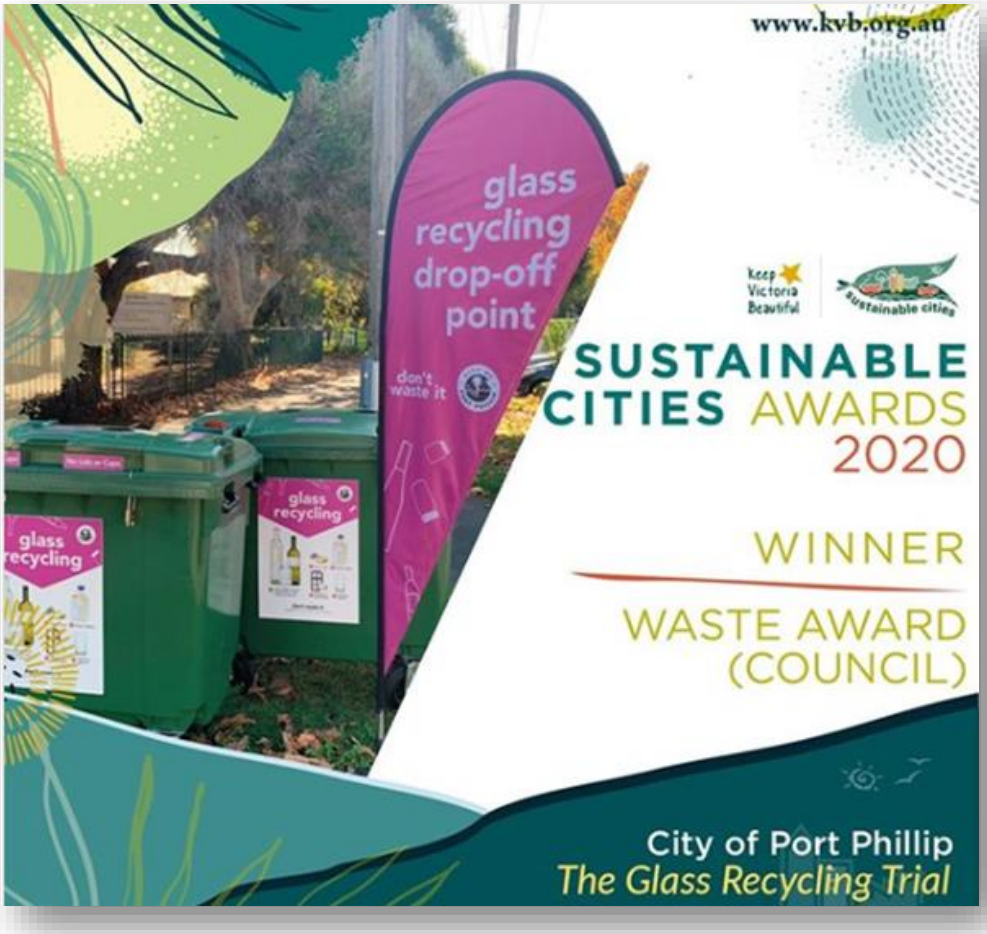
The Glass Recycling Trial

Closure Report



Presented by

Binita Shrestha & James Walden

June 2021

Table of Contents

1. Introduction

In March 2020, the City of Port Phillip began an eight-month trial exploring the use of Glass Recycling across the municipality.

The trial held two components – kerbside and communal – and was aimed at testing a glass recycling stream among homes with spaces to house an additional bin, and within public areas surrounded by medium and high-density housing.

Throughout the trial weekly audits were performed, and utilisation and contamination rates were recorded, analysed and reviewed. Those audits resulted in educational responses where needed, and were used to steer residential behaviour towards improved recycling outcomes.

2. Executive Summary

In March 2020, the City of Port Phillip began an eight-month Glass Recycling Trial to measure residential adoption against a possible glass recycling service -- in line with the State Government's requirements that all Council's will require a four-waste stream system by 2030. The trial held two components – a kerbside glass recycling option for residents of Garden City who held enough yard space to house an additional bin; and a communal glass recycling option located in public areas within South Melbourne and Albert Park, for residents living in medium-to-high density dwellings who didn't have enough yard space to house an additional bin.

Audits were performed across all bins, including the existing kerbside yellow recycling bins in Garden City, from March until early August 2020 when COVID-19 related restrictions prevented further measures. Contamination and utilisation were monitored, and where contamination was present, educational material and intervention were applied with view to producing reduced contamination across the kerbside glass and yellow recycling streams.

In the five months of auditing, the kerbside component of the Glass Recycling Trial (182 homes in total) held an average fill rate of 30 litres, or one-quarter of the bin full, against the fortnightly collection schedule. The trial-to-date contamination rate for the service concluded at 11%, meaning 11% of total bins present held some form of contamination. The primary causes of contamination were lids and caps (64%).

The existing yellow recycling service was also managed within the scope of the trial, and pre-trial audits were performed to establish a baseline. Pre-trial utilisation of the yellow recycling service sat at 78% -- meaning 78% of all possible bins were placed outside for collection on the allotted schedule. Contamination pre-trial sat at 41%, and the pre-trial fill rate was recorded at 104 litres.

Through the trial, the existing weekly yellow recycling collection shifted to fortnightly, occurring on alternate fortnights to the kerbside glass recycling bin. Contamination was

driven from 41% to a trial-to-date concluding average of 11%, and hit as low as 3% within the latter auditable months. Utilisation grew from 78% to 87%, and average fill levels rose from 104 litres per bin to 134 litres per bin – likely due to a combination of shifting to a fortnightly collection, residents upgrading their yellow recycling bin capacity (from 120 litres to 240 litres), and the introduction of sustained COVID-related lockdowns which confined residents to their homes.

Utilisation on the communal component of the glass recycling trial proved staggering. The original intent was to place four x 660 litre bins across four communal sites with a once-each-week collection frequency. Resident demand however led to a total of 12 bins being placed across 7 separate sites, and a shift to a twice-each-week collection frequency in response to increased residential utilisation. Contamination across the communal stream fluctuated between 2 – 5% for the length of the trial, meaning 2 – 5% of all collected material held some form of contamination. Lids and caps again remained the primary contaminant.

The kerbside component of the trial concluded end of October 2020 and 143 of the 182 purple-lidded glass recycling bins were recovered. Two 660 litre communal bins were placed in Buckingham Reserve – centre of the Garden City trial area – to provide an alternative option for continued glass recycling. At the time of writing, that alternative is being utilised.

Post-trial audits were performed mid-November, across four weeks, in the trial area to monitor behaviour on the yellow recycling stream in the absence of auditors. Audits had not been performed since early August 2020, and the expectation was contamination rates might've returned to pre-trial levels. Staggeringly, that was not the case, and across the four-audited post-trial weeks, contamination in the yellow recycling stream averaged 7%.

That sustained result may be advantageous to Council, and may provide a method for creating improved recycling behaviours across the municipality moving forward.

Though the kerbside glass recycling service was embraced by residents, the concluding data of the trial suggests the kerbside option should remain on-hold until the introduction and stabilisation of Victoria's Container Deposit Scheme (CDS) in 2023. Until then, the communal component of the trial, which has consistently held high utilisation and low contamination rates, should remain in place, and be expanded to cater for residential demand, and provide a glass recycling option to the Port Phillip community.

Total glass captured within the Glass Recycling Trial, and the seven months post-trial, March 2020 to May 2021, is approximately 317,590 litres from the communal component, and 54,270* litres of glass across the auditable period for the kerbside component (note – audits for the communal component continued throughout the trial, and post-trial period. Audits for the kerbside component only existed March to July, and are under-representative of total volumes collected).

The total glass captured within the Glass Recycling Trial, and since, is approximately 371,860 litres, or 129.04 tonnes.

3. Background – Why the trial?

In 2018, the City of Port Phillip endorsed the *Don't Waste It! Waste Management Strategy 2018 – 2028* to provide 'the blueprint for how Council and the community will work together to create a more sustainable future for Port Phillip through the way we manage our waste.'

Within that strategy, Council established its vision against the following outcomes --

Those outcomes were challenged in 2018 with the introduction of China's National Sword Policy, which drastically disrupted the global export markets for recycling, and again in 2019 with the collapse of Port Phillip's primary recycling processor, SKM recycling.

In the aftermath of the collapse of SKM Recycling, the City of Port Phillip entered into mediation with other effected Council's and began examining methods to develop local recycling markets, and increase the value of collected recyclable materials as a means of prompting localised growth within the recycling economy.

Part of that development strategy included the launch of the Glass Recycling Trial.

In the latter months of 2019, the Department of Environment, Land, Water and Parks (DELWP) believed the presence of broken glass within the existing yellow recycling stream contributed substantially to overall contamination as broken glass components became embedded in paper and cardboard material, ruling each category as unrecyclable.

The introduction of a glass recycling option -- which, for Port Phillip, pre-dated the State Government announcement that all Victorian Council's would require a four-waste stream system by 2028 -- was seen as a means of optimising both the glass and paper/cardboard markets by keeping each category separated, and, by consequence, contamination free.

4. Components

In 2016, the Australian Bureau of Statistics reported that 89.9% of dwellings within the City of Port Phillip were deemed to be medium or high density, compared to 33% in Greater Melbourne[i].

Many homes within the City of Port Phillip, regardless of their stance on the implementation of a glass recycling service, lacked sufficient yard space to house an additional bin.

> *"In the City of Port Phillip, 89.9% of the dwellings were medium or high density, compared to 33% in Greater Melbourne."*
>
> *- ID Community – Demographic Resources - 2016*

In response, Council decided to test a two-tiered approach with the rollout of the glass recycling trial. The first tier, named the 'kerbside glass recycling trial,' focused on providing residential homes within Garden City with a 120-litre purple-lidded glass recycling bin for the trial's duration. Garden City was selected as the kerbside trial area owing to the prevalence of residential homes that held an above average yard space believed to be sufficient to house an additional bin.

The second tier, named the 'communal glass recycling trial,' focused on providing a glass recycling option to those areas that lacked sufficient space to house an additional bin. The areas of South Melbourne and Albert Park were selected as the communal trial areas, largely owing to the prevalence of medium and high density housing within the two towns, and several 660 litre glass recycling bins were issued to public spaces alongside collateral advising residents of the newly installed glass recycling bins.

The Kerbside Glass Recycling Trial

The Communal Glass Recycling Trial

5. Collection Frequencies

For the kerbside component of the glass recycling trial, residents were issued 120 litre bins and provided with a fortnightly collection schedule. Each fortnight, the glass recycling bin would be placed on the kerbside along the household waste bin and each would be collected on the same day.

With the kerbside trial, the existing yellow recycling bins were collected on alternate fortnights to the glass recycling bins. The waste collection continued unchanged and weekly.

For the communal component of the glass recycling trial, each 660-litre bin was originally installed with view to collecting once each week. Shortly after the trial's commencement, however, the high utilisation rates and residential demand increased those collections to twice weekly, and Council increased the total amount of bins on three of the four sites. Details of that increased utilisation have been provided below.

A magnetic collection calendar was delivered to residents within the kerbside component of the glass recycling trial as part of a 'welcome pack' aimed at easing the transition period for the new recycling service.

6. Konect – An Auditing Platform

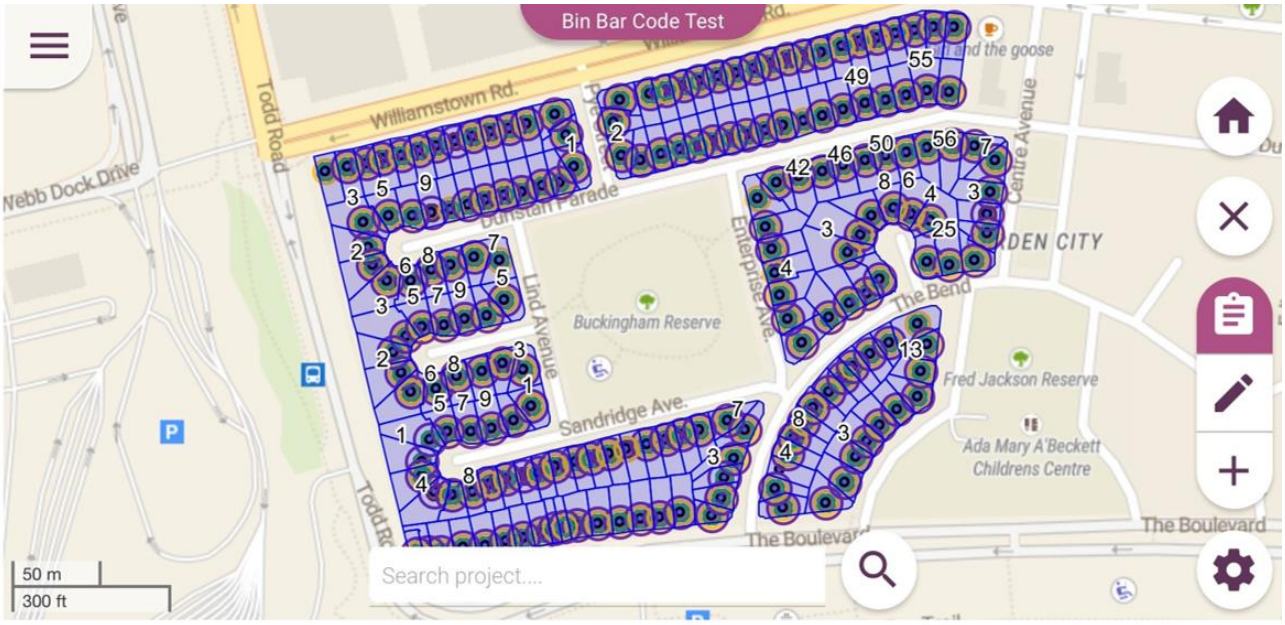
The overarching purpose of the glass recycling trial, in both its tiers, was to test residential behaviour and response to the glass recycling service.

During the concept stage, Council understood that successful acceptance of the kerbside glass recycling service, particularly in light of the State Government's announcement that all councils would require a four-waste system by 2030, could result in the need to introduce a 120 litre glass recycling bin to approximately 35,000 households within the municipality.

At an estimate, the cost of providing the bins alone, not including the cost of collection each week or disposing material, would surpass $2 million dollars.

Within that context, Council understood the vital role that data would play throughout the trial, and aimed to guarantee its consistency and accuracy to ensure whatever database was created would be verifiable by outside parties, and would prove reliable for internal decision-making.

Against that requirement, the project delivery team designed and implemented a GIS based auditing tool named 'Konect' and created an auditing framework for the trial's duration.



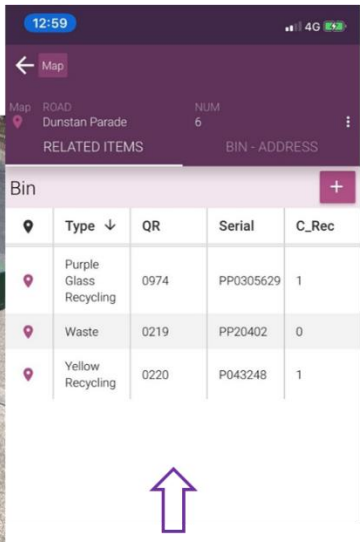
Waste officers collaborated with IT to develop a GIS based mobile auditing solution that mapped participating households within the trial area, and attached individual bin records against participating properties

Within Konect, Council built an audit questionnaire that allowed field auditors to capture key data on bin use, fill levels, contamination, contaminated material presence, utilisation, and document key information like photographs of the bin material which could then be attached to the individual audit record. Key metrics, including whether the bin was ready for collection that week, and whether an educational response was required, was also recorded.

Once the audit questionnaire was completed, Council attached QR codes to every bin within the trial areas, including the existing waste and yellow-lidded recycling bins, and registered the bin against each address, providing an anchor point in the database.

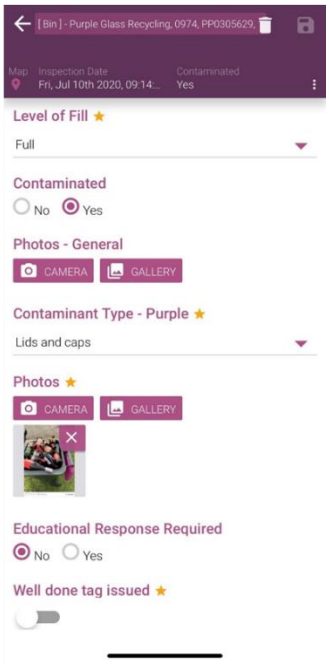
With the audit framework established, Council could now guarantee that no matter which employee performed the audit, the audit itself would be performed in a uniformed way, and each auditor would have access to the full historic database against each registered bin.

Each bin was fitted with a QR code to tie it to the residential address in the database. That allowed for audit integrity even if a bin shifted address during the length of the trial.



All collectable bins were recorded against each property, and all bins were audited during the morning of each collection.

The auditing questionnaire was built into the platform, capturing information on contamination and recording whether educational material was distributed, alongside the photograph evidence of the contaminating material.



7. Collateral

Council began engaging with residents within both the kerbside and communal trial areas pre-rollout with the delivery of an introductory letter that provided an overview of the upcoming glass recycling trial. The introductory letter outlined Council's motivation behind the trial, the terms and conditions of the trial, and, in the case of the kerbside glass recycling component, provided residents with the ability to 'opt-out' should they wish to forgo the eight-month glass recycling service.

Once participant numbers were finalised, a 'Welcome pack' was delivered to participating residents and included a second, detailed letter on the kerbside glass recycling trial rollout, alongside a magnetic calendar that highlighted the relevant dates for both the glass recycling and the yellow recycling collections, and a copy of Port Phillip's *Don't Waste It! Guide* which outlines, by material, information on what can and cannot be placed inside each recycling bin.

In addition to residential engagement, collateral was prepared for the bins themselves, and stickers were installed on the front-facing points of both the kerbside and communal glass recycling bins as a means of reminding residents of acceptable items. 'No lids or caps' stickers were installed on the lid of each bin to deter lid-and-cap-based contamination, and, in the case of the communal glass recycling component, large tear drop flags were installed at each communal glass recycling location as a means of showcasing the recycling site, and inviting nearby residents to utilise the glass recycling solution.

Collateral was fitted to all glass recycling bins, kerbside and communal. Additional teardrop flags were created and installed at each communal glass recycling site to encourage awareness of the communal trial, and invite residents to contribute their glass recycling.

8. Rollout

On the morning of Friday 28 February 2020, the Waste Management Services team of the City of Port Phillip were joined by members of the Waste Futures Team and Service Transformation team to rollout the 120-litre purple-lidded glass recycling bins to the participating residents of Garden City.

Though 192 homes were initially selected to take part in the trial, a total of ten selected to 'opt out' stating, for the most part, that they didn't believe they'd gain enough utilisation from the kerbside glass recycling bin throughout the eight-month trial.

A total of 182 homes remained in the trial until the trial's completion.

Across a five-hour period, bins were constructed, decaled, delivered and registered to the homes of Garden City. Addresses were manually written on the back of each bin, per standard practice within Port Phillip, and QR codes were fitted and registered against both the bin serial number, and residential address, providing a three-tiered identification structure that'd be utilised by auditors throughout the length of the trial.

On Tuesday 3 March 2020, four 660 litre communal glass recycling bins were installed across the four communal glass recycling locations. Each bin was also constructed, decaled, delivered, and registered to the relevant public site, and tear drop flags were installed beside each bin to notify passers-by of the communal glass recycling installation.

Though welcome packs weren't provided to homes around the communal bin sites (given no one property had responsibility for bin's management and maintenance), information letters were provided to residents within the surrounding streets notifying them that the install had occurred, and providing them details on the trial, its length, and the manner of material that'd be accepted within the communal glass recycling bins.

9. Placement of Communal Bins

The four locations selected for the communal glass recycling component were:

- Little Finlay Reserve, Albert Park
- Lyell Iffla Reserve, South Melbourne
- Corner of Park and Nelson Road, South Melbourne
- Sol Green Reserve, South Melbourne

Each location was selected for its prevalence of terrace houses, medium-density units, and multi-unit developments within the surrounding areas, which, in turn, minimised the likelihood that homes might possess a storage space large enough to house an additional kerbside glass recycling bin for the eight-month trial or indefinitely.

The selection of each communal site was somewhat sensitive, and Council remained cognisant of the myriad of requirements that each location demanded. Locations needed to be fairly visible and known to the surrounding community, but not so visible that they'd invite dumped rubbish, theft, or vandalism from any passers-by. The locations needed to be somewhat central to residents to minimise the effort it took to walk from home to the communal bin site but needed to maintain enough of a distance to minimise any would-be noise complaint. When installed in park areas, the locations needed to be close to existing bins to prevent cross-contamination, but needed to be kept separate enough from communal play areas to prevent any instances of broken glass overflow.

Little Finlay Reserve, Albert Park

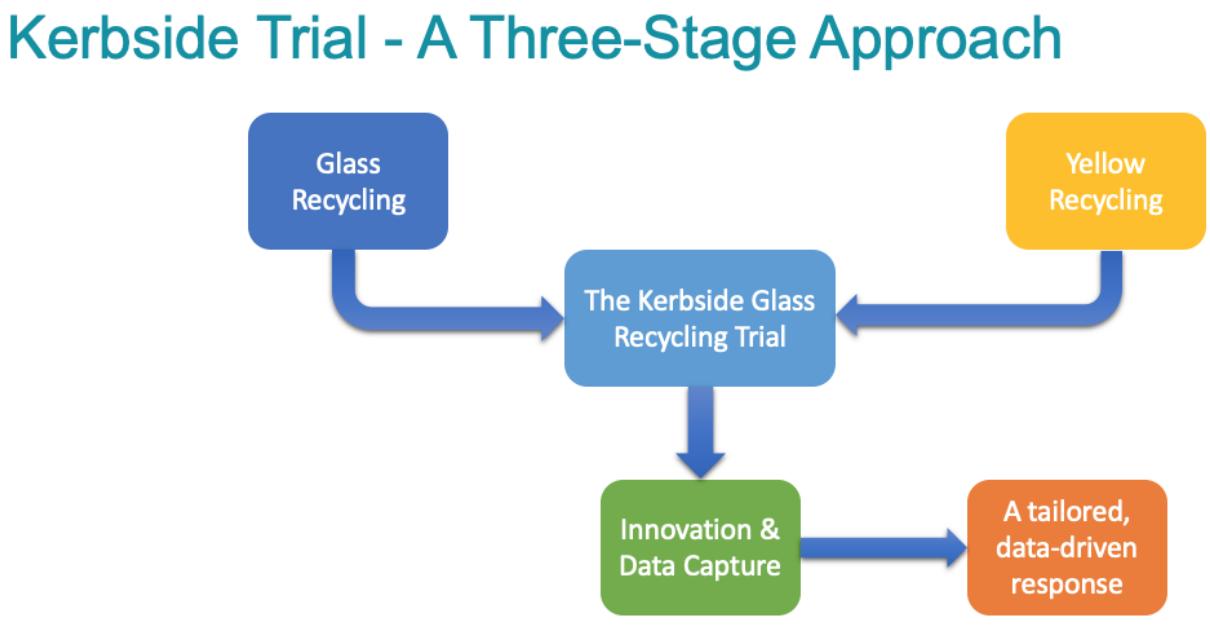
Lyell Iffla Reserve, South Melbourne

Corner of Park & Nelson, South Melbourne

Sol Green Reserve, South Melbourne

10. Audit Rundown

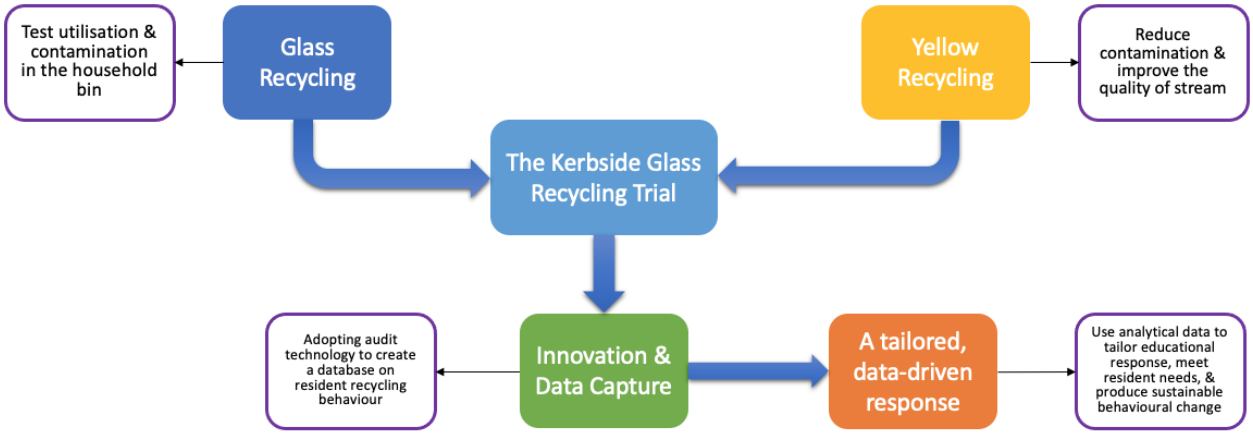
From conception, the auditing component of the glass recycling trial was seen as the backbone that would hold the trial together. For the kerbside component of the glass recycling trial, that backbone supported a three-stage approach:



With a primary objective of measuring the adoptability of a kerbside glass recycling service among our Garden City residents, the metrics of utilisation and contamination were held as the pillars that would allow our auditors to gain objective insight into residential glass recycling bin use. Yet while utilisation and contamination would reflect the glass components that were being recycled within the new glass recycling bin, audits wouldn't highlight the presence of recyclable glass still held within the existing yellow recycling or

kerbside waste bins. For that reason, audits were also performed on the yellow recycling and waste bins, collection schedule dependant, to ensure all glass disposal was recorded. Given auditors would be examining the yellow recycling stream anyway, a secondary objective was created to reduce general contamination rates within the existing yellow recycling stream.

Note — while waste bins were audited throughout the trial's duration, the existence of plastic bags within the waste bins often limited the information auditors could capture. Flip top audits, the most common throughout the trial, did not involve removing material that might've been housed within a plastic bag. For that reason, data captured through the waste bin audits was limited and may not reflect the full material breakdown. That issue did not occur with the yellow recycling bin audits.



From a frequency standpoint, auditors aimed to inspect all recycling bins every week without fail, collection schedule dependant. If bins were placed out for collection, those bins were audited as norm. If bins weren't placed out for collection, auditors recorded the bins as 'not out for collection' and used that information to steer utilisation reporting.

Standard practice for the audit itself was an industry standard 'flip top' audit which involved lifting the lid of the bin, and visually inspecting the bin contents for contamination and material present. Auditors would often shift through the top layers of material in an attempt to better gauge any contamination that might be hidden beneath the surface or caught within other material. Where contamination was present, a record was made within the Konect system, and a photograph of the contaminated material was recorded. A 'bin tag' was then issued, highlighting the cause of the contamination and requesting the material be removed before a bin collection can occur. Details of the bin tags and education process are highlighted in detail below.

In addition to the 'flip top' audits, approximately 10 bins (representing 5% of the trial area) were selected at random each week, often within a concentrated area, for a 'full bin' audit.

With a 'full bin' audit, auditors removed the bin from site and wheeled it to a nearby Council vehicle, often a Council ute. Bins were lifted onto the back of the ute, and all material was poured from the bin onto the ute tray for inspection. Auditors then inspected the material in full, photographing and recording it, and following the same contamination process as outlined with the flip top audits.

The contents of the yellow recycling and glass recycling bins were poured out entirely onto the back of a Council ute. Material was inspected for contamination, then returned to the residential bin. Where contamination was found, contaminated materials were left at the top of the bin material and the bin was tagged as contaminated, allowing the resident to quickly access and remove the offending material.

Full bin audits often revealed contamination that couldn't have been highlighted within a flip top audit. And provided a more accurate sample of the types of contamination frequenting the trial site.

Full bin audits often revealed hidden contaminants. Here, soft plastic rolls and queen size bed sheets were both found stuffed within a full yellow recycling bin. That material wouldn't have been revealed with the flip top audit only.

In addition to the kerbside bin audits, all communal bins were inspected twice weekly, and inspected with flip top audits only. Although the logistics of pouring out a 660-litre glass recycling bin could've been established, the risk involved with having auditors shift through 660 litres of broken glass manually each week prevented Council from exploring that option. Instead, flip top audits sufficed, alongside ad hoc material reporting from Council's glass recycling facilitator.

11. Education

An overarching theme of the Glass Recycling Trial was to utilise audit data to pinpoint residential needs with view to customising our educational responses to meet those individual needs, and steer recycling behaviour to produce sustainable outcomes.

To do so, a behavioural database was needed, and was captured via the Konect questionnaire. Yet auditors still needed a fairly easy and simple means to engage with residents to steer those behavioural outcomes. The method adopted was the bin tag system.

Where audits occurred, one of two possible outcomes were achieved:

1) Recycling material was flagged as clean, and a 'Well done' tag was issued; or

2) Recycling material was flagged as contaminated, and an 'Oops' tag was issued.

Auditors issue bin tags across both the glass recycling and yellow recycling streams. Tags are designed to allow for customisation to tailor the recycling message to individual resident needs.

Well-done tags were seen as a means of encouraging the continuation of good recycling habits, and Oops tags were designed to allow auditors to specify what material had caused the contamination, and encourage its removal.

All tags were issued to the handle of the bin.

12. Bin Tags

Bin tags were produced for the yellow recycling and glass recycling streams. Each stream had both a unique Oops tag and unique Well-Done tag, both of which reminded residents what materials were accepted within both streams.

The yellow recycling tags were unique to that service, and served a reminder of what is and isn't acceptable within the yellow recycling bin. Where contamination was present, an 'Oops' tag was issued, and the relevant contaminant was highlighted to aid the resident's ongoing education about what is and isn't acceptable within the yellow stream.

All tags were made of recycled material, and residents were encouraged to recycle their tags post-use.

Tags themselves were designed to cater for various levels of literacy, and emphasised clear imaging for the sake of clarity, and to cater to a cultural and linguistically diverse audience (the CALD community).

The notes section at the bottom of the Oops tag also allowed auditors to flag contaminants outside of the standard categories — the presence of food within a bottle, for example, as highlighted here.

13. Utilisation

Kerbside Glass Recycling

Utilisation for the kerbside component of the glass recycling trial was measured each week from the trial's start in March 2020 until stage four restrictions, resulting from COVID-19, halted all kerbside bin audits early August 2020.

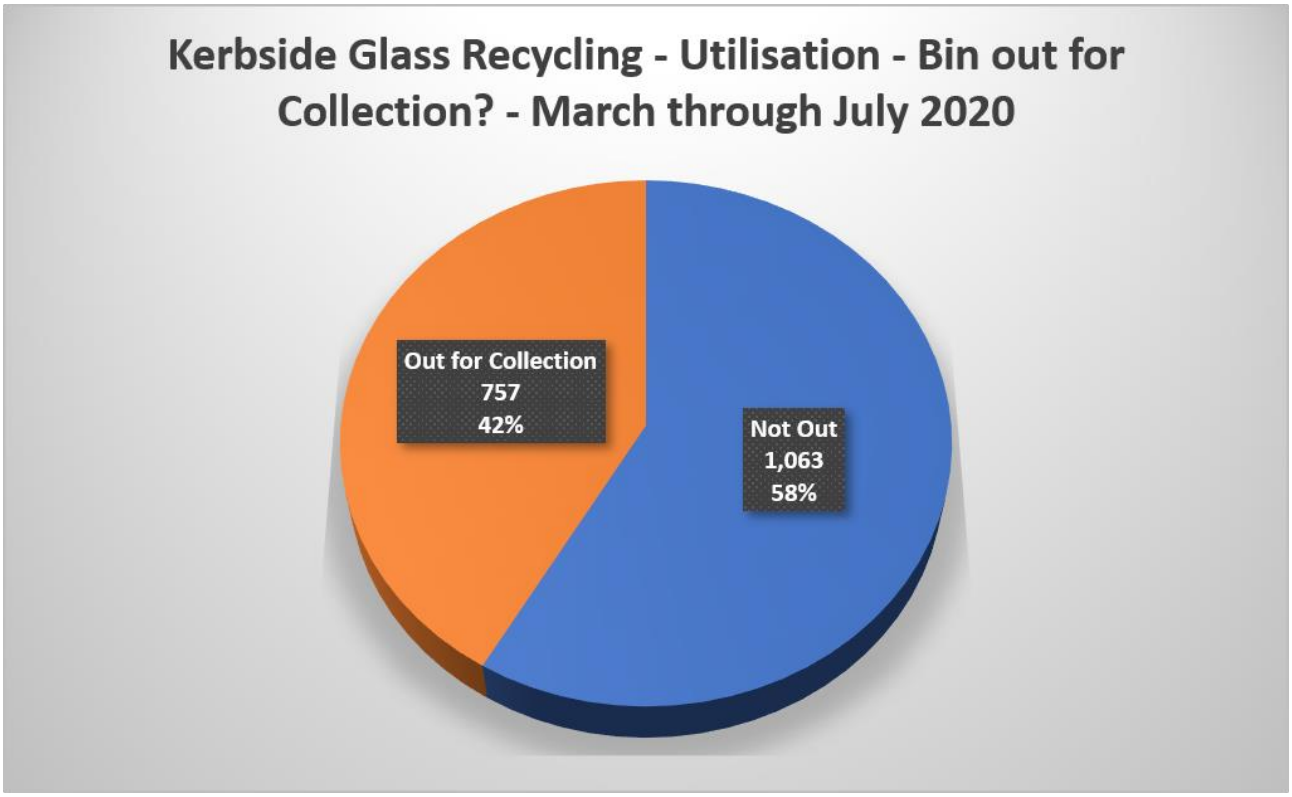
In all, five months of utilisation were tracked, or a total of twenty-one weeks of bin use.

Utilisation was measured across two tiers: the number of bins out each week from the total available bins, and the level of fill within each bin among the total out for collection.

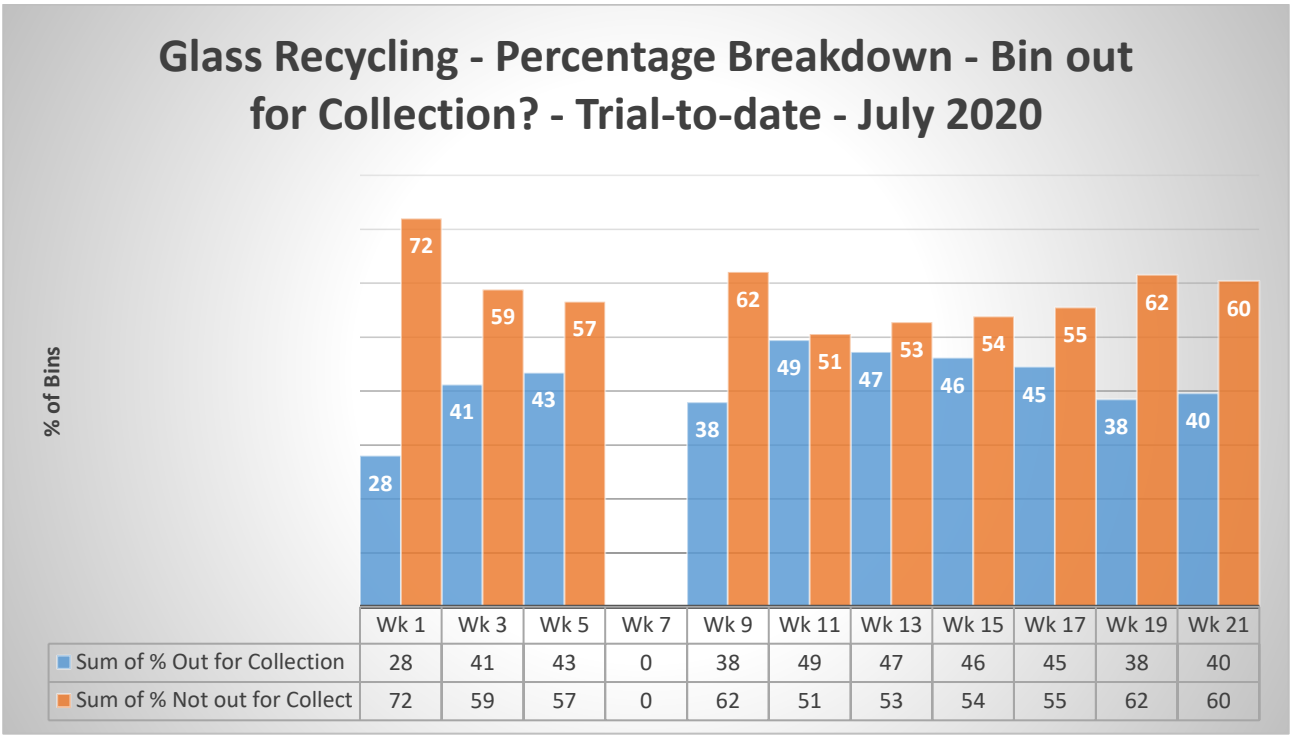
Out for Collection

Across the twenty-one available weeks, a total of ten kerbside glass recycling collections were scheduled, and all ten were audited. Throughout that period, 1,820 glass recycling

collections could have taken place, but only 757 glass recycling bins were placed outside for collection, resulting in a trial-to-date utilisation rate of 42%.



First week utilisation proved the lowest, as residents slowly progressed to glass recycling adoption, and week eleven provided the trial's peak utilisation rate of 49% -- meaning 49% of all available glass recycling bins had been placed out for collection on the scheduled week.



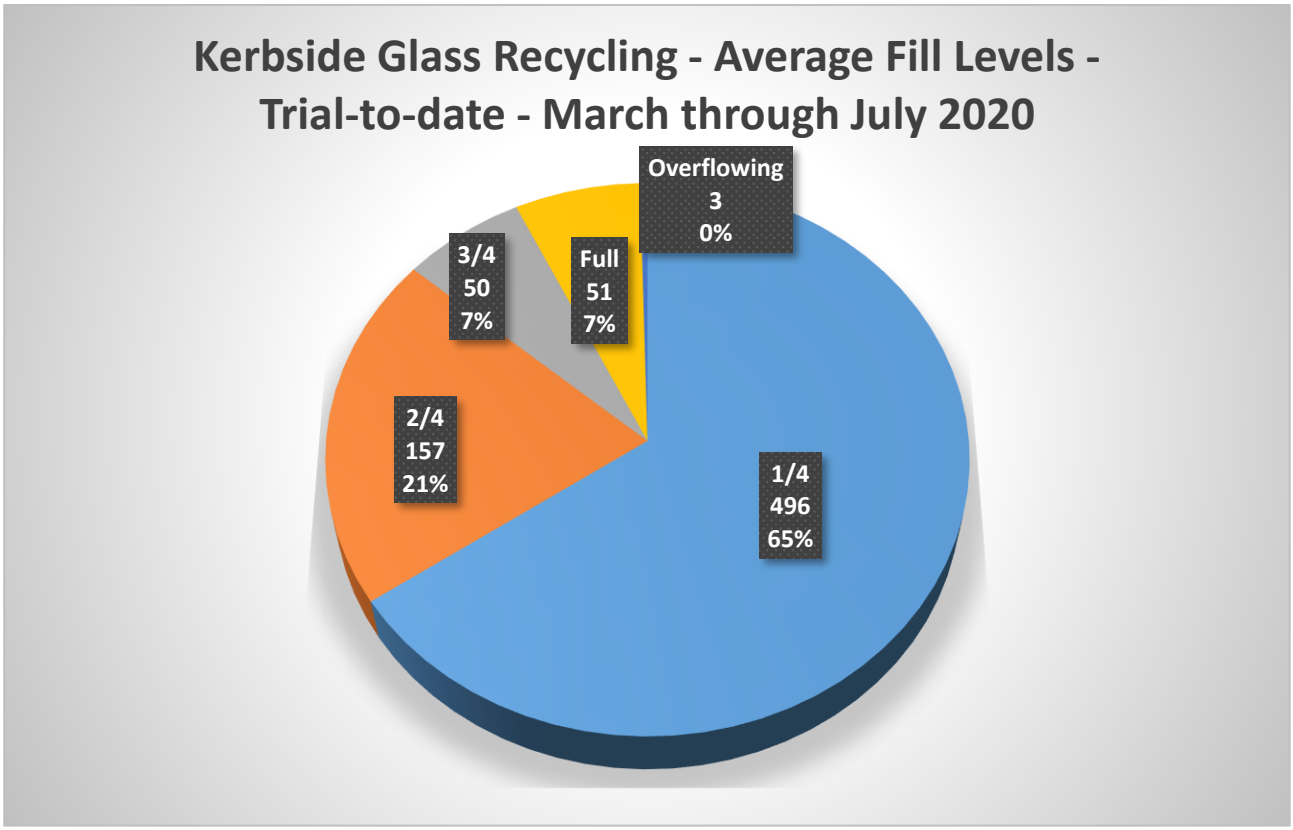
The two highest peaks of utilisation within the kerbside trial both occurred in May 2020.

Note - week seven coincided with the public holiday weekend for Easter. No audits were performed during the Easter weekend.

Average level of fill

Though a select number of households within the kerbside trial continually filled their 120 litre glass recycling bin each fortnight (below left), the vast majority held an average fill level of one quarter – or the equivalent of 30 litres of glass (below right).

Across the ten auditable collections, 65% of kerbside glass recycling bins were recorded with fill levels of approximately one quarter, 21% were recorded as half filled, 7% as three quarters full, and only 7% as full within the fortnightly service.



Kerbside Yellow Recycling

Audits were performed on the existing yellow recycling bins within Garden City pre-trial to establish a baseline for comparative reporting. Those audits took place 27 February 2020, one week before the rollout of the glass recycling bins.

In all, 144 yellow recycling bins from a possible 185 were placed outside homes for their weekly collection producing a baseline utilisation rate of 78%. Of the bins placed out for collection, 86% (124 bins) were recorded as 120 litre bins, while 14% (20 bins) were recorded as 240 litre bins. 41 bins were not placed outside for collection, so their size was not recorded within the baseline audit.

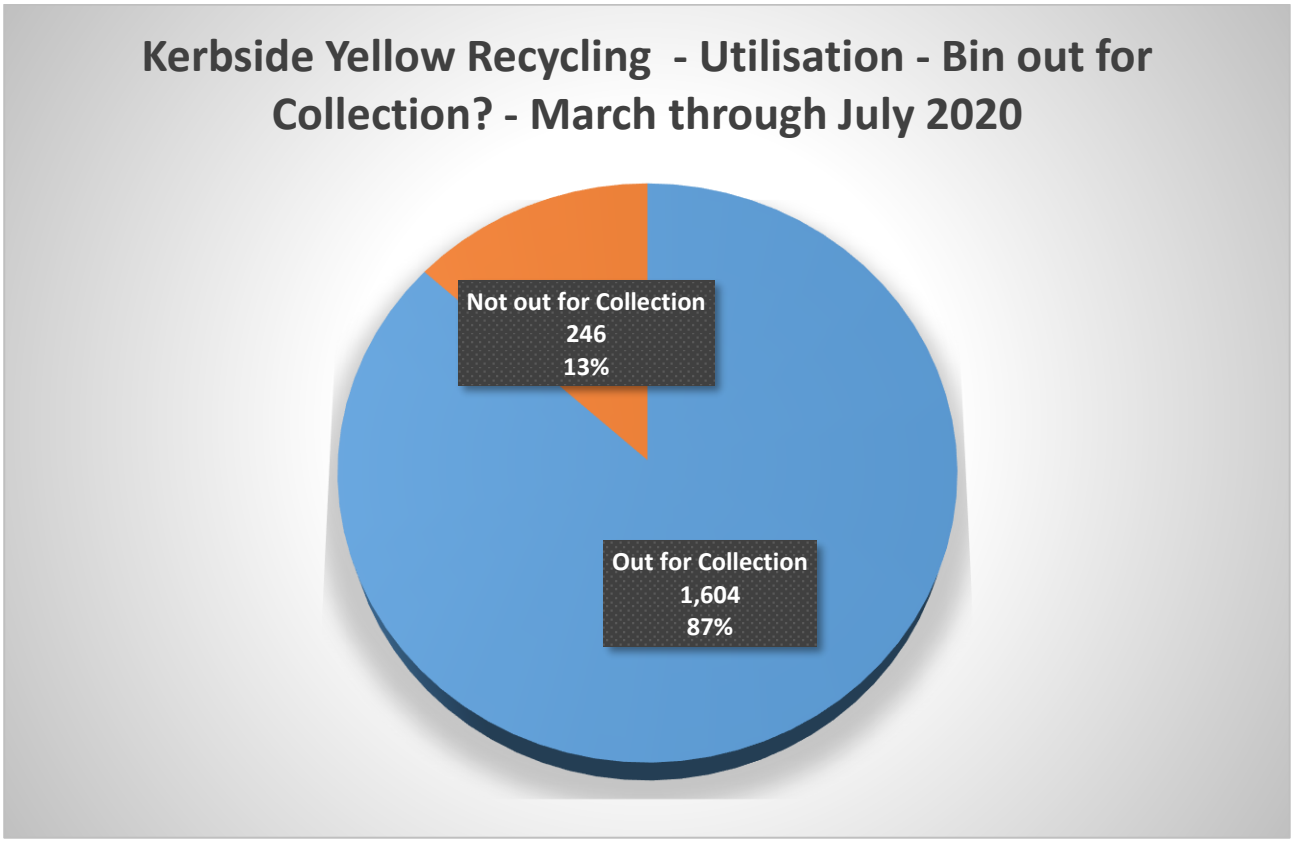
Utilisation for the kerbside yellow recycling bins was measured each week from the pre-trial baseline in February 2020 until stage four restrictions, resulting from COVID-19, halted all kerbside bin audits early August 2020.

In all, five months of utilisation were tracked, or a total of twenty-two weeks of bin use.

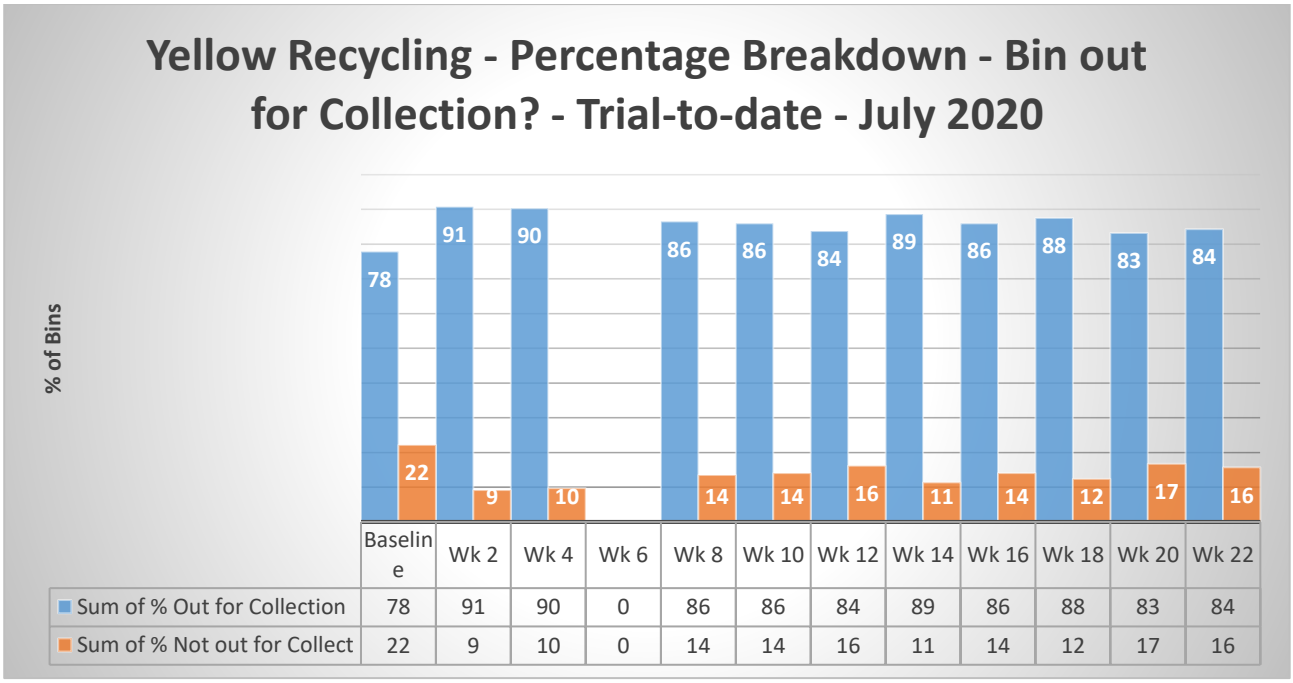
Utilisation was measured across two tiers: the number of bins out each week from the total available bins, and the level of fill within each bin among the total out for collection.

Out for Collection

Across the twenty-two available weeks, a total of eleven kerbside glass recycling collections were scheduled (excluding the baseline), and ten of the eleven were audited. Throughout that period, 1,850 yellow recycling collections could have taken place, and 1,604 yellow recycling bins were placed outside for collection, resulting in a trial-to-date utilisation rate of 87%.



The first two weeks of the yellow recycling component provided the trial's highest and second highest utilisation rates of 91% and 90% respectively, possibly indicating residential adaption, or early panic, as the yellow recycling schedule shifted from a weekly collection to fortnightly collection.



	Baseline	Wk 2	Wk 4	Wk 6	Wk 8	Wk 10	Wk 12	Wk 14	Wk 16	Wk 18	Wk 20	Wk 22
Sum of % Out for Collection	78	91	90	0	86	86	84	89	86	88	83	84
Sum of % Not out for Collect	22	9	10	0	14	14	16	11	14	12	17	16

Utilisation stabilised from there on, hovering between the 83% and 89% margins throughout the remainder of the trial.

Note - week six coincided with the public holiday weekend for Easter. No audits were performed during the Easter weekend.

Average level of fill

The average fill rate for the yellow recycling bins remained high throughout the length of the kerbside glass recycling trial.

Pre-trial baseline audits recorded 144 bins out for collection, and found the average fill rate across those bins sat at 104 litres. Through the length of the kerbside glass recycling trial, that average fill rate climbed to 134 litres per bin. Though pin-pointing a single cause behind the inflated fill rate would be difficult, it's likely the climb was produced by a combination of factors occurring across the same timeline as the glass trial.

First, the existing weekly collection shifted to fortnightly as part of the kerbside glass recycling trial. Though glass material would've been separated, the existing recyclables would've now held two weeks of material, compared to the one week of material captured during the baseline audits.

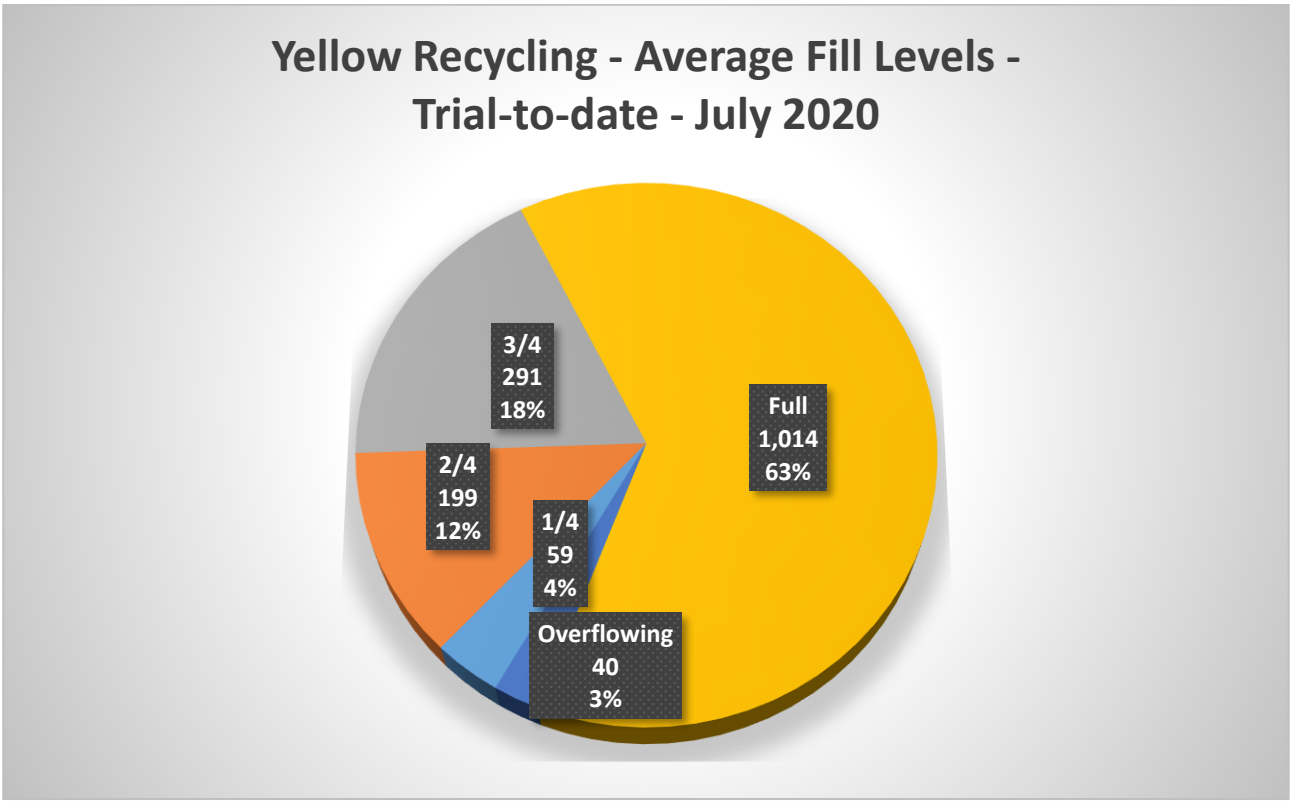
In addition, the launch of the trial in March 2020 coincided with the outbreak of COVID-19, and in Victoria, the launch of lengthy and severe stage three and stage four lockdown protocols. With residents confined within their homes for extended periods (months, in the case of metropolitan Melbourne), the household waste footprint rose substantially, as did the instances of home-delivery services, which, in turn, delivered higher rates of recyclable packaging.

The introduction of the kerbside glass recycling bin, by its nature, likely also freed up additional space within the existing yellow bin that would've otherwise been consumed by glass. That additional space may have allowed material to be recycled within that might've otherwise been disposed of in the existing household waste bin.

The seasonal shift from Autumn to Winter might've also played a factor. Given the newness of bin audits within the City of Port Phillip, no concrete was behaviour data existed on the use of yellow recycling bins across the trial area that could aid in producing a comparative analysis. It's entirely possible then that the participants generally consume more recycling, on average, in Winter than Autumn but the behaviour had never been monitored before.

In any event, a similar trial would have to be conducted free of the influence of a global pandemic before specific causes could be verified.

In terms of percentage breakdowns, across the eleven auditable collections, 84% of yellow recycling bins were recorded as either overflowing, full, or three-quarters of the way full -- including all instances where 120 litre bins were upgraded to their 240 litre counterparts. Only 4% of bins on average across the full five months were recorded with the one-quarter fill level that dominated the kerbside glass component.



Communal Glass Recycling

Utilisation across the communal glass recycling service was managed somewhat differently than its kerbside counterpart.

First, the total amount of participants within the kerbside component remained fixed throughout the trial's length. The trial area was pre-selected, limiting the total number of participating households to the limited area, and the total number of bins provided remained the same throughout -- one 120 litre purple-lidded glass recycling bin per home, without exception.

The communal component however fluctuated in terms of size, scope, bins issued, and frequency of collection, in response to residential demand.

The original concept for the communal service was four x 660 litre bins across four sites, with a collection frequency of once per week. By April, however, glass recycling captured by the communal bins had exceeded expectations, and additional bins were rolled out across the four sites, in line with an increased collection frequency which saw bins collected twice-per-week, on average, for the remainder of the trial.

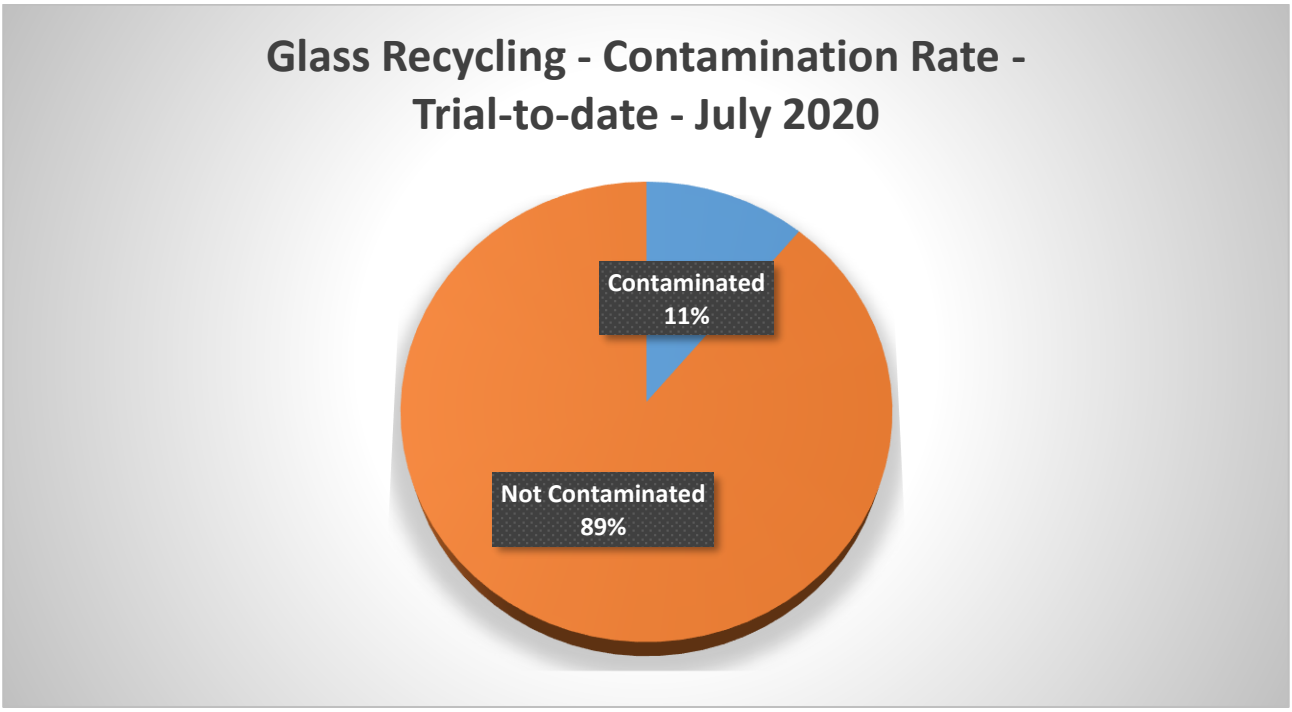
For that reason, utilisation across the communal glass service is better reflected by the total volume of material collected than the average rate of fill.

14. Contamination

Kerbside Glass Recycling

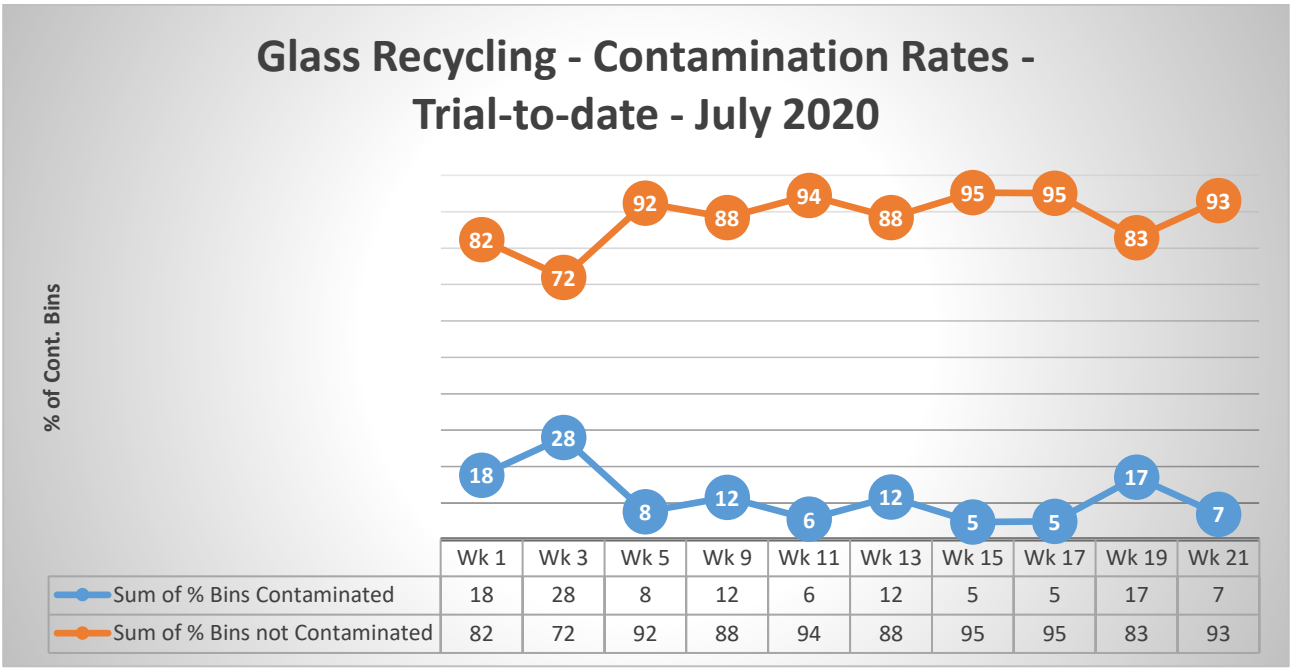
The total contamination rate average trial-to-date for the kerbside glass recycling trial concluded at 11%.

Contamination was measured as a percentage of total bins out for collection, and not the material itself. Meaning, if a bin was out for collection and contamination was found, the bin as a whole would be flagged as contaminated, instead of recording an assessment on the amount of contaminating material found in proportion to the overall contents of the bin.

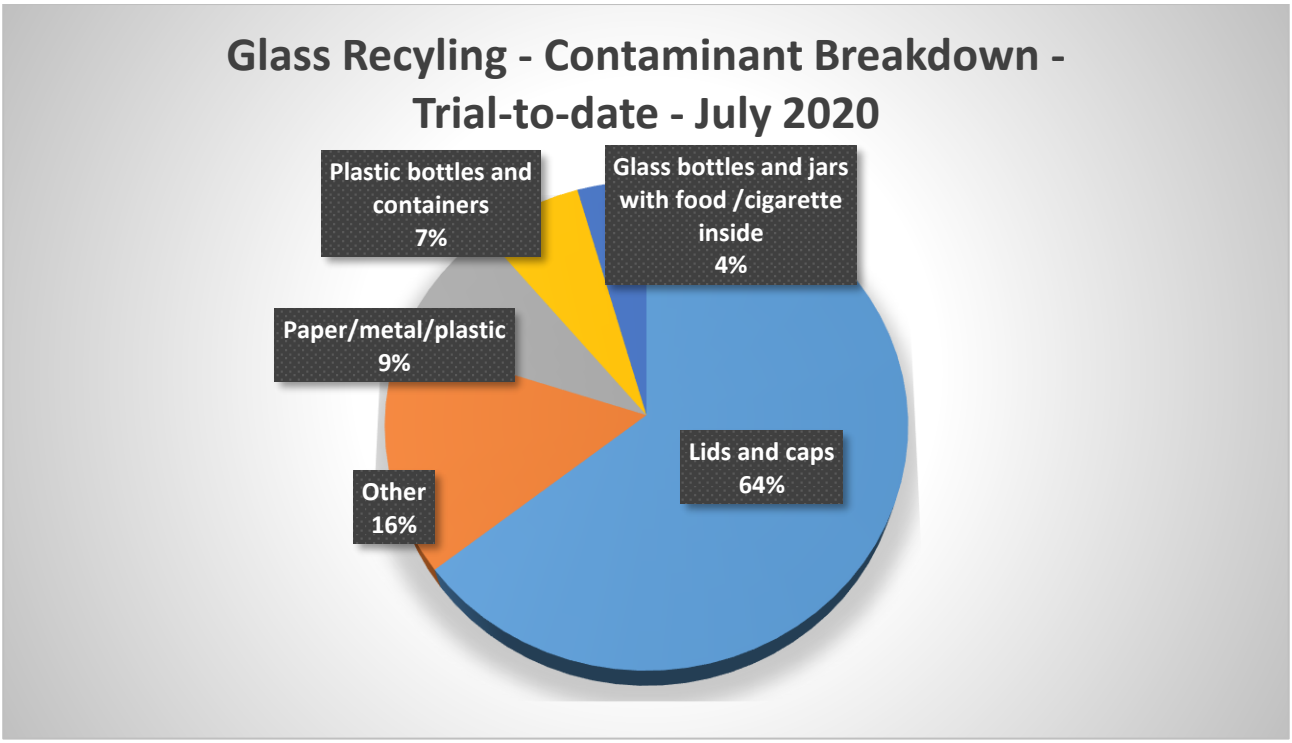


Across the trial's length contamination fluctuated, with the highest rates being recorded at the trial's start (week one and three) as residents adopted to the new recycling service, and existing recycling behaviours were amended.

By the third month, or mid-point of the audited timeline, trial participants seemed to adopt to the requirements of the glass service, and contamination rates stabilised, dipping as low as 5% each week.



In terms of material responsible for causing contamination, the presence of lids and caps on glass bottles were overwhelmingly the primary cause, composing 64% of all contamination.



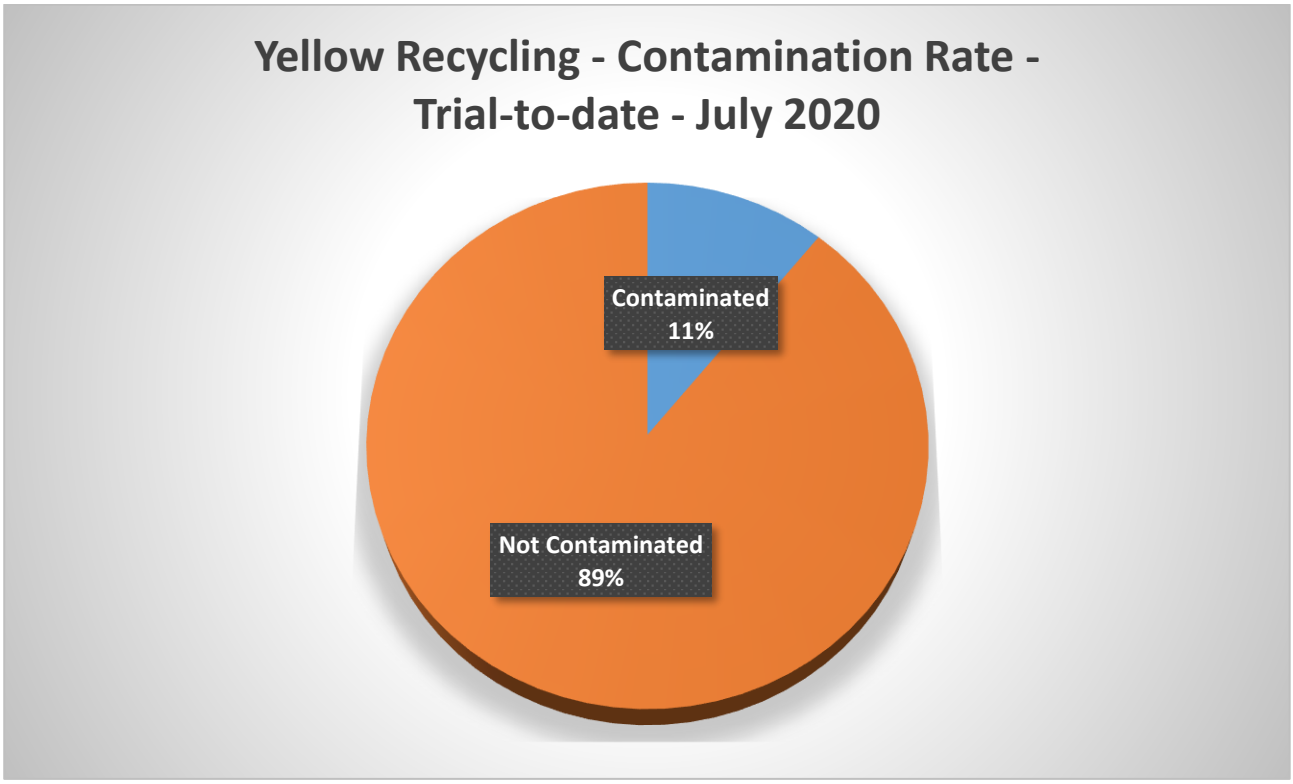
An "Other" category was the second most common cause of contamination, accounting for 16% of contaminated bins through a combination of non-recyclable glass (pyrex, vases, mirrors), ceramic plates, and several residents who used the glass recycling bin in place of a FOGO or waste bin and filled it with the wrong materials entirely.

The presence of lids and caps (left) were the primary source of contamination through the kerbside glass trial's length, but there were still instances where participants utilised the glass recycling bin for non-glass material altogether (right).

Kerbside Yellow Recycling

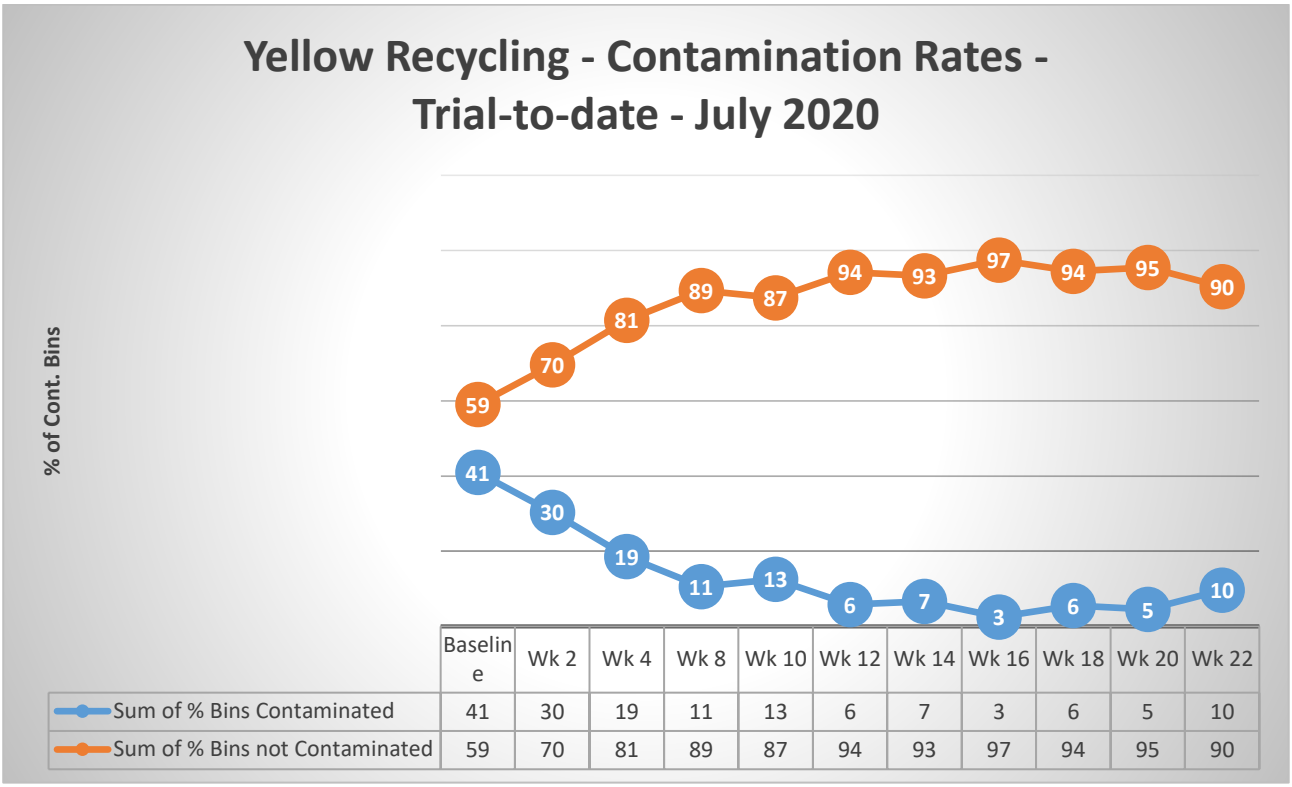
Given the yellow recycling service was in place in Garden City before the kerbside glass recycling trial commenced, officers were able to perform baseline audits, and captured the pre-trial contamination rate at 41% across the trial area.

Through the duration of the kerbside glass recycling trial, in which efforts were made to continually reduce contamination in the yellow recycling stream, the project delivery team managed to produce a trial-to-date contamination rate of only 11% -- a 30% contamination reduction against the baseline average.



Perhaps more impressively, the consistent approach of auditing the yellow recycling bins, flagging contamination where apparent (including the presence of glass), issuing bin tags and educational material, and halting collections on contaminated bins saw the weekly contamination levels drop to just 3% in the later stages of the trial's auditing period.

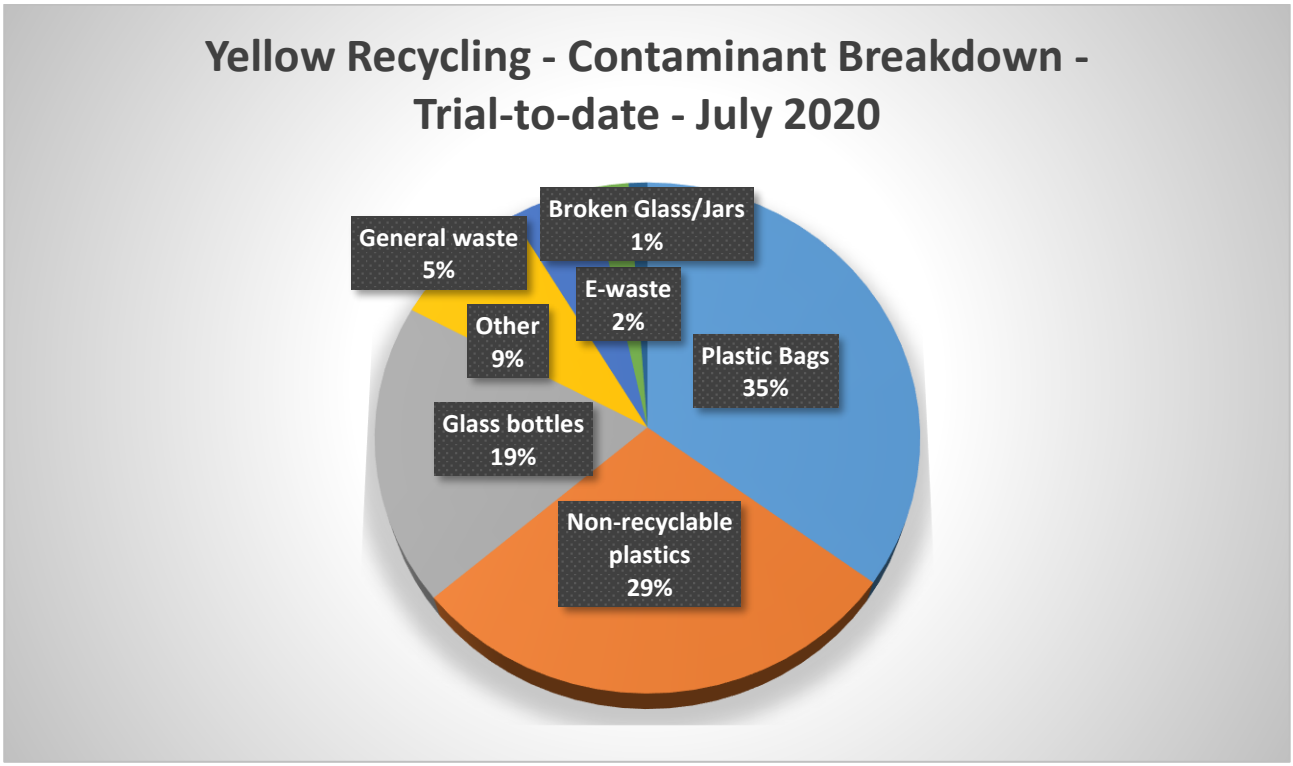
On the whole, Council's recycling processor typically requests all Victorian Council's aim for no more than a 10% contamination rate in order to optimise recyclable material for future recycling markets. In the ten available auditable weeks, Council achieved a 10% or under contamination rate six times.



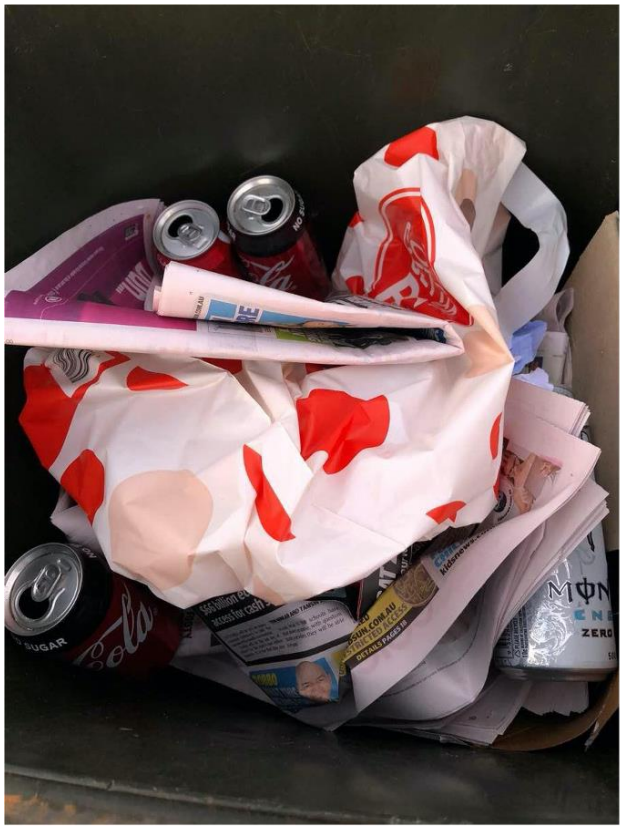
	Baseline	Wk 2	Wk 4	Wk 8	Wk 10	Wk 12	Wk 14	Wk 16	Wk 18	Wk 20	Wk 22
Sum of % Bins Contaminated	41	30	19	11	13	6	7	3	6	5	10
Sum of % Bins not Contaminated	59	70	81	89	87	94	93	97	94	95	90

Where contamination was present, the presence of plastic bags proved the primary culprit, accounting for 35% of all contamination. Non-recyclable plastics accounted for the second highest category at 29%, meaning 64% of all contamination fell into the soft plastic/non-recyclable plastic category.

In talking with residents, it seemed many were unclear on the processes around soft plastics, and couldn't quite estimate which items were and weren't recyclable. Though supermarket shopping bags and household garbage bags were the largest source of plastics, food wrappers including those used for biscuits or chocolate bars were prevalent as well, alongside biodegradable bags that certain residents had purchased believing them to be a more eco-friendly, recyclable option.



Soft plastics are likely to remain a challenge in the yellow recycling stream for residents, and Council may have to find creative ways of engaging with residents to provide some clarifying guidelines.



Though plastic bags were the main contributor to yellow recycling contamination (left), it was not uncommon to find additional materials buried through the recycling contents. Here (right), a full bin audit revealed glass bottles, food organics, soft plastics, and plastic-coated steel.

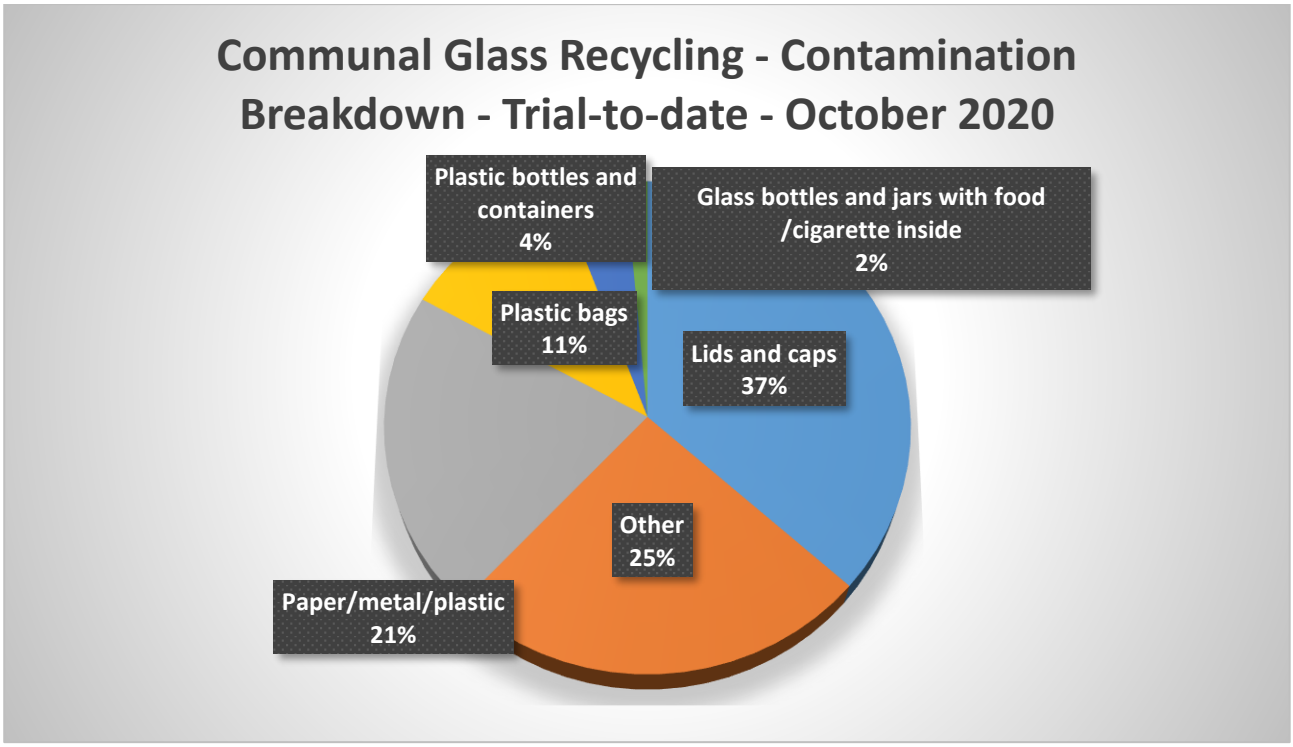
Communal Glass Recycling

Contamination across the communal glass recycling service was monitored differently to the kerbside component, owing to low bin, high volume distribution, and the challenges involved with thorough auditing.

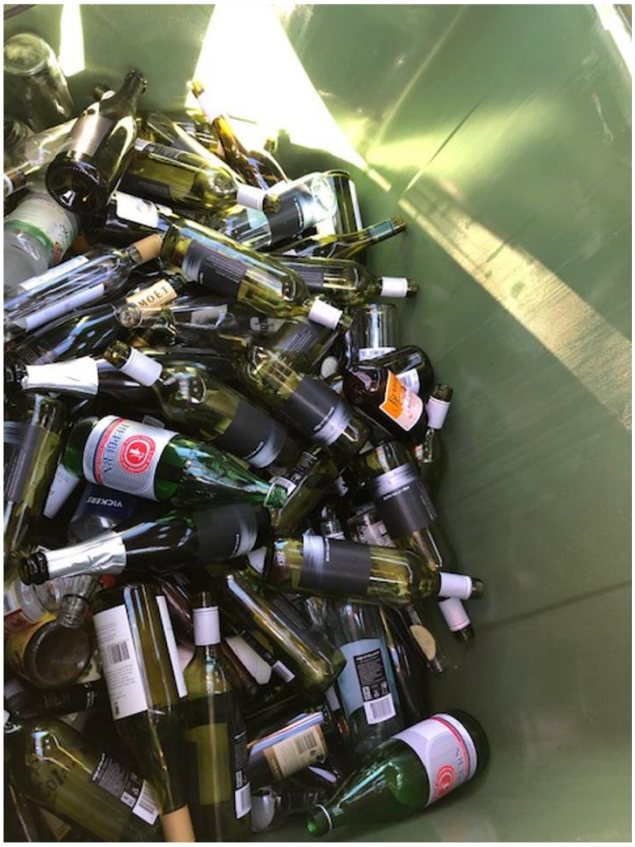
While the kerbside glass and yellow recycling bins allowed for both flip top and full audits throughout the length of the trial, often revealing hidden contaminants and improving audit records, tipping a 660 litre bin of its glass provided too large a risk for Council's auditors. Instead, flip top audits were consistently applied, and material reports were sought from Council's glass recycling facility to crosscheck audit records against end contamination rates.

Against that auditing model, contamination was tracked as a percentage against total glass material collected, instead of against total bins out for collection, as was the case in the kerbside and yellow recycling bin components of the glass recycling trial.

Trial-to-date, 16% of bins audited contained contamination, but the true contamination rate across the communal bin sites as a volume of material collected hovered between 2 -5 % of total material.



Lids and caps again provided the largest portion of contamination with 37%, followed by "other" which included coffee cups, tissues, drinking glass and dog poo -- owing to the public parks in which the bins were located.



The presence of lids and caps was often enough to mark a communal glass recycling bin as contaminated, despite the prevalence of otherwise clean, recyclable glass.

15. Customer Response

Despite several attempts to engage with residents pre-trial rollout, alongside the written offer encouraging residents within the kerbside area to 'opt-out' should they not wish to participate in the eight month glass recycling trial, resident reaction post-rollout still appeared severe. One portion of residents vocally supported the trial and encouraged Council's initiative in exploring additional avenues for recycling, while another portion of residents remained overwhelmingly sceptical, resistant, or unaware of the trial at all, despite Council's pre-trial engagement.

Among the initial responses to the trial, many residents feared the trial would result in a direct increase in their yearly rates. Some believed audits would result in fines, akin to parking fines issued within the municipality for illegal parking, and many, in the wake of the SKM Recycling collapse and the mainstream media attention it brought, believed there was no use in separating recycling material at all, believing all material would be disposed of in landfill post-collection anyway.

Once audits began, a small portion of residents expressed their concerns over privacy issues, believing the flip top and full bin audits were a direct violation of their privacy. Bin

ownership was a common belief among residents, despite Council owning all bins, and a small portion of residents remained irate, abusive, and verbally confrontational throughout the trial any time they witnessed auditors inspecting their bins, or flagging their bins for contamination.

As the audits continued, auditors were able to engage with many residents one-on-one and face-to-face and address many of their concerns. Many residents stated they were unaware of the trial, despite the initial two letters, and some had briefly read the letters, but disposed of them soon after without absorbing any trial information.

Social media posts, although great for the wider branding of the trial and service, did little to engage with participating residents, and often failed to deliver key intel to Council's intended audience.

Throughout the trial, residents were invited to voice their feedback officially via ASSIST and/or online options. And, during the initial 4-6 weeks of the trial, as many as ten to fifteen residents per day did, voicing their complaints, queries or questions to Council's waste department.

Those queries primarily consisted of general recycling queries including the question of why recycling mattered in the first place, queries around what can and cannot be placed within each of the recycling bins, and general information queries about the trial itself.

Each query served as a reminder that although two pre-trial letters had been delivered to residents alongside a welcome pack that included a collection schedule and *Don't Waste It!* recycling guide, and collateral had been placed on each of the kerbside glass recycling bins, and in spite of digital postings on both Council's website and social media streams, residents

still remained ill informed, and Council's communications strategies still failed to engage with a large portion of the kerbside glass recycling trial participants.

A direct engagement strategy, delivered by onsite auditors and the Waste Technical Officer within the Waste team, aiding in closing the gap between Council's initial attempts and resident absorption, and helped uplift residential support for the trial by around the eight-week mark.

Conversely, little engagement was required for the communal bin component of the glass recycling trial. Residents were informed pre-trial via a letter drop, and each site was broadcasted across Council's digital platforms, but little engagement was required with residents to achieve the high utilisation rates across the four communal sites.

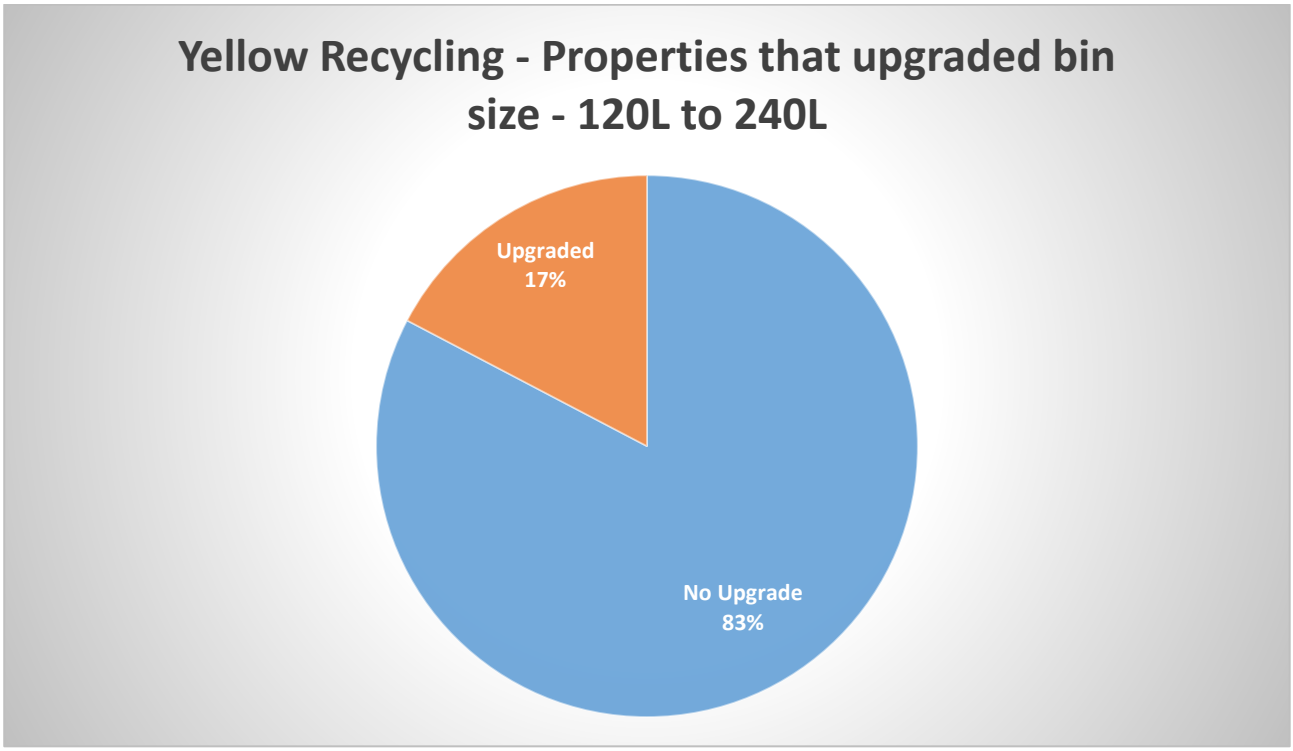
16. Yellow Bin Upgrades

The introduction of the glass recycling service across the kerbside component shifted the existing yellow recycling collection from a weekly schedule to a fortnightly schedule within the Garden City trial area, with yellow recycling collections occurring on alternate fortnights to the newly introduced glass recycling bins.

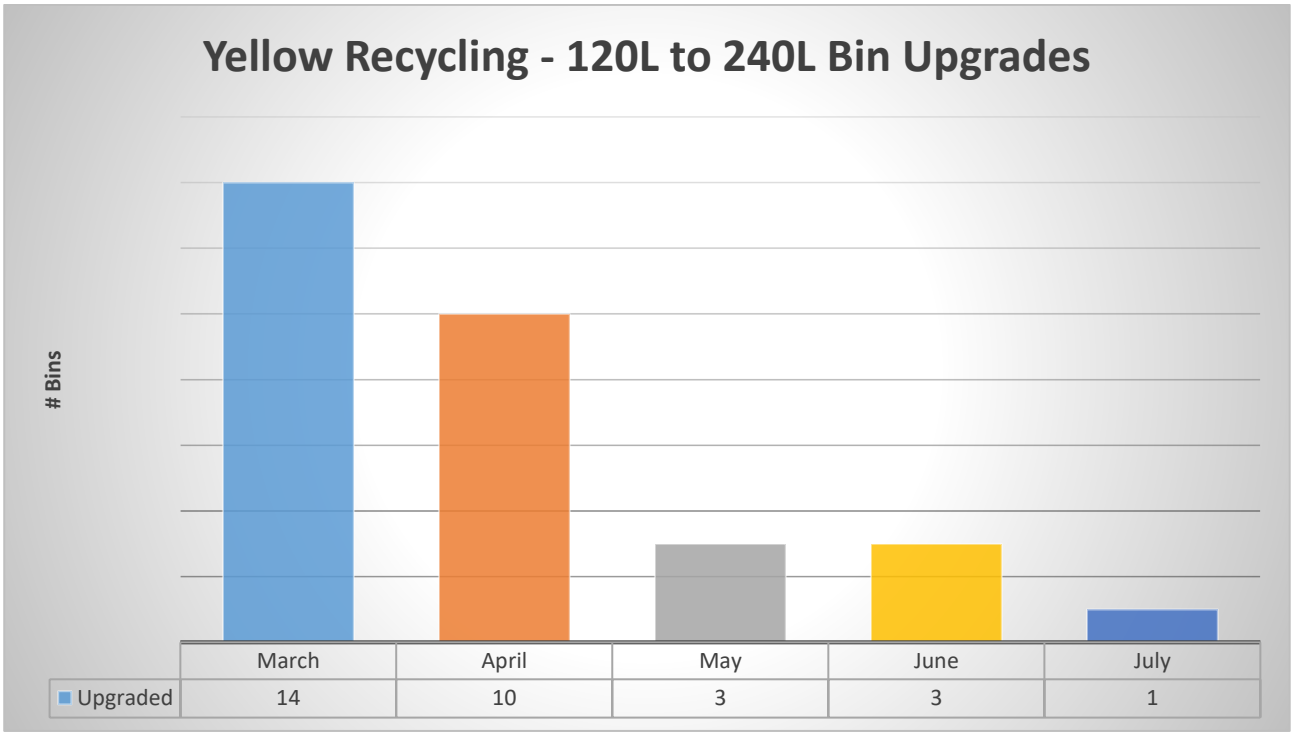
During the first two months of implementation, some participants, particularly those with larger households, struggled with the volume and storage of their yellow recycling material, often filling their existing 120 litre yellow recycling bins within one week, and having to hold that material until week two, until the scheduled collection took place.

To improve the experience for trial participants, and the promote continued support for both the glass recycling trial, and sustainable recycling behaviours, residents were encouraged to increase the size of their yellow recycling bins as needed, from 120 litres to a 240 litre option, which was supplied without charge, and delivered as needed by Council.

Through the length of the trial, a total of 31 residents opted for the larger yellow recycling bin, representing 17% of total trial participants.



Of the residents that opted for the yellow recycling upgrade, 77% selected the upgrade within the first two months of the trial. By the time the trial stabilised entering its third month, only 7 additional participants required the larger bin.

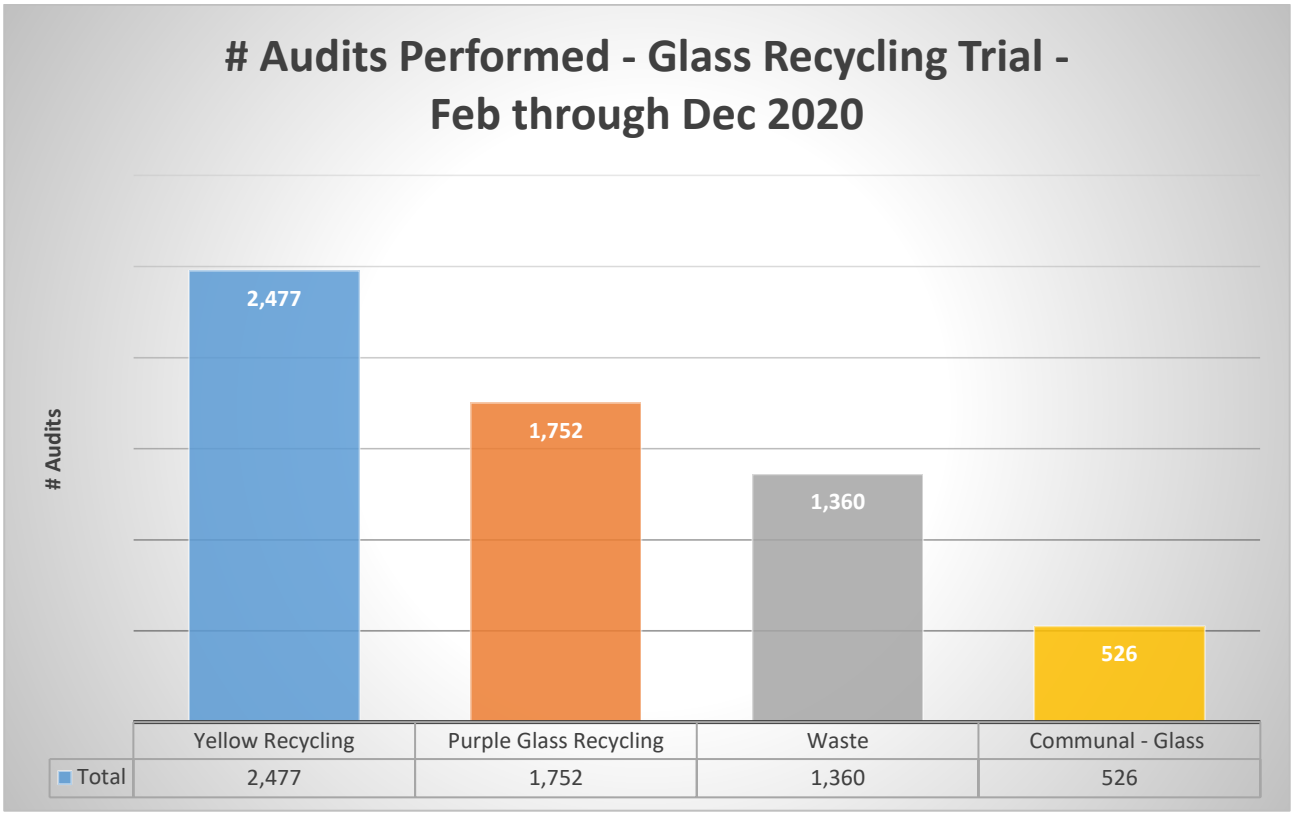


17. Database

The use of data, and Council's data-capture platform Konect, played an integral role in the successful delivery of the glass recycling trial and its outcomes.

In total, from the baseline audits performed in February 2020 through to the post-trial audits performed in December 2020, Council auditors performed a total of 6,115 bin audits, building the largest residential bin-use database in the City of Port Phillip's history.

Of the captured data, a total of 2,477 audits were performed on kerbside yellow recycling bins (40%), 1,752 audits on kerbside glass recycling bins (29%), 1,360 audits on kerbside waste bins (22%), and 526 audits were performed across the communal glass recycling bins (9%).



That data not only proved critical in measuring key metrics around utilisation, contamination, and bin-fill levels, but also aided residential engagement in a multi-tiered frontline manner.

Where auditors attended a site and flagged contamination, the database allowed Council's auditors to quickly review past instances of contamination, if any, and tailor their response to suit the resident's needs. If contamination persisted, and seemed to hold some central cause (soft plastics, for example), auditors were able to contact the resident, highlight the ongoing issue, and provide evidence of the cause in an effort to collaborate with the trial participant, and produce improved and sustainable recycling outcomes.

Likewise, where residents discovered their recycling bins had been flagged with contamination, and opted to contact Council's waste department for further information, Council's waste team were able to quickly review the contamination record, alongside photo evidence that could be shared with the resident live within the call, in a manner that acted as a training aide to deliver improved and tailored recycling education with view to achieving improved recycling behaviours.

It should be noted that no personal or private information of residents was stored within Council's bin-audit database. Bins were allocated against residential addresses, and the bin serial number was listed alongside a QR code that'd been fitted to each bin. Each audit, built from that foundational data, was stored against the bin record (and thereby address record) only. No residential or personal details appeared anywhere within the bin-audit database. And no personal or private information was ever recorded, shared or broadcast.

18. Monthly Reporting

In order to provide data-driven educational responses to behavioural fluctuations among trial participants, the trial's data had to be captured, analysed and actioned within a relatively short timeframe.

Through the use of Konect, auditors could assess how often contamination was occurring at each individual property in the live environment, and could reflect on whether issues of contamination were isolated instances, or repeat patterns of behaviour.

Through the use of Konect's records function, auditors could also view photos of past contamination to review key causes, and isolate the kinds of material contributing to each household's issue.

To view the trial area on whole, however, a larger scope of analysis was required, and was provided through the use of monthly reporting.

Each month, throughout the length of the trial, a report was prepared to showcase the trial-to-date utilisation rate, contamination rate, and average fill levels across the kerbside and communal components of the glass recycling trial. That report included core details on the progress of the trial, analysis of the trial's data, and intel captured from the auditors and project delivery team's communication and experience to highlight those items or issues not specifically addressed within the data capture.

May's Update

The end of May marked the completion of the first thirteen weeks of the Glass Recycling trial in Garden City and thus far, it appears as if residents are improving their recycling habits each week, and settling in to an understanding that a contaminated recycling bin, be it glass recycling or yellow recycling, will inevitably lead to no collection that week. At least until the contaminated materials are removed.

At the beginning of the trial, marking contaminated bins, particularly the yellow recycling bins, was met with resident frustration and conflict. Residents would argue that they'd been filling their recycling bins without consequence the same way for years, and couldn't understand why they were now being penalised. That conflict occurred even when residents accepted that the material they were disposing in the recycling bins wasn't actually recyclable material.

Three months into the trial, however, and it appears we've succeeded in creating a 'recycle right' mindset amongst the residents of Garden City.

More and more residents now approach auditors each week to check in with the results of the Glass Recycling trial. Often, residents will present auditors with niche questions or seek clarity about what can and can't be recycled. And it's clear there's not only an increased understanding of what can and can't be recycled among residents now, but there appears to be more pride in taking responsibility for their individual household recycling collection.

Routine questions often presented to auditors include what constitutes 'soft plastics' and whether or not store-bought biodegradable bags can actually be recycled.

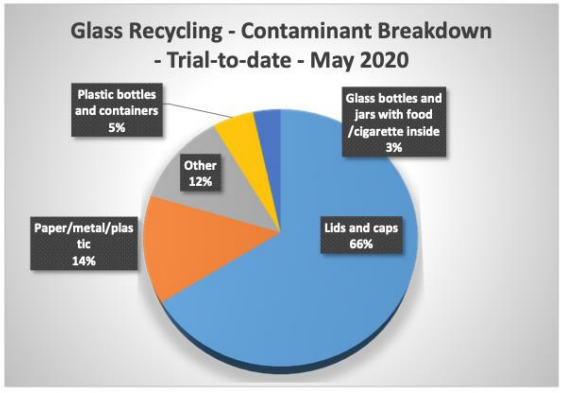
Utilisation of the yellow recycling bins also appear to have increased, either in response to more families working from home or in response to yellow recycling shifting to a fortnightly collection (likely a combination of both). Either way, when presented with queries around collection frequencies, auditors encourage the issue of a larger 240 litre recycling bin to prompt residents to continue their improved recycling behaviour. Auditors have even stood watch, at some residents request, to assist in disposing material between the various bins.

The popularity of the trial has began to rise with one resident who'd opted out originally now requesting to be included moving forward, and several residents from nearby areas contacting Council requesting the trial be extended to their areas and households too, praising the trial as a "great initiative" from Council, and stating their hopes that the trail will be rolled out en masse in the future.

Binita Shrestha
Waste Technical Officer

That information was collated in each month's report, then circulated to key stakeholders within the organisation as a means of showcasing the trial's outcomes relatively live and as they occurred.

Glass Recycling – Contaminant Breakdown



- Lids and caps remain the highest source of contamination in the glass recycling stream, recording 24 cases in March, 2* in April, and 13 in May. (Less audits were performed in April due to public holidays).
- In 5 of the 6 audited weeks, lids and caps remained the primary source of contamination. In week thirteen, paper/metal/plastic outweighed lids and caps with 4 recorded cases to 3.

Lids and caps from jars, wine bottles and beer bottles remain the primary source of contamination.

Where frequent lids and caps contamination is recorded, a 'No lids or caps' sticker is fitted to the bin lid, alongside the 'Oops...' educational tag.

Post-circulation, outcomes were reviewed by stakeholders, and feedback was invited by the project delivery team to ensure best practice remained at the project's forefront throughout the length of the trial.

19. COVID-19

Baseline audits for the glass recycling trial project began in the last week of February, several weeks prior to the impact of COVID-19 throughout metropolitan Melbourne.

For the first few months of the trial, the introduction of COVID-19 related restrictions had a minor impact on the delivery of the trial, and the behaviour of the trial's delivery team.

Council's auditors maintained correct social distancing as needed, and ensured all audits were performed in a safe and protected manner, utilising standard PPE (gloves, high-vis clothing, safety boots, etc), alongside COVID-specific personal protection equipment (masks, and sanitised equipment).

Though some residents expressed concern early on that auditors were still performing tasks in-field, the tasks themselves were conducted in strict compliance with organisational and state-wide safety policies related to COVID-19.

On 4 August 2020, following the escalation of local COVID-19 cases and the introduction of stage 4 restrictions throughout metropolitan Melbourne, an organisational decision was made to cease all in-field audits until restrictions had eased, and a safe working environment had once again stabilised.

Those restrictions did not ease until near the trial's end, and no kerbside audits were performed between August and the trial's conclusion in October 2020. Post-trial audits were performed in the kerbside area however after stage 4 restrictions had eased.

A secondary impact was also noticed throughout the trial's length. Municipal-wide waste generation appeared to grow substantially with the introduction of stage three and stage four restrictions, as more and more people were confined to their homes on a near round-the-clock basis, and home-delivery, for food and other items, became a new norm.

Though the increase in waste generation wasn't limited to the glass recycling trial participants, including those utilising the communal glass recycling bins, it would be difficult to untangle the behaviours that occurred throughout the trial's length and pinpoint which successes or failures stemmed from COVID-19 restriction-related behaviours, and which would've occurred as standard practice in the absence of those restrictions.

20. Noise Levels

During the communal component of the glass recycling trial, three of the four communal sites received noise complaints from neighbouring residents. Each site was inspected at the time of complaint as officers aimed to find short-term and long-term resolutions to the noise pollution issue.

The placement of each communal recycling bin presented a significant challenge. Locations needed to be public enough to encourage visitation, and provide easy access to residents within the surrounding areas, but needed to be far enough away from neighbouring homes to avoid unnecessary noise impact. Placing communal bins in areas with too much visibility -- major roads, or shopping strips, for example -- would likely invite contamination or illegal dumping from passers-by, yet placing bins in areas too far from residents would likely deter visitation altogether.

In aiming to find both short and long-term solutions to each complaint, officers examined domestic and foreign case studies from countries, councils and industry bodies utilising communal glass recycling services, and discovered residential noise is a common problem, even in the advanced European countries where the service has operated en masse for several decades.

The complaints themselves seem to hold two-tiers: noise generated when bottles are disposed of in bins; and, the noise generated when the bins are emptied with collection.

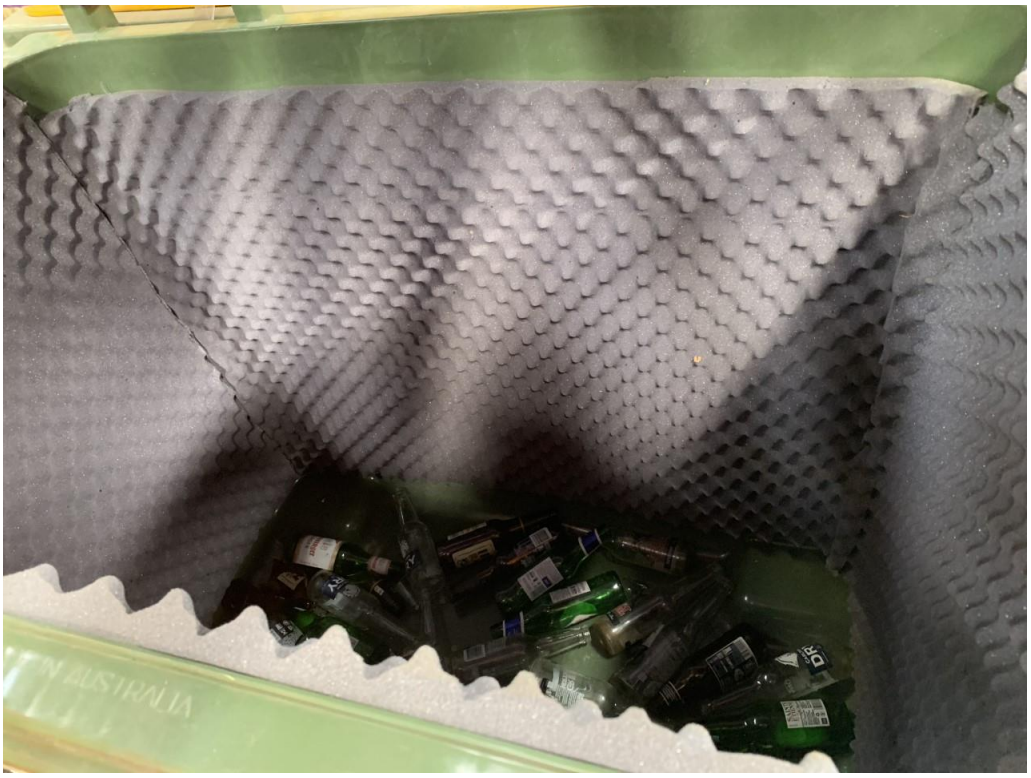
In regards to the latter, Council examined the *Noise exposure in glass collections for recycling* report published by WRAP UK -- a not-for-profit company established in 2000 with the aim of 'promoting and encouraging sustainable resource use through product design, waste minimisation, re-use, recycling and reprocessing of waste materials'[ii]. The report examined 21 recycling collection operations including kerbside, communal, co-mingled and bottle bank collection points, with the aim of gaining 'a more in depth understanding of the scale of the perceived problem of occupational noise associated with the different systems of kerbside glass collection'.[iii] Decibel levels were recorded across differing collection methods, and noise-cancelling measures were introduced, and assessed for their effectiveness.

Though the assessments made were thorough, the focus of the report was on the noise generated for workers performing the service more than any noise impact on nearby residents. Nevertheless, the report found that bottle banks and communal bins produced only slightly more noise than their kerbside component when emptied, and concluded that the introduction of rubber lining on the inner areas of the waste collection trucks themselves might be the most effective means of reducing noise at the point of collection -- though the final noise reduction is marginal.

Officers also consulted with domestic bin manufacturers to examine specialised options that might reduce noise. The market itself proved somewhat limited, given the newness of the glass recycling service, and a bin equivalent to the 660 litre options available across the communal bin sites weren't found.

Though officers continue to seek solutions for noise generated while communal bins are emptied, which, at the time of writing, is 1-2 times each week between the hours of 8am and 11am, a solution has been found to reduce the noise generated when disposing glass bottles in bins.

Investigation into possible noise reducing methods led to consultation with various musicians and automotive experts who suggested specialised lining akin to the type used in sound studios and motor vehicles to reduce noise pollution within cabins. Material was purchased and trialled across a communal bin, and decibel levels were recorded to measure the lining's impact.



Rubber matting was also installed at the entry points for bottle disposal. The rubber matting, once again pulled from motor vehicles, was fitted at the entry point with pop rivets, and positioned to minimise noise escape at the point of bottle disposal.

The introduction of inner lining and rubber matting produced an eleven-decibel noise reduction across the bins, as measured when empty and, partially filled. On whole, more material within the bin led to lower noise production.

Though it's difficult to assess what level would be optimal to satisfy residents without reducing recycling, the noise-reduced bins -- which have been placed across areas with the highest noise impact -- have thus far removed any additional noise complaints, hopefully resolving any negative impact residents might have previously experienced.

No noise complaints were received at any point during the kerbside component of the trial.

21. Wrap Up

In October 2020, four weeks before the conclusion of the kerbside component of the Glass Recycling Trial, letters were delivered to the homes of Garden City advising participants of the last scheduled date of collection. An invitation for feedback, likely through a survey, would've also been provided to residents early October, but Council elections within Port Phillip were still underway, and a caretaker period had been instilled limiting engagement with the community.

A second letter drop was performed during the last week of October, reminding participants of the trial conclusion date, and of the process required to leave their purple-lidded glass recycling bins at the front of their properties, complete with any glass content, for a final collection and retrieval.

Within those letters, a transition to business-as-usual was also provided, detailing future options for glass recycling within Garden City, and the process and collection dates for the yellow recycling stream as waste behaviours returned to pre-trial conditions.

An additional communal recycling bin was also delivered to Buckingham Reserve -- a public park that sits within the centre of the Garden City trial area -- and participants were advised of its location, and invited to utilise the communal option as a means of continuing their glass recycling commitments.

22. Survey & Results

The Mid-Trial Results

In July 2020, as the kerbside component reached its mid-point, participants were invited to provide feedback through a standardised survey equipped with the following five questions:

1. How satisfied are you with the glass recycling service?
2. Would you prefer a communal glass recycling option in a nearby area instead?
3. Are you clear on what contaminates the glass recycling bin?
4. Is there anything about this glass recycling trial you felt should've been improved?
5. What has been the most helpful guide to assist you in adopting the glass recycling process?

Of the 185 participants, a total of 25 responded to the survey, providing a sample size of 14%.

In response to the question *How satisfied are you with the glass recycling service*, 92% of respondents stated they were either satisfied or very satisfied.

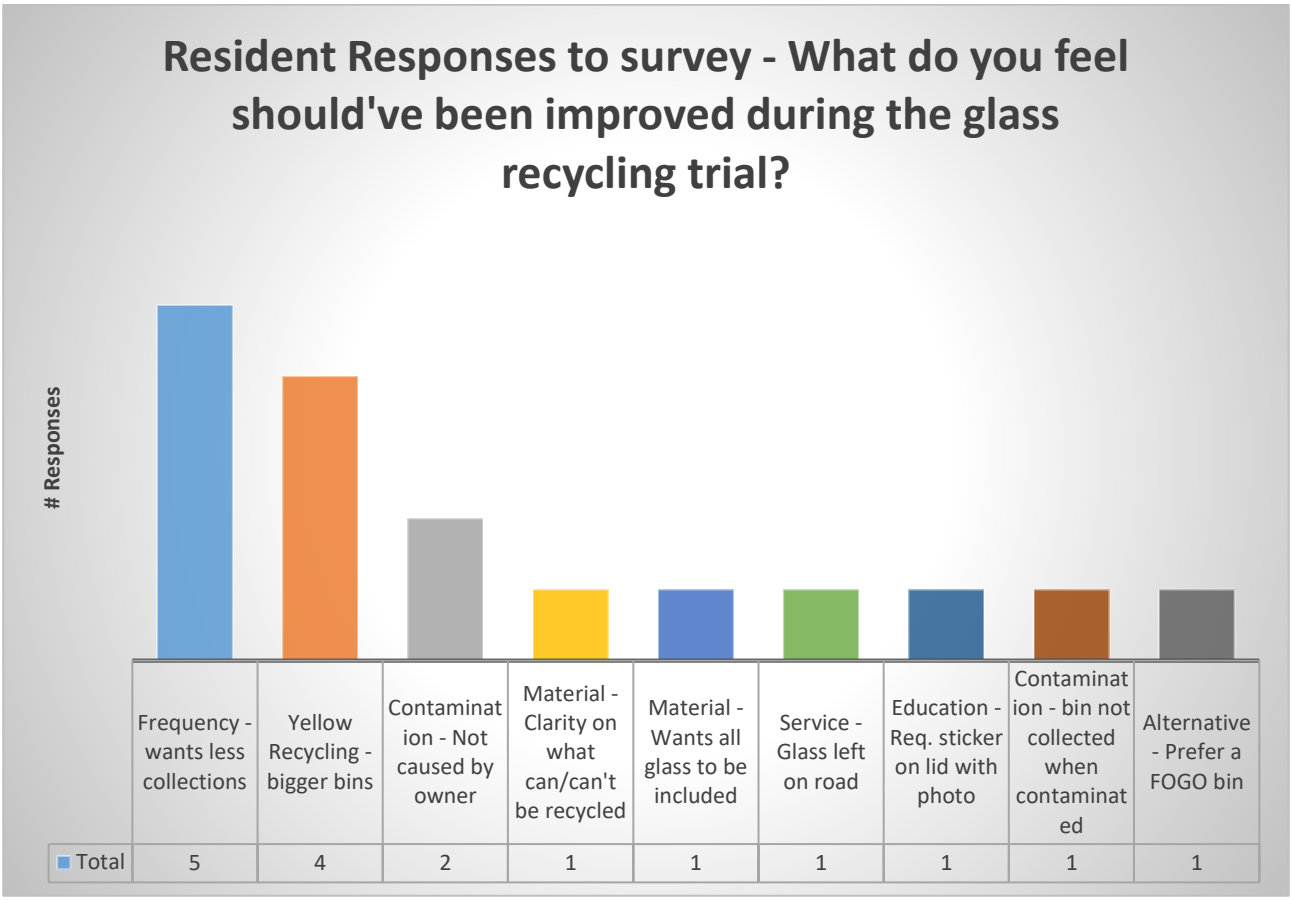
In response to the question *Would you prefer a communal glass recycling option in a nearby area* instead, 68% of respondents said no, while 32% were open to the communal option. It should be noted that at the mid-point of the kerbside component, most residents of Garden City would've been far removed from the presence of the communal glass recycling bins that operated in South Melbourne and Albert Park. It is unclear how different the response might've been had a communal option been present within Garden City at the time of feedback.

In response to the question *Are you clear on what contaminates the glass recycling bin*, 96% of respondents stated they held a clear understanding on what contaminated the glass recycling stream.

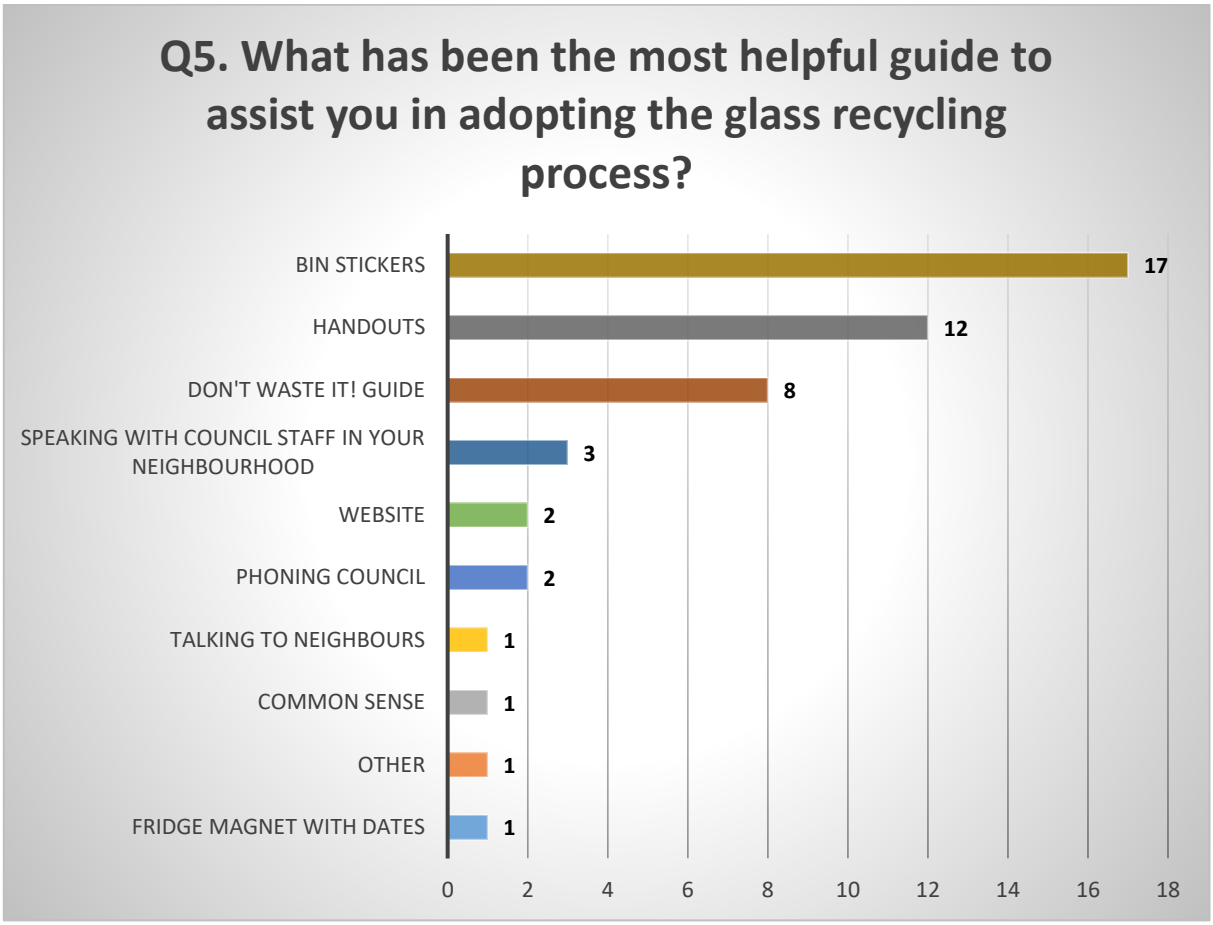
That response is not indicative of actual contamination rates trial-to-mid-point, but may be representative of the challenges Councils face between perceived understanding, and behaviour that represents actual acknowledgement for recycling requirements.

In response to the question *Is there anything about this glass recycling trial you felt should've been improved*, 52% of respondents provided a suggestion.

Of the 13 respondents who provided suggestions, 17 suggestions in total were recorded, with the two most common suggesting a monthly glass collection schedule (instead of the trial's fortnightly collection), and a request for larger yellow recycling bins. That request for larger yellow recycling bins, which were available to all City of Port Phillip residents throughout the length of the trial, might also be interpreted as a request for more frequent collections, given the trial shifted the pre-trial frequency from a weekly collection to fortnightly for the yellow recycling bins.



Finally, in asking respondents *What has been the most helpful guide to assist you in adopting the glass recycling process*, only 4% referenced Council's website or social media. Instead, 78% of residents listed their primary sources of information as stemming from either bin stickers and education tags fitted to the glass recycling bins (36%), handouts received throughout the trial (25%) or Council's *Don't Waste It!* guide, which provides recycling information for all residents municipality-wide (17%).



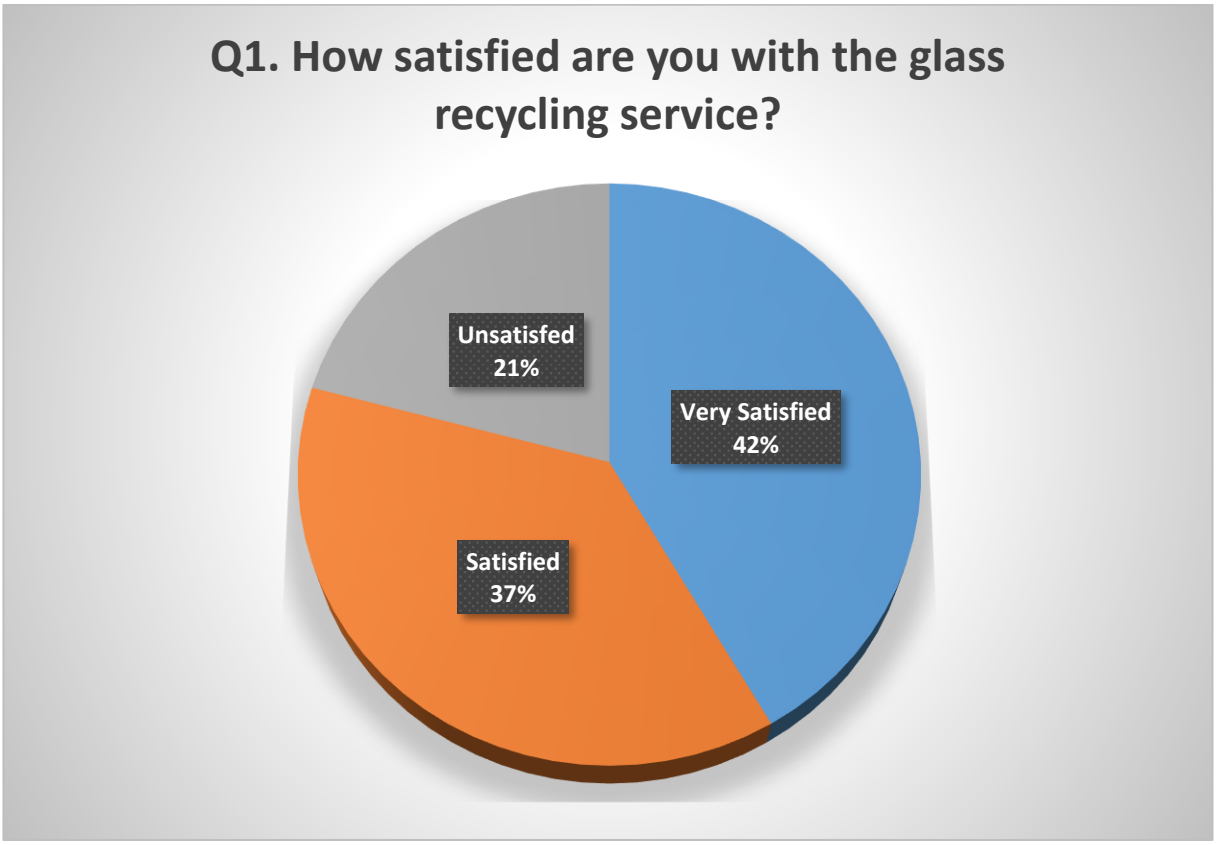
The End-of-trial Results

In October 2020, as the kerbside component reached its end and Council's caretaker period -- initiated by Council elections -- concluded, participants were once again invited to provide feedback through a standardised survey equipped with the following five questions:

1. How satisfied are you with the glass recycling service?
2. What was the highlight of the trial for you?
3. Do you have a clear understanding of what contaminates a glass recycling bin?
4. What was the most helpful guide in adopting the glass recycling process?
5. Is there anything about this glass recycling trial that could've been improved?

This time, of the 185 participants, a total of 24 responded to the survey, providing a sample size of 13%.

In response to the question *How satisfied are you with the glass recycling service*, 79% of respondents stated they were either satisfied or very satisfied, and 21% of respondents voiced their dissatisfaction.

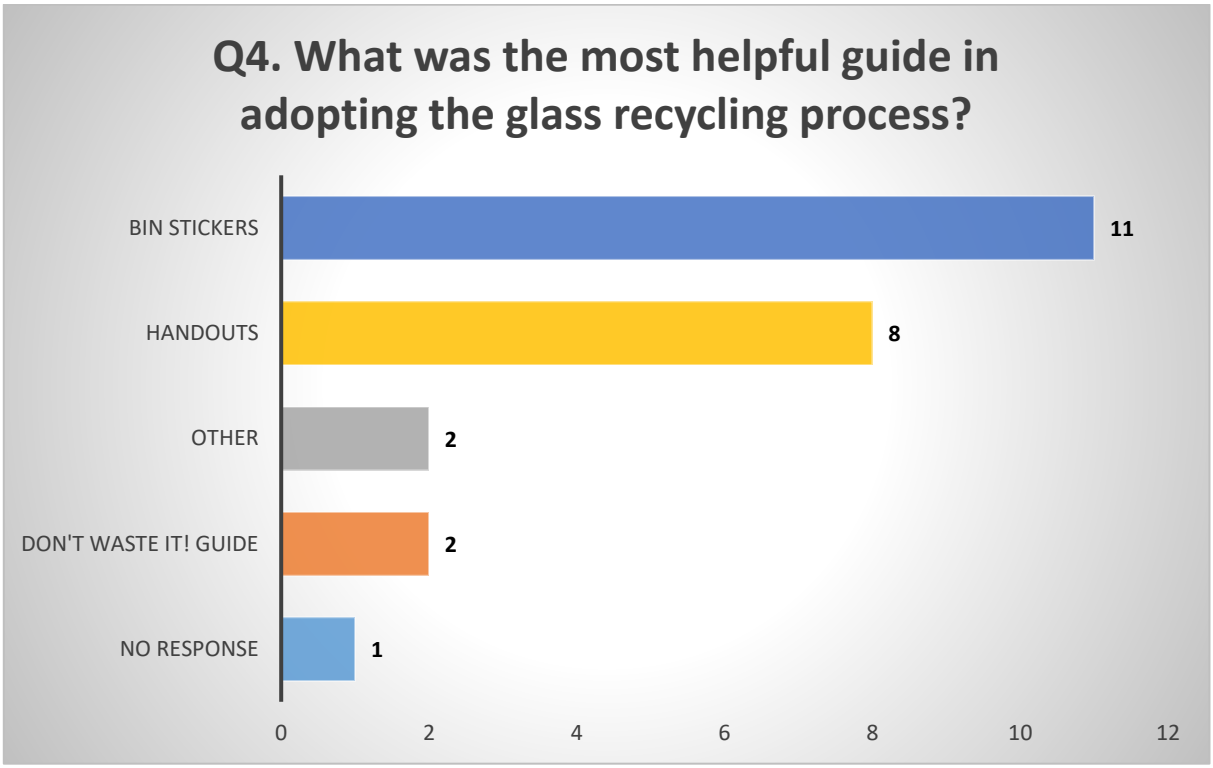


Of the 21%, which represented a total of 5 respondents, 2 believed their yellow recycling and glass recycling bins should still be collected when contamination is present, 1 requested a Food Organics and Garden Organics (FOGO) service instead of glass, 1 suggested no Victorian Councils had a need for a glass recycling service, and 1 believed the glass service should be kept, but collected less often.

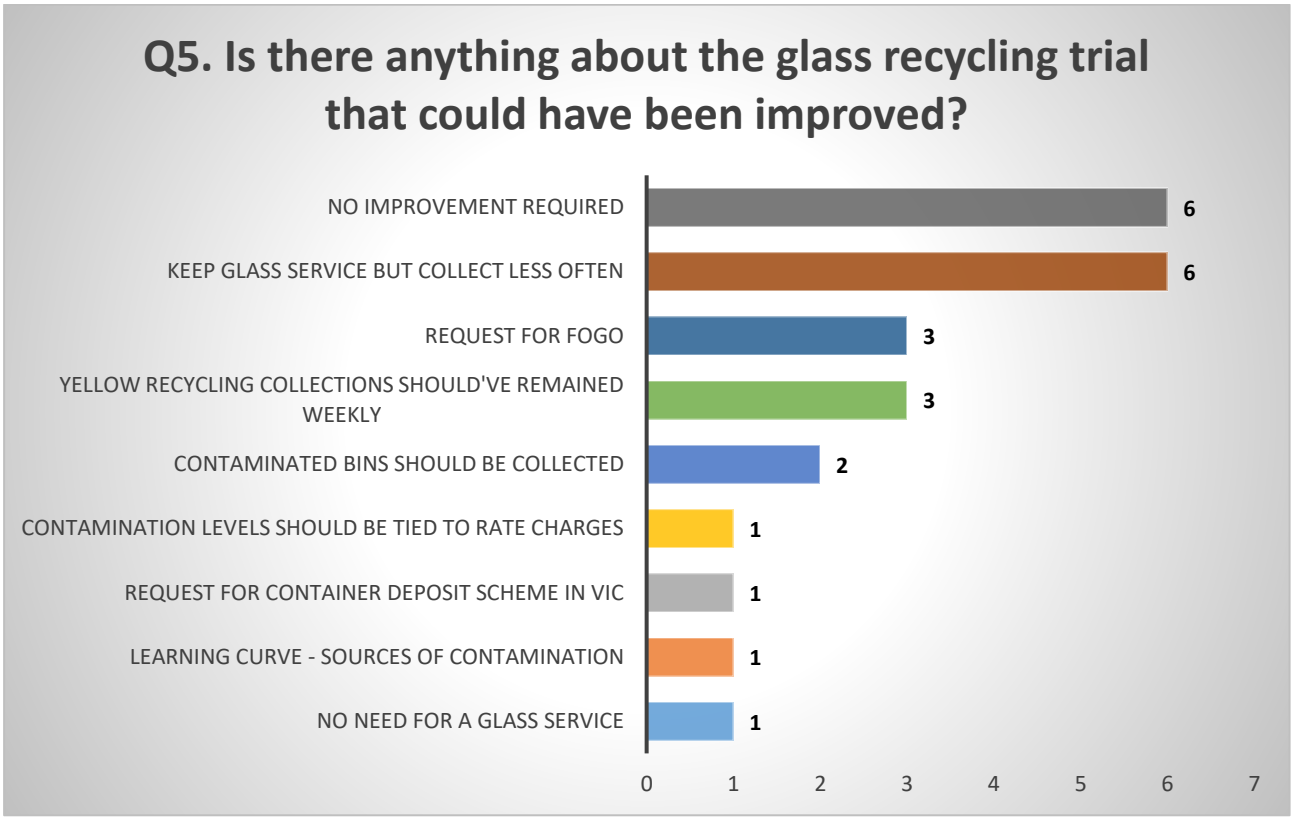
In response to the question *What was the highlight of the trial for you*, 50% of respondents stated maximising their household recycling was the number one highlight, 29% stated receiving a 'well-done' tag for recycling was their highlight, 13% stated a general improved understanding of recycling was their highlight, and 8% of respondents provided no response.

In response to the question *Do you have a clear understanding of what contaminates a glass recycling bin*, 100% of respondents stated yes, they do. For the sake of consistency, it should again be noted that the perceived understanding on recycling contamination doesn't necessarily correlate with reduced contamination in practical application and behaviour.

In response to the question *What was the most helpful guide in adopting the glass recycling process*, 46% of respondents stated their bin stickers were the most helpful guide, 34% claimed handouts, and 8% claimed Council's Don't Waste It! guide was the most helpful guide in adopting the glass recycling process.



And finally, in response to the question *Is there anything about the glass recycling trial that could have been improved*, 25% of respondents felt nothing needed to be improved, 25% wished the glass service would continue but at a monthly or bi-monthly frequency instead of each fortnight, 12.5% would've preferred a FOGO service to glass, and 12.5% believed the existing yellow recycling service should've remained a weekly and not fortnightly collection throughout the length of the trial.



Two particular pieces of feedback were also worth noting. One respondent suggested the yellow recycling service should've remained a weekly collection with the introduction of the glass recycling bin, but the existing waste service should've been shifted to fortnightly, and one respondent suggested fluctuating contamination rates should be represented through fluctuating household rates -- either increasing household rate charges, or decreasing household rate charges, as bin contamination varies.

23. Bin Recovery

On 30th October 2020, Council's waste contractor performed the final glass collection across the kerbside component of the glass recycling trial. Shortly after, at 7.30am, five Council officers attended Garden City and began the process of recovering the 120-litre purple-lidded glass recycling bins.

Though Council was hopeful they'd recover all bins, a decision was made prior to the wrap-up to forgo any bin that wasn't specifically present within the bin collection area of each participating property. No officer entered the premise of participants to recover glass bins that weren't placed outside, and the existing yellow recycling and household waste bins were left untouched throughout.

In total, 143 of the 182 glass recycling bins were recovered, creating a bin recovery rate of 79%.

The purple-lidded glass recycling bins were transported to Council's Operations Centre, where they were recorded as returned, and have been stored and/or repurposed ever since.

In the weeks following the wrap-up day, additional participants contacted Council requesting their purple-lidded bin be recovered. In each instance, officers attended Garden City to retrieve the purple-lidded bin without cost.

24. Thank you bottles

At the completion of the kerbside glass trial, the project delivery team wanted to extend their thanks and appreciation to participants in the trial area, and wanted to provide a gift that was reflective of the benefits of glass recycling.

Keep cups were examined as a potential item, but given their prevalence in the market, it was thought most participants would already own one or a nearby equivalent. Instead,

thank you bottles were designed with the City of Port Phillip logo, and a reference to the 2020 Glass Recycling trial.

On the wrap-up day, bottles were delivered to residents alongside a thank you note, and some key statistics from the trial including the total volume of glass that'd been recycled through the Garden City effort.

25. Post-Trial Audits

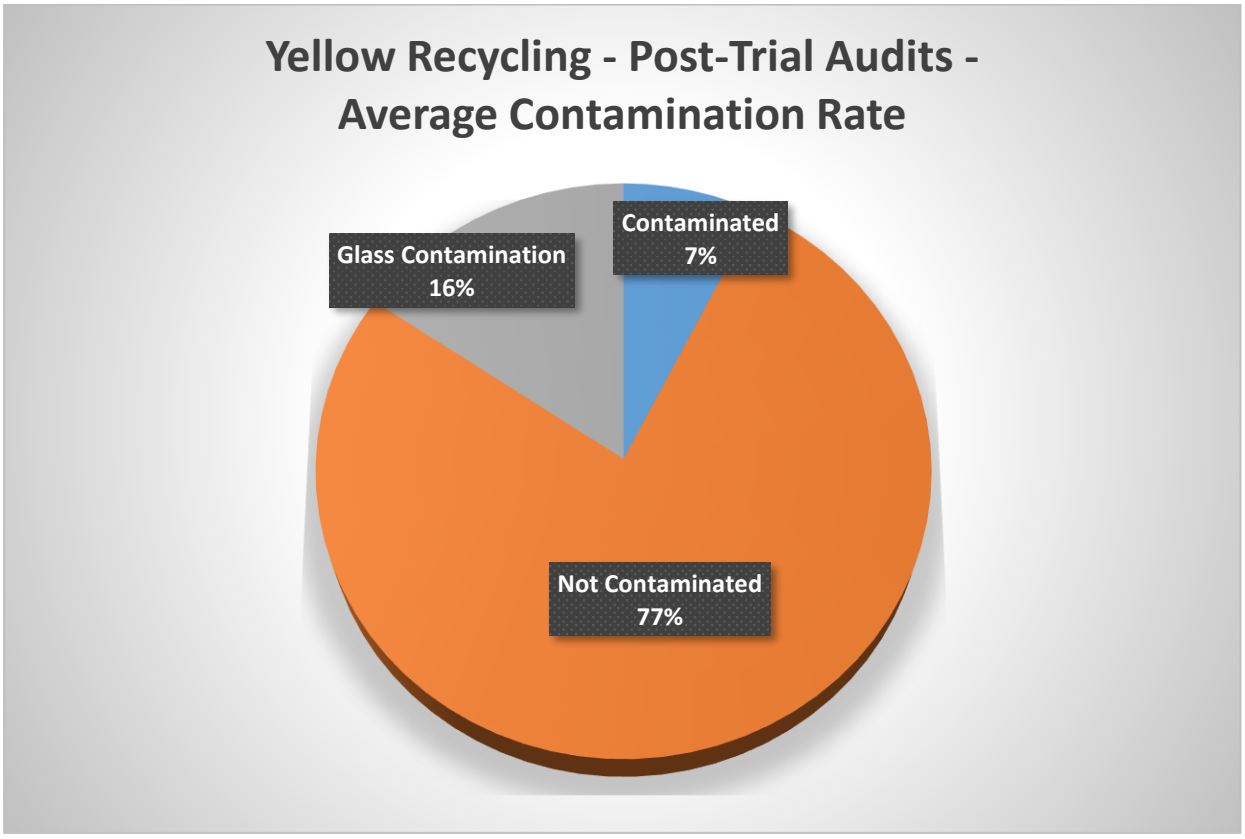
On the 20th November 2020, audits were performed once more across the yellow recycling bins in the trial area of Garden City to measure two traits:

- If the improved contamination rate across the yellow recycling stream would remain sustainable after the removal of auditors from the trial area (audits ceased early August 2020 in response to COVID-19); and
- If the introduction of a communal glass recycling option in the nearby Buckingham Reserve would prompt trial participants to continue their glass recycling by utilising the communal glass option.

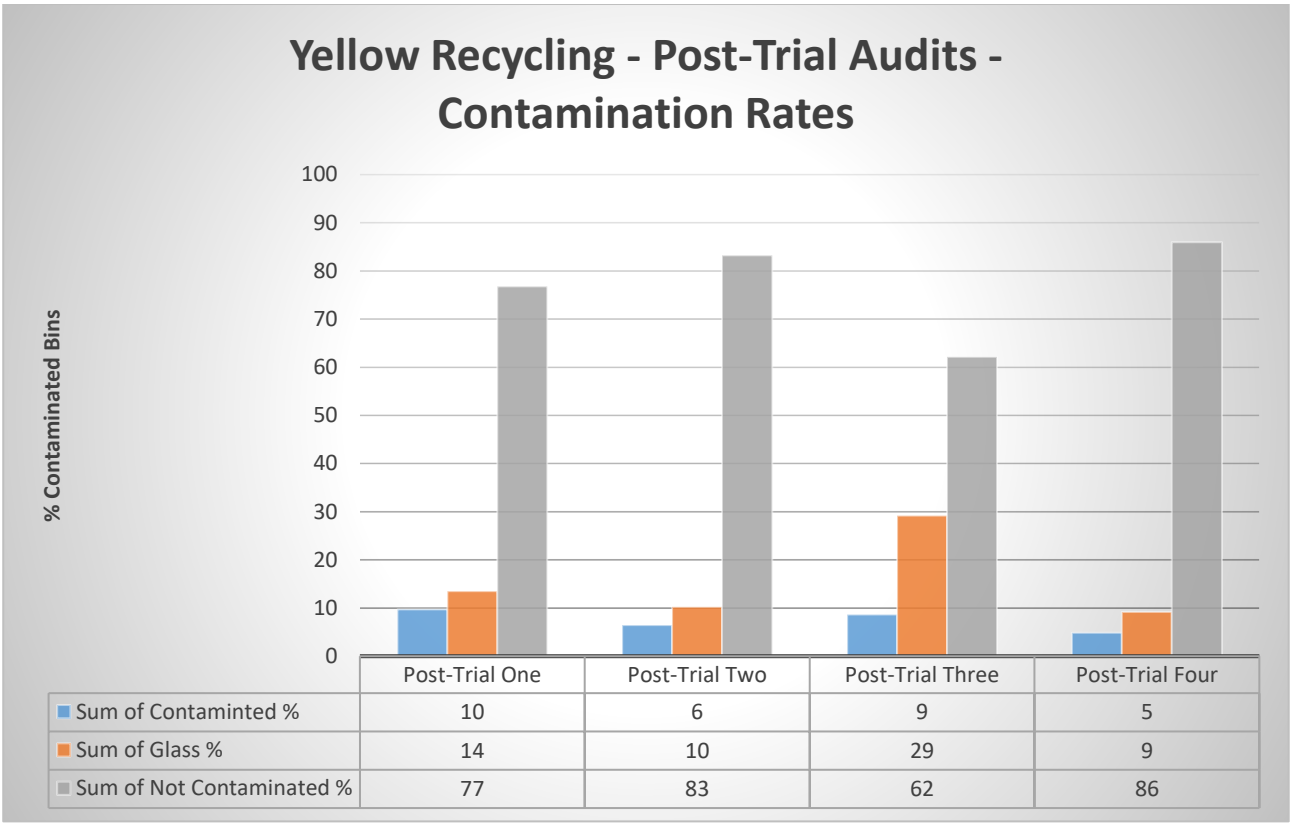
Across a four-week period, yellow recycling bins were audited, and contamination rates were measured. Given that auditors were measuring glass presence as a key component of the post-trial audits, where glass was present, auditors recorded the glass as a contaminant, but issued no educational tags, and collected the yellow recycling bin as norm.

In total, across the four-week post-trial audit period, average contamination in the yellow recycling stream, excluding the presence of glass, sat at 7% -- lower than the trial-to-date average of 11%, and substantially lower than the pre-trial baseline contamination rate of 41%.

16% of audited bins were found to contain glass material. Though the material was flagged for the purpose of reporting, glass in itself does not represent contamination in the normal stream of yellow recycling.

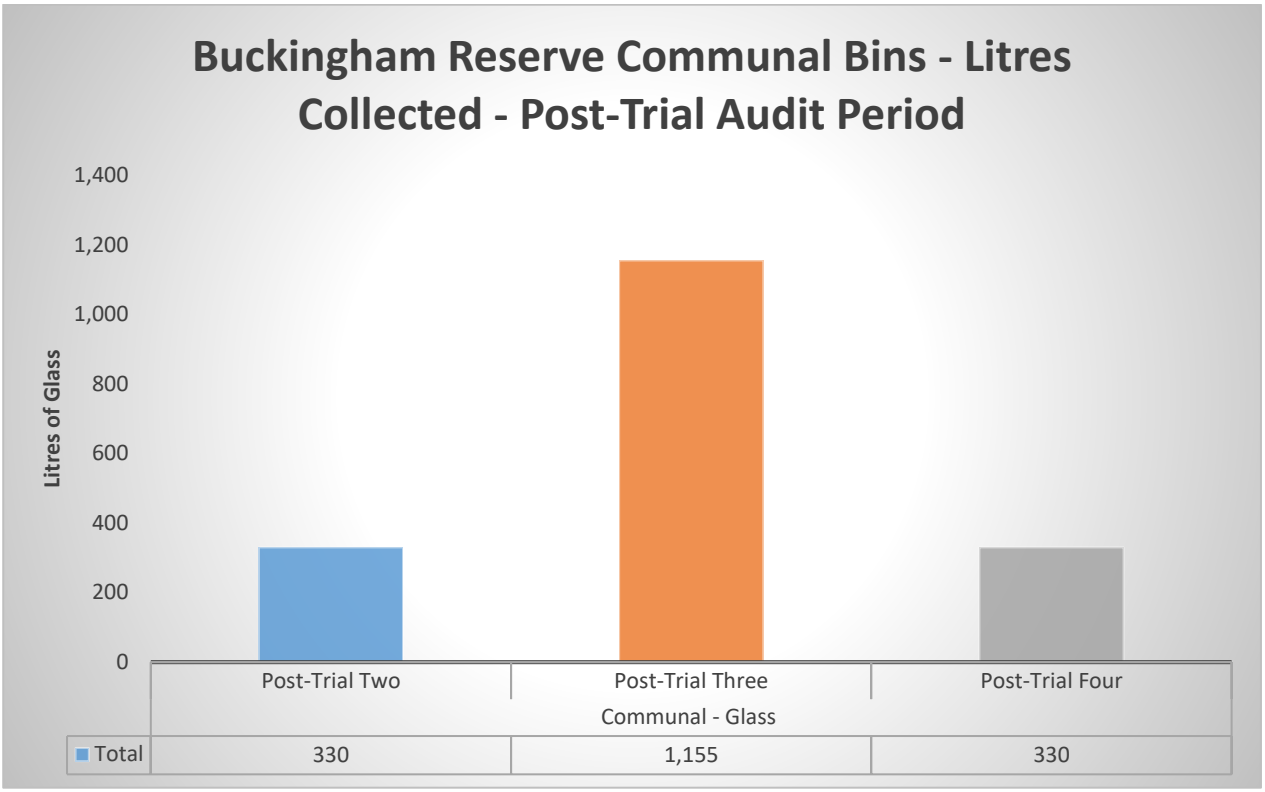


Across the four-week audit period, contamination rates remained steady, ranging between 10% in week one, and 5% in week four. Where clear contamination occurred in the yellow stream (the presence of plastic bags, for example), bins were flagged in the same manner as trial conditions, but all bins, contaminated or otherwise, were collected as norm.



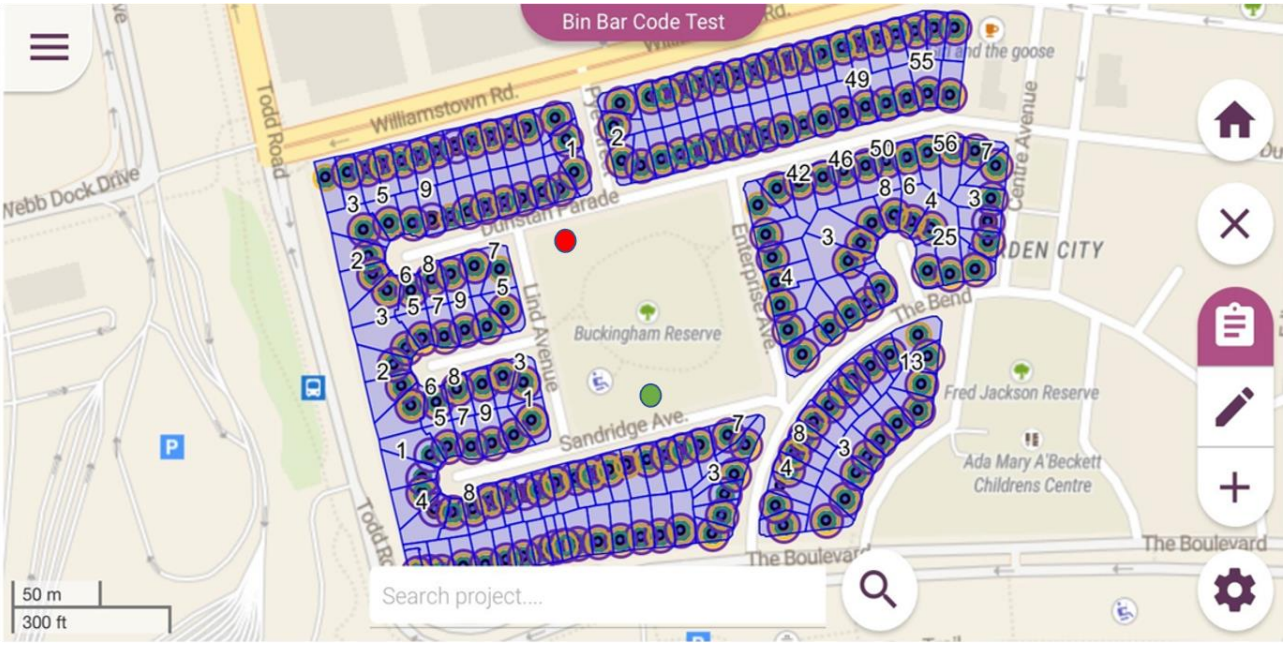
	Post-Trial One	Post-Trial Two	Post-Trial Three	Post-Trial Four
Sum of Contaminted %	10	6	9	5
Sum of Glass %	14	10	29	9
Sum of Not Contaminated %	77	83	62	86

Though the sustained reduction in yellow recycling contamination post-trial represents a staggering achievement in its own right, and one that would be beneficial to Council to replicate in other areas of the municipality, the secondary measure, namely whether glass recycling continued, and continued with the adoption of the communal glass recycling option in nearby Buckingham Reserve, is a little more complex.



Glass audits of the Buckingham Reserve bin (one communal bin at the time of the post-trial audits, though an additional bin has been installed post-post-trial audits at residents request) reveal the bin was being utilised across the post-trial period, but perhaps not as strongly as it could've been.

The placement of a communal bin option in Buckingham Reserve, which is the centre point of the Garden City trial area, provided a location that isn't more than a 500-metre walk for any resident within the trial area. Most residents, located inside the trial's boundary, would've been able to access the bin with a 50 - 300 metre walk. The post-trial results, and the prevalence of glass within 16% of audited bins, may be representative of the challenges Council face, and indicative of the model among residents -- those that are committed to recycling will utilise the communal bin option, despite whatever effort it might cost them, and those who aren't as strongly committed will opt for business-as-usual, unless there's an intervention point that sways them otherwise (Council audits, contaminated bins not being collected, etc).



Properties highlighted in purple represent the Garden City kerbside trial area. The red dot represents the communal bin introduced at the trial's conclusion, and the one present during the post-trial audits. A second communal bin (green dot) has since been introduced.

26. Communal Bins Post-Trial

The communal component of the glass recycling trial has expanded since the trial officially ended in October 2020, and continues to deliver value for the residents of the City of Port Phillip.

The communal trial began with four bins across four collection sites, and, at the time of writing, has expanded to include a total of twelve communal recycling bins, situated across seven separate sites in South Melbourne, Albert Park, Garden City, St Kilda West, and St Kilda East.

The number of bins within the existing sites has also grown in response to user demand.

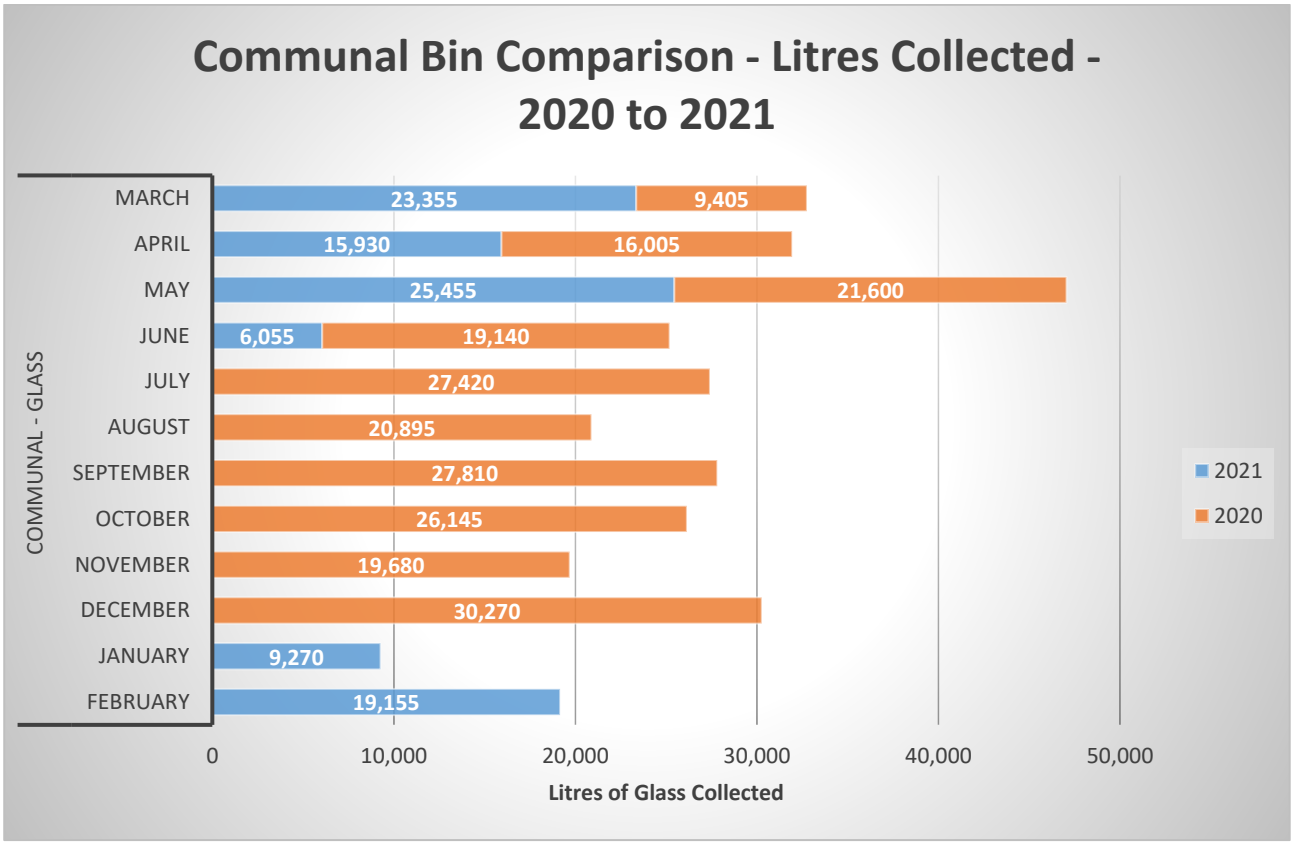
As at June 2021, the following sites possess the communal glass recycling service:

- Little Finlay Reserve – Albert Park
- Buckingham Reserve – Garden City
- Lyell Iffla Reserve – South Melbourne
- Corner of Park and Nelson Roads – South Melbourne
- Sol Green Reserve – South Melbourne
- Alma Park West – St Kilda East
- HR Johnson Reserve – St Kilda West

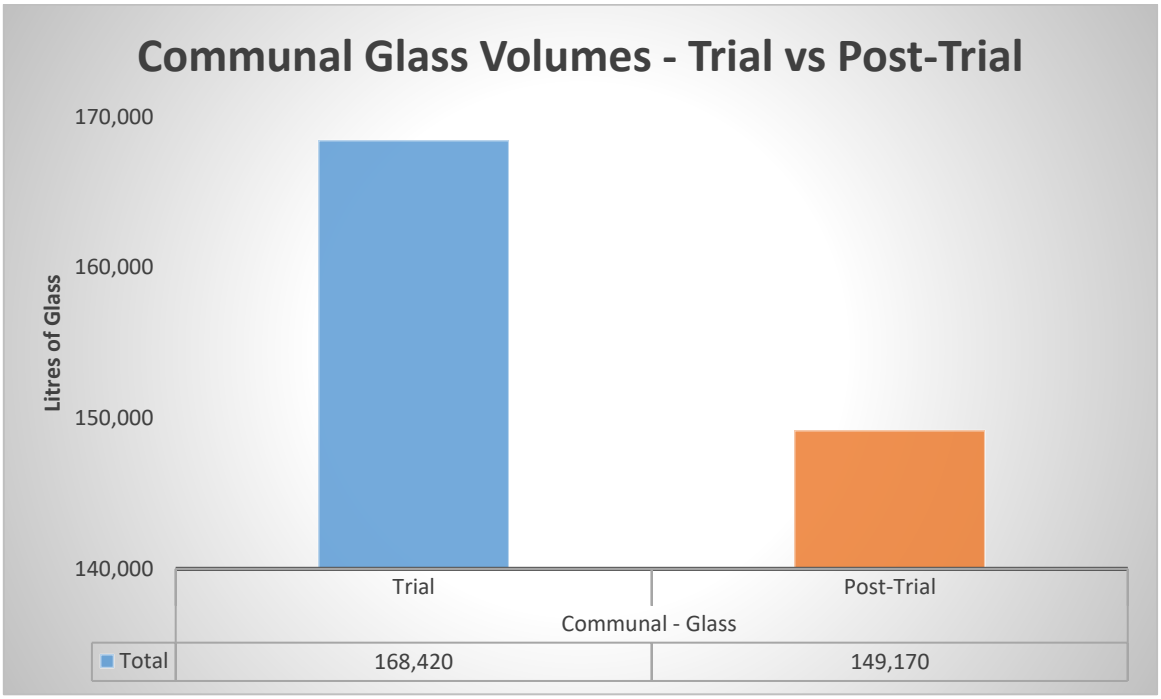
H.R. Johnson Reserve, St Kilda West

Alma Park, St Kilda East

Though it's too early to perform yearly comparisons on the communal service, comparisons across the months of March, April and May 2020 to 2021 can be made, and highlight that the total volume of glass collected has grown substantially year-to-year.



Comparing trial to post-trial collection volumes, which cover an eight month and seven month period respectively, shows post-trial collections remain strong, and, with another month of use to even the comparative timelines, will likely meet or exceed the in-trial collection rates.



It should also be noted that the volumes of glass collected seemed to fluctuate periodically. The summer months, which should have produced higher glass rates, coincided with the lifting of COVID related lockdown restrictions, and the reopening of hospitality venues. The winter months, both in 2020 and 2021, coincided with the introduction of COVID related lockdown restrictions, and limitation of trading across hospitality venues. It is unclear whether each factor produced an impact independently, or whether the combination of both lead to fluctuating glass use.

Photo taken in June 2021 reflect peak utilisation across the communal bin service – Corner of Park and Nelson. These bins are emptied twice each week.

27. Budget

Costs associated with the Glass Recycling Trial and its two components were funded through the existing Waste Management Services operational budget, and supported by

BAU. Given that the project was BAU funded, and not project funded, many direct costs were worn by existing allocations and weren't specifically allocated to the running of this trial.

For that reason, all costs provided are indicative only, and represent an approximate guide to assist future, comparative trials.

The cost of providing kerbside and communal glass recycling bins, including bin, collection & processing costs, the design, print and distribution of educational material, the annual licences for the Konect software and the printing of the associated QR codes for bins, all associated labour including auditing, residential engagement, and data processing, and Council vehicle use, has been estimated at $90,951.

No charges were incurred by residents of Port Phillip or the trial's participants at any point within or following the trial.

Readers should note that 100% of the trial's audits were performed by City of Port Phillip staff. Were the audits performed by third-parties, or Council's waste collection contractor, costs would've likely varied.

28. Industry Response

While the City of Port Phillip wasn't the first Victorian Council to launch a glass recycling service or trial, they were the first to launch it with both the kerbside and communal component, and were early adopters of the glass recycling service. As a result, neighbouring Councils and industry bodies often engaged with the trial team, eager to monitor the ongoing progress, and report it to the wider industry.

The Metropolitan Waste and Resource Recovery Group (MWRRG) were one of those bodies, and featured trial updates regularly through their Metro Waste News platform.

METROPOLITAN WASTE AND RESOURCE RECOVERY GROUP

VICTORIA State Government

LOGIN

Search our site

WASTE ▾ PROCUREMENT ▾ PLANNING ▾ PROJECTS ▾ NETWORKS ▾ ENGAGEMENT ▾ ABOUT US ▾ CONTACT US ▾

Home › Newsletter Items › No room for a fourth bin? Trialling glass recycling for high density areas in the City of Port Phillip

No room for a fourth bin? Trialling glass recycling for high density areas in the City of Port Phillip

Rolling out separate glass recycling to residents with limited space is a challenge many councils are currently facing. With high density housing on the rise in metropolitan Melbourne, making sure residents of apartments and other multi-unit developments (MUDs) have access to comprehensive and reliable recycling services is more important than ever.

For City of Port Phillip, where 90% of homes are high or medium density, providing glass recycling that caters for residents without space for an extra bin is an essential part of rolling out a four stream service. Between March and October 2020, the council trialled glass bins in 180 homes and installed communal bins in parks across South Melbourne and Albert Park.

"Our goal was to make participating in the glass recycling trial as easy as possible for residents living in densely populated multi-dwelling units," says Binita Shrestha, Waste Technical Officer at City of Port Phillip. The council originally arranged weekly collection for four 600 litre communal bins. By the third week of the trial, Binita says the communal bins were so popular that five more were added, and twice weekly collection was introduced.

Sustainability Victoria also displayed interest in the project's results at various points, including the trial's concluding results.

Several neighbouring Councils have also engaged the project delivery team, and a habitat of shared learning was created, as more and more Victorian Council's launch their own glass recycling trial's and service.

This report has been created, in part, to aid those Councils in their efforts, and openly provide key learnings.

29. Keep Victoria Beautiful Awards

In October 2020, the Glass Recycling Trial was announced as the joint recipient of the 2020 Keep Victoria Beautiful Sustainable Cities Award in the category of waste.

In announcing the winner, the trial was praised for its innovative approach, and judges made recommendations that the model was shared with other Victorian Councils, particularly those in rural areas, given the State Government requirement that all Council's adopt a four-waste-stream system by 2028.

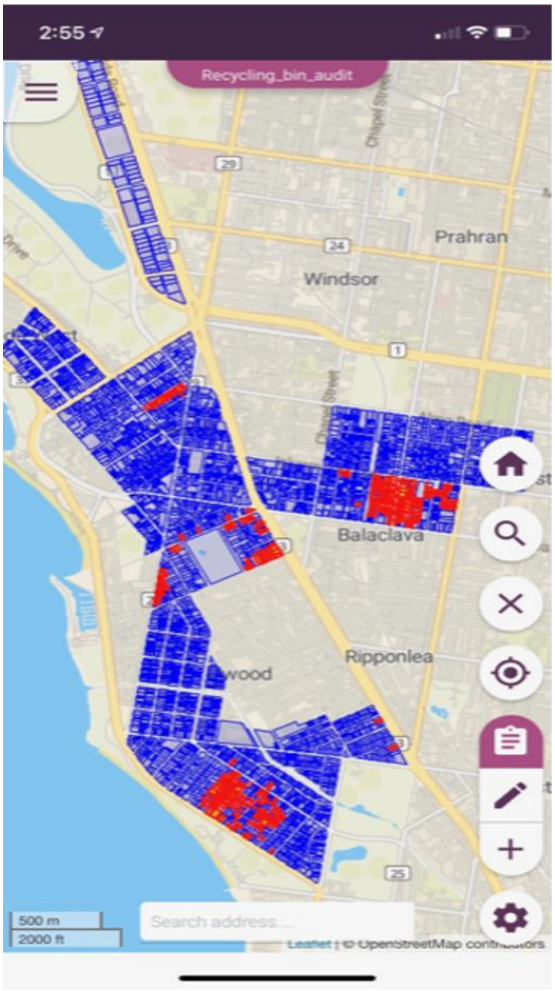
To date, the Keep Victoria Beautiful awards are the only award the Glass Recycling Project has applied for.

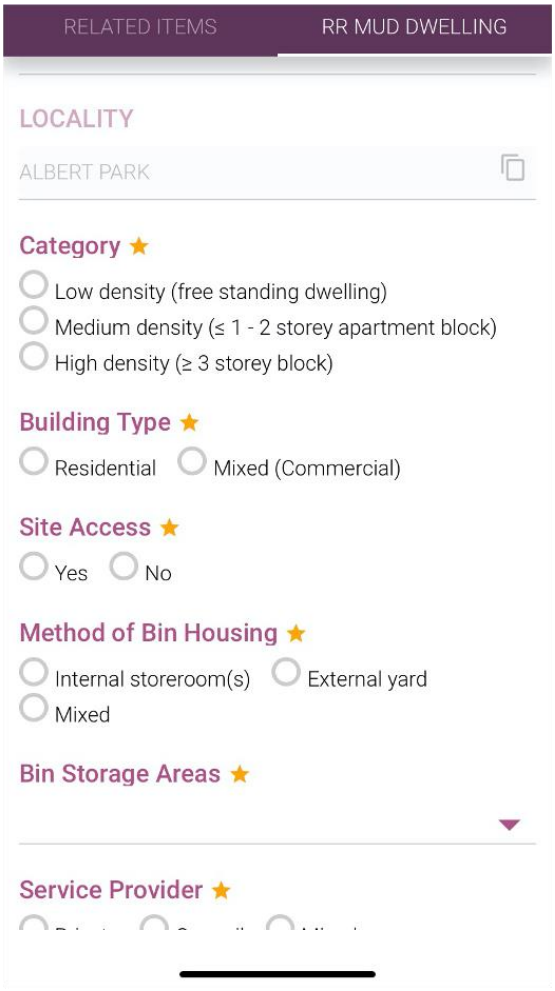
30. The New Audit Model

The Glass Recycling Trial was the first collaborative project between Council's Digital Technology Services team (DTS) and Maintenance & Operations team to capitalise on mobile device enabled technology for the purpose of field-based auditing.

Knowing the importance data would play throughout the trial, and the difficulties involved with manually recording information, and manual data entry post-collection, the DTS and waste management team within Maintenance & Operations established the Konect auditing framework, and honed the platform throughout the trial's length.

Not only did that benefit the Glass Recycling Trial and its participants, and the Council officers performing each audit, but it created a new standard for audit-based projects within the City of Port Phillip that has since been utilised by the Recycling Reset program and the Food Organics and Garden Organics (FOGO) trial.





While Council may opt for a different solution to Konect as other GIS-based platforms become available, the model of creating digital records live and in field, and using trial-to-date data to drive operational decisions and educational responses will likely continue.

As of June 2021, the communal component of the Glass Recycling Trial is still in operation, and audits are still being performed across each communal bin each week, utilising the audit framework established during the trial.

31. Conclusion

Kerbside Glass Recycling

The adoption of the kerbside recycling service showcased that although residents will use the kerbside option, and some residents would benefit from a continued fortnightly collection, overall, the conclusion was that a fortnightly collection is too frequent for most residents, and should the trial continue as a standard service, a once-a-month collection might suffice.

Alternatively, if Council wished to offer a kerbside glass recycling service to Port Phillip residents, it might be beneficial to both Council and the community to offer the service as a user-needs model, whereby only those users who subscribe to the glass recycling service receive the kerbside bin, and the associated service.

The user-need model would also benefit those residents lacking sufficient yard space to house an additional, and potentially under-utilised, third or fourth kerbside bin.

Communal Glass Recycling

The overwhelming utilisation of the communal glass recycling bins across all participating sites is indicative of resident adoption and demand. At the time of writing, communal bins have been available to Port Phillip residents for 15 months, and are still receiving high volumes of material and use across all sites, even as the number of sites have expanded substantially.

Though the communal trial began with four sites and four bins, as at June 2021, there are currently seven sites within Port Phillip offering the communal glass recycling service, across a total of twelve communal glass recycling bins.

The communal service also represents significant value for money to both Council and the community, particularly in comparison to the kerbside collection service. Data for the kerbside collection was recorded March to July 2020, and within those five months, the kerbside component collected 40,440 litres of material (14.03 tonnes). By comparison, the communal bins across the four sites, collected 93,570 litres within the same timeframe (32.47 tonnes), and did so with lower management and auditing costs.

It should also be noted that from a resource point of view, the ongoing management of the communal bin service is significantly more convenient than the kerbside counterpart, even when dealing with similar levels of material, or similar levels of residential engagement. The sites themselves are visible to the public, and the communal presence suggested a fostering of group participation among those residents who’ve opted to utilise it.

Finally, for the sake of comparative analysis, European municipalities possessing long-standing communal bin equivalents (often called "bottle banks") were examined as a means of establishing best-practice for bin distribution. The *Good practices in collection and closed-loop glass recycling in Europe*[iv] report examined services offered across multiple European countries, states and municipalities and found that municipalities across Belgium, the Netherlands, Germany, Switzerland, and France offered an average ratio of 1 bottle bank for every 766 inhabitants[v]. Comparatively, as at June 2021, the City of Port Phillip offers 1 communal glass recycling bin per 10,000 inhabitants.

32. Container Deposit Scheme

In February 2020, the State government announced Victoria would join South Australia, New South Wales, Queensland and Western Australia by introducing a Container Deposit Scheme (CDS) by 2023[vi].

Though the *Victoria's container deposit scheme factsheet*[vii] issued by the Department of Environment, Land, Water and Planning (DEWLP), and the Victorian Government's *Container deposit scheme* webpage[viii] don't specifically state which materials will be accepted within the cans, cartons and bottles program, it is believed the CDS will include glass recycling, albeit for glass bottles only.

So far, the CDS has encouraged high return rates across beverage containers interstate, with South Australia, New South Wales, and Queensland claiming a 77%, 68% and 60% container return rate in the 2019-2020 period[ix]. Although the return rates are impressive, data on the categorical breakdown of returned material appears to be limited, making it difficult to assess the volume of plastic versus glass or aluminium within those figures.

It should also be noted that the CDS, at least as it operates in New South Wales, excludes glass wine and glass spirit bottles[x].

In any event, the introduction of a container deposit scheme within Metropolitan Melbourne is expected to impact the glass recycling service, though at the time of writing, the extent is unknown. It's likely a successful CDS in Port Phillip would impact the future of the kerbside glass recycling service far more than it'd impact the continued presence of the communal glass recycling service.

33. Recommendations

The project delivery team for the Glass Recycling Trial propose the following recommendations:

1. Any extension of the kerbside glass recycling service remain on-hold until the container deposit scheme has been introduced to Metropolitan Melbourne, and specifically the City of Port Phillip, and has stabilised across the Port Phillip userbase, and produced enough data to prompt evidence-based decisions
2. The communal glass recycling service continue indefinitely inline with residential demand, and utilisation
3. The communal glass recycling service expands the total number of sites, and offers additional residents a glass recycling service, including those within the areas of Elwood, Middle Park and St Kilda, who haven't yet experienced glass recycling
4. The number of communal glass recycling bins present on each site continues to fluctuate to meet demand
5. Bin sensors (also known as smart sensors) be installed across all communal bins to avoid glass overflow, monitor fill levels, and avoid unnecessary resource deployment

6. Bin audits across the communal glass bins continue – as a means of monitoring bin use, utilisation, and contamination levels, with view to optimising the service.

34. Acknowledgements

Binita Shrestha would like to acknowledge and thank the following people for their extensive contribution, ongoing support, leadership and guidance through the glass recycling trial:

Mauro Vella; Nick Dunstan; Lachlan Johnson; Lisa Davis; Donna D'Alessandro; and Donna Shiel.

And thank the following people for their contribution across audits, rollouts, retrievals, clean-ups, data management, and collateral design:

Chloe Worthington; Sevda Ibrahim; Jayson Goodall; Stacey Ward; Siobhan Slattery; Patrick Connellan; Nigel Wells; Yvette Dugina; Manohar Esarapu; Claudia Michienzi; Luky Annash; Emma Caley; Kate Henderson; Mark Rosser; Peter Leeming; Dhan Arachchilage; and Darren Brownscombe.

Finally, the Glass Recycling Trial would not have been possible without the support of the residents, Council and Executive Leadership Team within the City of Port Phillip. A big thank you to you all.

35. References

Australian associated press. (2020). *Victoria to introduce container deposit scheme to tackle recycling crisis.* The Guardian. Retried from https://www.theguardian.com/environment/2020/feb/24/victoria-to-introduce-container-deposit-scheme-to-tackle-recycling-crisis

Department Environment, Land, Water and Planning. (2021). *Victoria's container deposit scheme factsheet.* Retrieved from https://www.vic.gov.au/sites/default/files/2021-04/Victorias%20Container%20Deposit%20Scheme%20Factsheet.pdf

Environmental Protection Agency. (2021). *Return and earn*. Retrieved from https://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/return-and-earn

.idcommunity. (2016). *City of Port Phillip - Community profile*. Retrieved from https://profile.id.com.au/port-phillip/dwellings?

Jobling, B., and WRAP. (2012). *Noise exposure in glass collections for recycling*. Retrieved from https://wrap.org.uk/sites/default/files/2021-03/noise-exposure-in-glass-collections-for-recycling.pdf

State Government of Victoria. (2021). *Container deposit scheme*. Retrieved from https://www.vic.gov.au/container-deposit-scheme

WRAP. (2021). *About us - Tackling the entire system*. Retrieved from https://wrap.org.uk/about-us

Xirou, H. & Rivet, F. (2012). *Good practices in collection and closed-loop glass recycling*. Retried from https://www.acrplus.org/images/technical-reports/ACR2012_Good-Practices-in-collection-and-closed-loop-glass-recycling-in-Europe-REPORT_ACR_FEVE.pdf

---

[i] .idcommuntiy. (2016). *City of Port Phillip - Community profile.*
[ii] WRAP. (2021). *About us - Tackling the entire system.*
[iii] Jobling, B., and WRAP. (2012). *Noise exposure in glass collections for recycling*
[iv] Xirou, H. & Rivet, F. (2012). *Good practices in collection and closed-loop glass recycling*.
[v] Xirou, H & Rivet, F. (2012).
[vi] Australian associated press. (2020). *Victoria to introduce container deposit scheme to tackle recycling crisis.*
[vii] Department Environment, Land, Water and Planning. (2021). *Victoria's container deposit scheme factsheet*
[viii] State Government of Victoria. (2021). *Container deposit scheme*.
[ix] Department Environment, Land, Water and Planning. (2021).
[x] Environmental Protection Agency. (2021). *Return and earn*.

The City of Port Phillip's Glass Recycling Trial delivery team. Left to right – Mauro Vella, Binita Shrestha, James Walden.