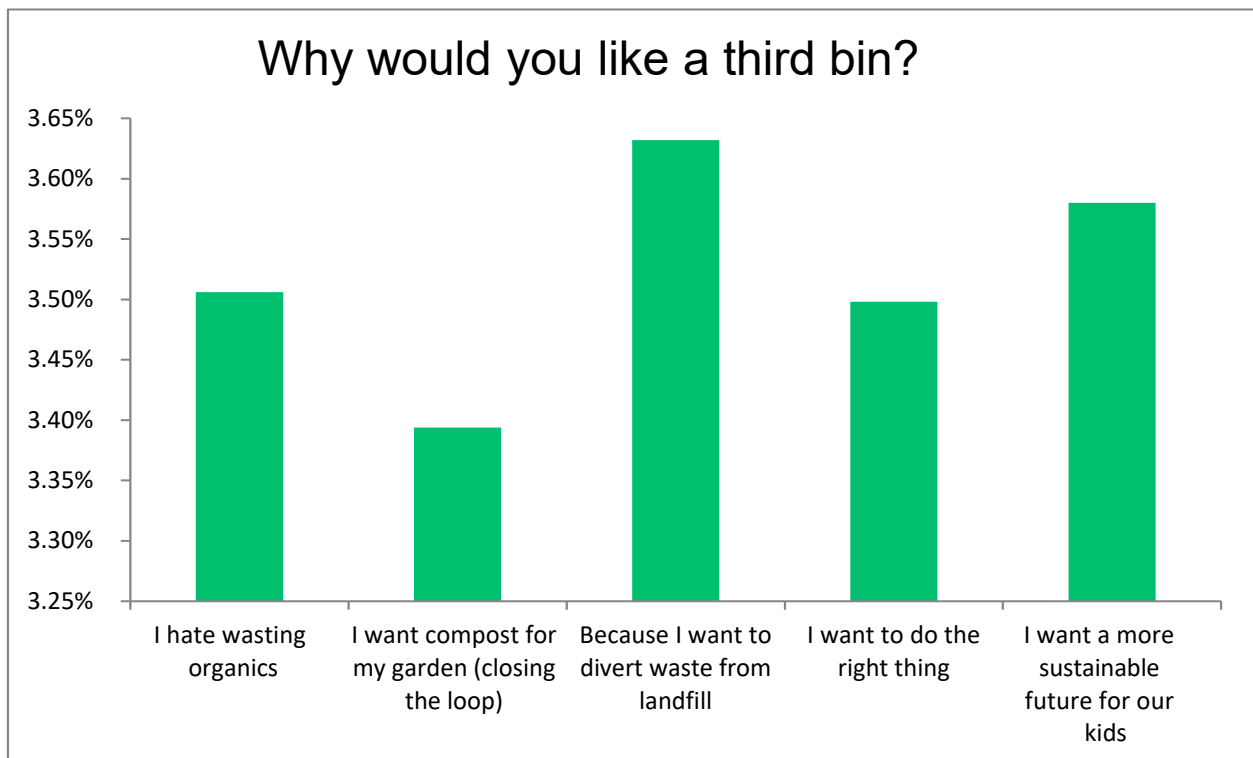
### Do you currently sort your waste and recycle at home?

Answer Choices	Responses	Count
Yes always!	66.74%	598
I try my best	31.58%	283
I am not confident	1.12%	10
No it is to difficult	0.56%	5
	<b>Answered</b>	<b>896</b>



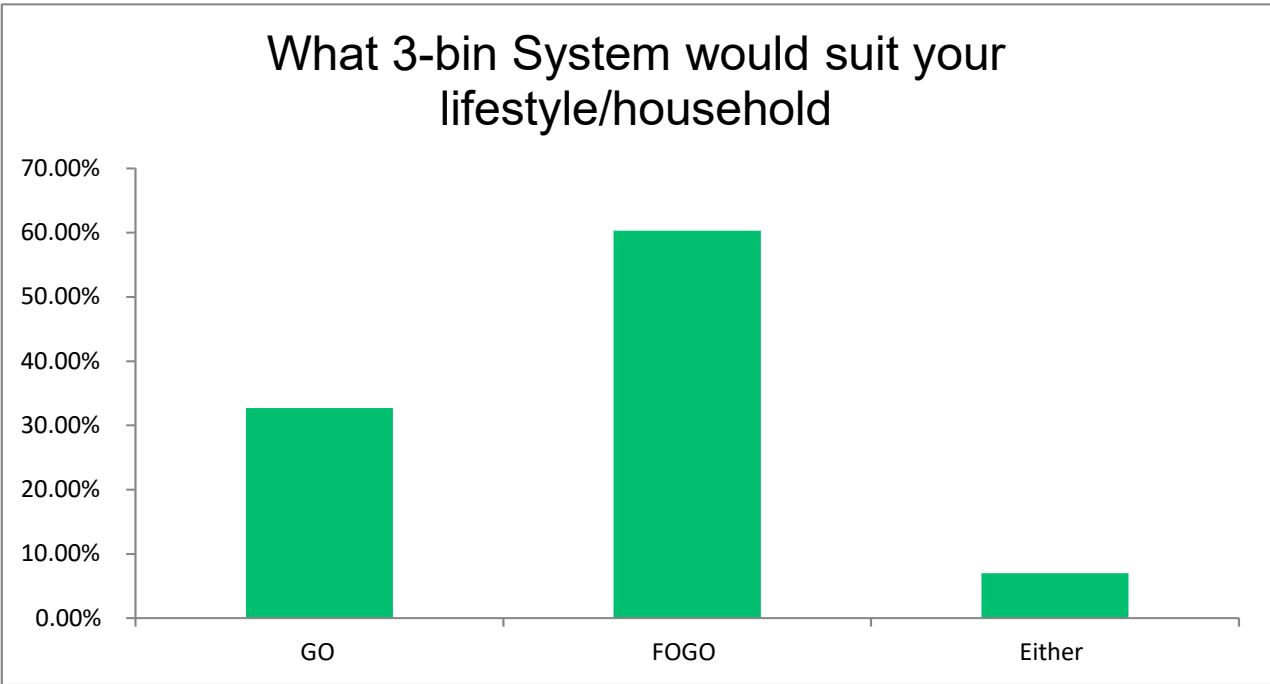
## Why would you like a third bin?

Answer Choices	AVG Rank
I hate wasting organics	3.51%
I want compost for my garden (closing the loop)	3.39%
Because I want to divert waste from landfill	3.63%
I want to do the right thing	3.50%
I want a more sustainable future for our kids	3.58%



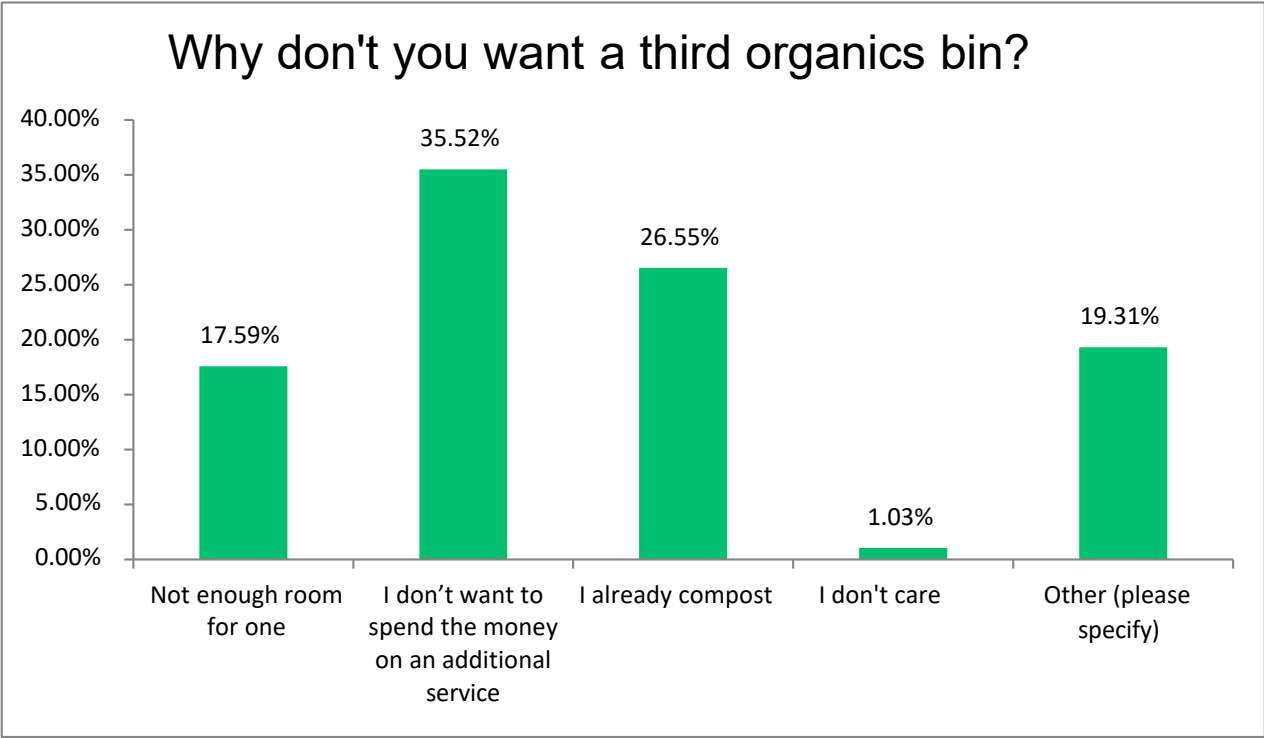
The City is investigating two kerbside organic waste systems. Garden Organics (GO) and Food Organics Garden Organics (FOGO). Which system would best suit your lifestyle/household?

Answer Choices	Responses	
GO	32.71%	192
FOGO	60.31%	354
Either	6.98%	41
Answered		587



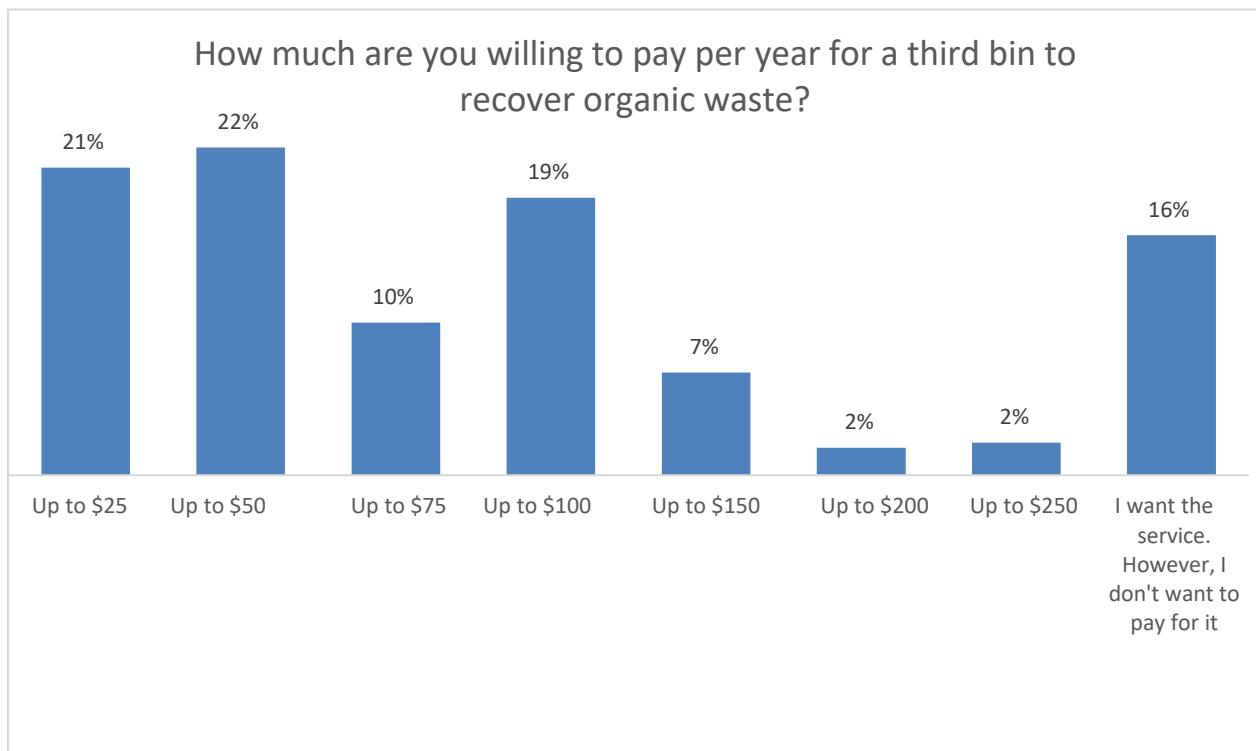
Why don't you want a third organics bin?

Answer Choices	Responses	
Not enough room for one	17.59%	51
I don't want to spend the money on an additional service	35.52%	103
I already compost	26.55%	77
I don't care	1.03%	3
Other (please specify)	19.31%	56
	<b>Answered</b>	<b>290</b>



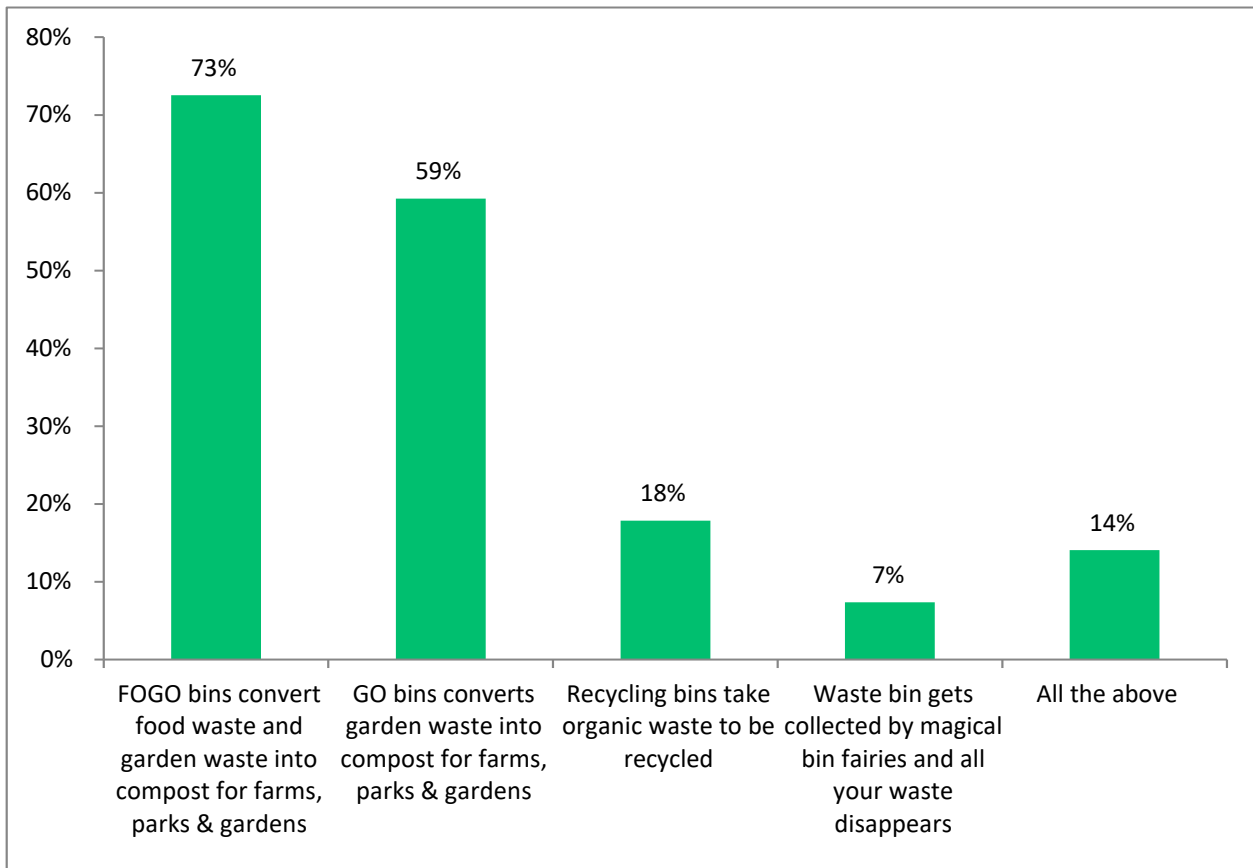
## How much are you willing to pay per year for a third bin to recover organic waste?

	Responses	Count
Up to \$25	21%	123
Up to \$50	22%	131
Up to \$75	10%	61
Up to \$100	19%	111
Up to \$150	7%	41
Up to \$200	2%	11
Up to \$250	2%	13
I want the service. However, I don't want to pay for it	16%	96
<b>Answered</b>		<b>587</b>



## From the options below which one best describes these services?

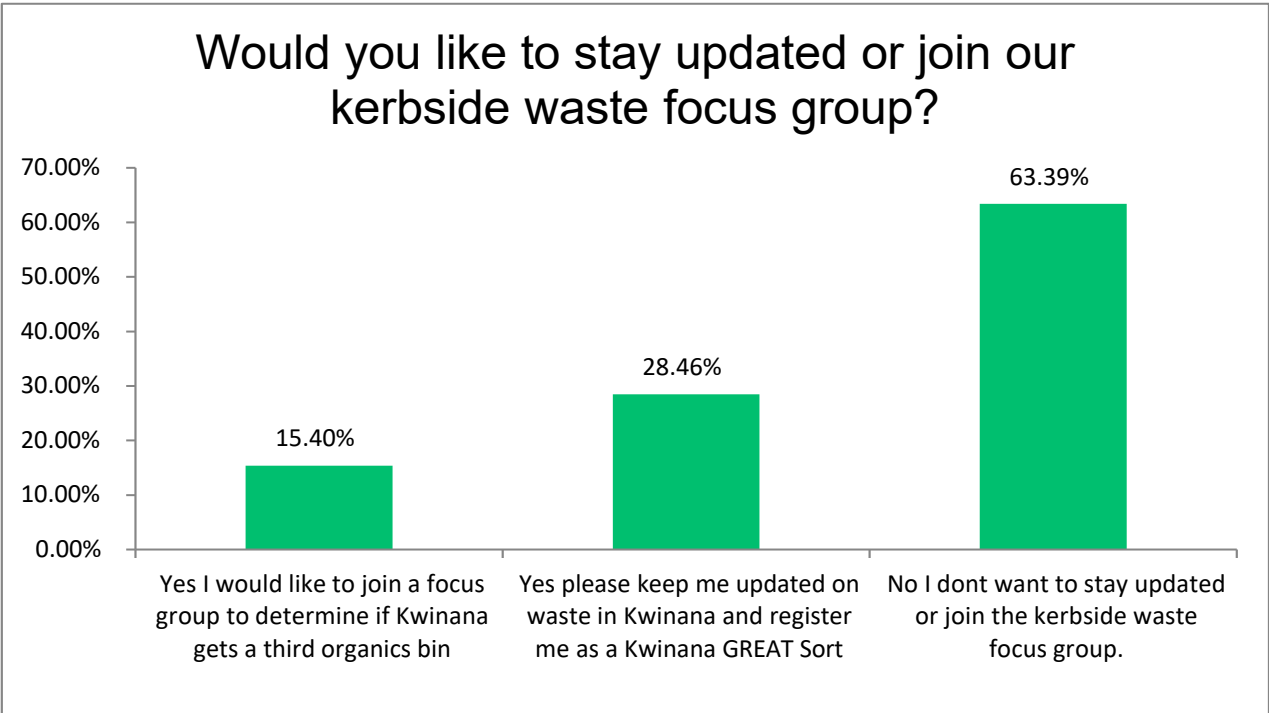
Answer Choices	Responses
FOGO bins convert food waste and garden waste into compost for farms, parks & gardens	73%
GO bins converts garden waste into compost for farms, parks & gardens	59%
Recycling bins take organic waste to be recycled	18%
Waste bin gets collected by magical bin fairies and all your waste disappears	7%
All the above	14%





Would you like to stay updated or join our kerbside waste focus group?

	Responses	Count
Yes I would like to join a focus group to determine if Kwinana gets a third organics bin	15.40%	138
Yes please keep me updated on waste in Kwinana and register me as a Kwinana GREAT Sort	28.46%	255
No I dont want to stay updated or join the kerbside waste focus group.	63.39%	568
	<b>Answered</b>	<b>896</b>





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