

10.5. Food Waste Recycling

AUTHOR	Bo Karaula, Waste Management Co-ordinator
ENDORSED BY	Marcelo Occhiuzzi, Director Community, Planning and Environment
ATTACHMENTS	1. APC Waste Consultants - North Sydney Food Organics Report [10.5.1 - 56 pages]
CSP LINK	1. Our Living Environment 1.1 Protected, enhanced and biodiverse natural environment 1.2 Environmentally sustainable community 1.3 Clean and green places 5. Our Civic Leadership 5.2 Strong civic leadership and customer focussed services 5.4 Council services are efficient and easy to access

PURPOSE:

The purpose of this report is to provide a summary of the results of the six-month food scraps trial in multi-unit dwellings, assessment of the ability of the market to provide processing services for organics in the immediate term within the Sydney basin, and a list of actions that Council must undertake in order to comply with State Legislation.

EXECUTIVE SUMMARY:

- North Sydney Council has long championed greater levels of sustainability in its operations.
- NSW Council will be legislatively required to implement Food Only (FO) or Food and Garden Organics (FOGO) collections for all NSW households by 2030.
- Between May 2022 and November 2022, 411 individual unit dwellings across 10 multi-unit dwelling (MUD) blocks participated in a six-month food waste recycling collection trial, examining the participation and food scraps contamination rates whilst gathering cost and operational data.
- As the trial progressed, audit results showed a decline in the amount of food waste separated by the participants as well as an increase in the contamination levels.
- Council's waste contracts are long-term engagements and require significant lead time to prepare and scope. Given the limited supply service market, adequate market information is required to ensure value for money in procurement is attained.
- Councils need more information on the timing and standards of new organic processing capacity so that tenders can be prepared with sound information on efficiency,

contamination standards, risk sharing, cost, location, technology, and greenhouse gas capture.

- Council will continue to research, collaborate, and work with other Councils to determine where commonalities may exist for FO/FOGO service delivery, and look for opportunities to collaborate on joint procurement of FO/FOGO processing services within the next five years.
- Council will need to review planning controls for new development to enable food organics stream separation and collection services in new MUDs to secure best recovery outcomes and reduced impact on residential amenity.
- Once a strategy is developed, Council will need to develop a comprehensive Communication Strategy, with a strategic key stakeholder framework to ensure high levels of awareness are achieved in the community.

RECOMMENDATION:

- 1. THAT** the Food Waste Trial report be received.
- 2. THAT** Council begins preparations to extend the current waste collections contract and disposal contract to allow for the waste industry to develop more economic organic waste processing options including collaboration with stakeholders and nearby Councils.
- 3. THAT** as part of the next review of the North Sydney Development Control Plan, amendments be prepared for waste management to incorporate changes that would allow for the storage and on-site collection of source-separated organic material.

Background

North Sydney Council has long supported and pursued sustainability policies and practices in its operations and management endeavours.

In 2006, Council contracted to transfer the material collected in the red bins to a processing facility at Eastern Creek, known as the UR3R, where waste was separated into streams utilising a Mechanical Bio Treatment anaerobic process. The technology was able to divert approximately 65% of the contents of the red bin from landfill whilst generating green energy. The outputs of the process, known as Mixed Waste Organic Output (MWOO), was used in mine site rehabilitation and in select agricultural applications. This, coupled with the kerbside commingled recycling bin service and, to a lesser extent, the greenwaste service, saw Council divert a total of 71% of waste from landfill.

Council surpassed the resource recovery target of 66% set by the State Government at the time. However, the waste exemption orders that allowed for such recovery were rescinded in 2018 due to concerns about contamination, resulting in the entire contents of the red bins being landfilled.

The Department of Planning and Environment recently set a resource recovery target of 80% from all waste streams including halving the amount of red bin organic waste sent to landfill by 2030¹. To achieve this aspirational target, councils are required to undertake waste management practices which minimise waste disposal at landfill and maximise resource recovery, with a focus on food organics recovery.

State Government legislative framework requires Councils to implement Food Only (FO) or Food and Garden Organics (FOGO) collections for all NSW households by 2030.

Report

The Trial

Council implemented a grant-funded food waste collection trial between May 2022 and November 2022 to provide baseline data that will assist in framing long-term strategic decisions on organic recovery options prior to the renewal of both the current waste collection contract, and the disposal and processing contract.

The main objective of the trial was to engage a diverse sample of medium-density developments (MUDs) large enough to generate data that was a good representation of the local government area (LGA). MUDs and high-density dwellings make up approximately 90% of the housing stock in the North Sydney LGA and are inherently more difficult to manage due their high transient population and lack of space to accommodate onsite resource recovery infrastructure. Notably, due to the large proportion of high-density dwellings, the volumes of greenwaste generated was not sufficient to warrant a trial for a combined FOGO service.

¹ NSW Waste and Sustainable Materials Strategy 2041

To reduce the risk of the results being biased or distorted, a direct random sampling method of recruitment was used. A total of 411 individual unit dwellings were recruited, represented by 10 MUD blocks across four suburbs within the LGA. Participants were provided with the necessary infrastructure such as kitchen caddies and compostable caddy liner bags to ensure the trial ran efficiently. Each building was provided with 120L bins allocated on a shared basis. The trial was supported by marketing and educational collateral including wall posters for lobby notice boards, bin and caddy stickers, bin bay signage, post cards, brochures, and direct correspondence to each participant and strata managers. A closed-group online chat platform was also provided.

The once-weekly collection was provided by Council's waste collection contractor, URM. The material was delivered to Earthpower, owned by Veolia, in Camelia where it was bulked up and transported to Forbes for composting.

Key Findings

The first three months of the trial looked favourable with a nine percent decrease in the amount of food waste presented in the red bin. This was, however, not sustained as overall a six percent reduction was observed in the audit at the end of the trial. Contamination levels during the trial also deteriorated with an increase from seven percent by weight, midway through the trial, to 13% at the end of the trial. The industry standard for food-only collections is contamination rates of five percent. Contamination of food waste bins was lower in small MUDs than medium-sized units. This reflects the significance of MUD block size to the waste dynamics. Common contamination issues were food in non-biobags, contaminated paper, soft plastics, and textiles.

Contamination will remain the single greatest issue as the supply of quality feedstock to the processor is key. Clean source-separated feedstock without plastics, chemicals, and other contaminants is central to the growth of organics recycling rates. While testing and processing technology can address a fraction of the contamination problem, it is expensive and does not necessarily remove all contaminants consistently.

Overall, the trial delivered a recovery rate of 32%, which means 68% of food waste was not diverted. While disappointing that the desired outcomes of greater food waste separation was not achieved at all the trial sites, the results reflect the variation in individual household behaviour.

The results of the Food Scraps Trial will be used to contribute towards the planning of future waste services to maximise food scraps recovery in a financial and environmentally sustainable manner. A detailed analysis of the waste data gathered during the trial can be found in the report by APrince Consulting (Attachment 1).

Current Status

Council currently undertakes the following resource recovery initiatives which is supported by ongoing waste minimisation and avoidance, education, and messaging:

- provision of subsidised compost bins and worm farms to residents who are encouraged to participate in workshops to enhance their knowledge of composting;
- greenwaste collected at kerbside is transferred to an organics processing facility (small volumes collected due to the density of the LGA);
- recyclables collected in the yellow-lidded bin are transported to Visy at Smithfield for sorting and processing;
- the Bower Reuse and Recycle Service allows residents of North Sydney Council to utilise the collection services of The Bower instead of the bi-monthly pre-booked clean-up service;
- RecycleSmart Program pick-up services for households for difficult to recycle items; and
- operation of the Community Recycling Centre on behalf of Ryde, Lane Cove, Hunters Hill Willoughby, Mosman, and Ku-ring-ai Councils for the recycling of problem waste.

Tender preparation for FO/FOGO services would require at least a two-and-a-half-year lead time before tenders could be called for such services. Additionally, the successful contractor would require at least 18 months lead-time to mobilise the necessary plant and equipment to fulfill their obligations prior to the commencement of the new contract/s in June 2029.

The existing market for organics processing service providers for outputs of residential food organics collections of either FO or FOGO is limited. At present, waste infrastructure is insufficient to meet current and future needs for NSW, especially processing infrastructure for FO/FOGO. Siting constraints, planning and approvals, public perception, and the social impacts/licence to operate are all barriers to entry. Existing services are located at long distances from the Sydney Metropolitan Area, with the majority of the current facilities located in western and southwestern Sydney. North Sydney Council would be required to deliver the material directly to the facility as no bulking-up or consolidation facilities are currently available in the northern region. A summary of the current organic processing facilities is provided in Attachment 1.

NSROC, in collaboration with North Sydney Council, is presently scoping for an investigation of the full implications (both positive and negative) of the proposed FO/FOGO mandate, including emission impacts and costs of offering different types of services. The project will develop a regional model to compare the proposed FO/FOGO mandate to business as usual. The model will examine the costs and benefits (including a life-cycle carbon assessment) of introducing the new service against a number of different scenarios. The model will be interactive, enabling it to be updated as new information and technologies become available, and will run at a local scale once completed.

NSROC, in collaboration with North Sydney and other Councils, is scoping a pathway to shared waste services and infrastructure, for the region to determine what the benefits might be and where commonalities may exist. It may have a higher influence, attract more ambitious technologies and equitable allocation of risks. Investigations include:

1. Implementation of mandatory food organics collection services
2. Transfer capacity primarily for organics and possibly residual waste
3. Processing contracts

Moving forward

Planning Controls

In preparation for the transition to a new organics service, reviewing planning controls to enable organics collection services in new MUDs will be required. Space is the biggest issue for multi-unit developments as waste storage areas within existing department developments have limited capacity, if any, to accommodate additional bins for food organics.

Apartment buildings create difficulties for waste storage and collection. Convenient recycling systems were not built into older apartment buildings, and they are difficult and costly to retrofit. Waste storage areas that incorporate sufficient space for food waste separation are needed in multi-unit dwellings.

Collections in high-density areas during the day causes traffic congestion and risks to the public, but late-night collections can be disruptive to residents. Additional bespoke fleets that will be required for FO collections will aggravate these conditions if not adequately addressed.

To ensure that there are no adverse impacts on residential amenity, waste storage areas must incorporate adequate design measures that respond to specific issues associated with food organics such as odour, liquid content of food organic bins, and increased potential for spills. Waste storage areas that incorporate food organic stream separation must be designed at the development stages to secure best recovery outcomes and reduced impacts on residential amenity. Guidelines and design advice specifically for multi-unit dwellings are required. If the food waste segregation system is not user-friendly within MUDs, residents will struggle to make the effort to separate food organics from other waste streams.

Through the trial, it was evident there is a need for custom and bespoke solutions for individual developments. This is resource-intensive, from the initial roll-out period to ongoing education with building managers/care takers and cleaners. Design characteristics of certain apartment types will be challenging for food waste service roll-out. This includes developments that incorporate a waste chute system and recycling cupboards to facilitate a food waste collection service. The role and importance of building managers and caretakers within apartment developments cannot be undervalued.

Education

Prior to the implementation of any future organics collection service, Council will need to develop a comprehensive communication strategy, with a strategic key-stakeholder framework. Council would need to allow 18 months for developing, consulting, testing, and implementing the education plan before service commencement. Extensive multi-faceted education programs will need to be adequately resourced with well-trained communication, education, and customer service personnel at various phases at pre-implementation, during implementation, and ongoing post implementation, to the following stakeholders:

- residents of SUDs and MUDs - property owners, owner-occupiers, and renters;
- public housing residents;

- building management (real estate, strata managers, body corporate, and cleaners - ongoing due to North Sydney's high transient population - 50% tenancy);
- culturally and linguistic-diverse residents;
- local community groups (e.g., precincts, local suburb Facebook groups etc.);
- media (mainstream and social media); and
- internal Council stakeholders (customer service centre, waste operational team, waste contractor, communications team, events officers).

A suite of education collaterals, print and digital marketing, including videos, and targeted education elements are required.

Education can have a positive return through:

- avoided landfill costs; and
- avoided contamination penalties.

Consultation requirements

Community engagement with the Trial participants occurred in accordance with Council's Community Engagement Protocol.

Financial/Resource Implications

Council was successful in securing a grant for \$180,000 from the State Government to assist with the delivery of the trial, and the Domestic Waste Management Budget funded \$40,000. There are no financial implications for the purposes of this report, however, as Council prepares to meet new organic collection targets, further costs may be borne, which will be the subject of future reports as these are determined.

Legislation

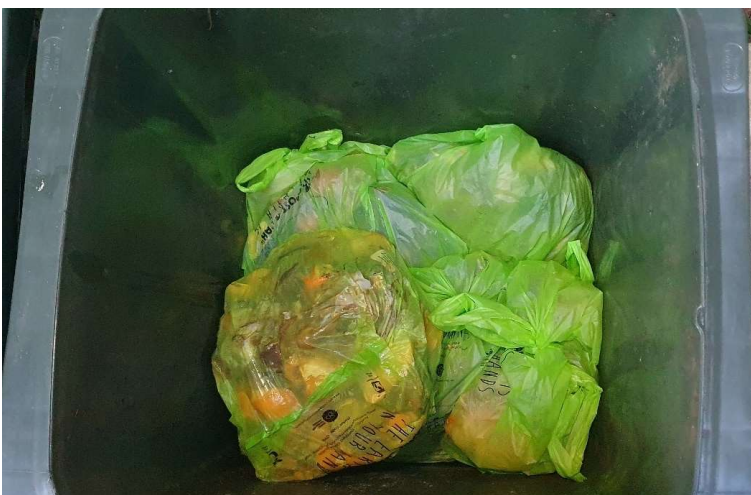
The NSW Waste and Sustainable Materials Strategy 2041 (WASM), introduced in July 2021 replaced the NSW Waste and Resource Recovery Strategy 2014-21 (released in December 2014) and the Waste Less, Recycle More Initiative (providing funding to councils from 2012 to 2022). WASM currently provides the framework for waste management in NSW.

Under WASM, the NSW Government mandated that councils must provide a food and garden waste collections service by 2030.



2023

North Sydney Council Food Scraps Collection Trial Final Report



A.Prince Consulting
ABN 96 077 504 226
TH 4 / 28 West Street
Nth Sydney NSW 2060
P: +61 2 9907 0994
E: admin@aprince.com.au
W: www.aprince.com.au

This report was researched and prepared by



A.Prince Consulting Pty Ltd
 ABN 96 077 504 226
 Email: admin@aprice.com.au
 Web: www.aprice.com.au
 TH 4/28 West St
 North Sydney NSW 2060
 Phone: (02) 9907 0994

For:
 Bo Karaula
 North Sydney Council
 200 Miller Street
 North Sydney NSW 2060
 Phone: (02) 9936 8100
 council@northsydney.nsw.gov.au

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ACRONYMS

ABS	Australian Bureau of Statistics
ACC	Australian Carbon Credits
APC	A. Prince Consulting
CDS	container deposit scheme
EPA	Environmental Protection Authority
FO	food organics
GO	garden organics
FOGO	food organics and garden organics
HR MUDs	high-rise multi-unit dwellings
LGA	Local Government area
LR MUDs	low-rise multi-unit dwellings
MGBs	Mobile Garbage bins
MUD	multi-unit dwelling
MWOO	Mixed waste organics outputs
NSC	North Sydney council
NSROC	Northern Sydney Regional Organisation of Councils
NSW	New South Wales
NWP	National Waste Policy
SD	single dwelling
URM	United Resource Management

EXECUTIVE SUMMARY

About the trial

- The NSW government has mandated all councils must provide a food and garden waste (FOGO) or a food-only (FO) service by 2030.
- North Sydney Council (NSC) introduced a six-month food organics collection and recycling service trial to 10 multi-unit dwellings (MUDs) containing 411 units across four suburbs to measure and monitor household behaviour and impacts on waste tonnages.
- The MUDs represent a mix of building size, age with various on-site waste bin systems and configurations to represent the broader MUD infrastructure found throughout the North Sydney LGA.
- The trial was limited to the Wednesday collection zone only.
- A. Prince Consulting (APC) was engaged to gather qualitative data using a pre- and post-trial resident survey and quantitative data by undertaking a pre-, mid- and post waste audit to measure both waste generation, composition, recovery and contamination. Bin monitoring occurred throughout the project without residents' knowledge to inform council of issues and program performance.

Quantitative data

General waste stream

General waste

- General waste generation – declined from 5.76 kg to 4.68 kg or 1 kg/ unit/week.
- General waste generation by MUD block size – small MUD blocks decreased by 1.9 kg/unit/week, large blocks decreased by 1.6 kg/unit/week and medium-size complexes were static.
- Composition of general waste – by weight, food waste decreased from the baseline of 26% to 20%.

Food organics

- Food waste yield – 0.5 kg or 1.1 litre/unit/week.
- Contamination – 13% by weight and 42% by volume. Common issues were food in non-biobags, contaminated paper, soft plastics and textiles.
- Recovery rate – the average MUD unit recovers 32% of all food waste generated, indicating room for improvement.
- The trend across all MUD blocks is that food recovery declined over the trial duration.
- Comment – the typical contractual threshold for processing requires contamination to be less than 5% or financial penalties may apply.

Quantitative data

Pre-trial and post-trial surveys

Pre-trial survey

10% of the trial participants responded, of which:

- 89% said it is important to reduce household waste to landfill.
- 91% stated the importance of investigating options for reducing waste to landfill through programs such as food scraps recycling.
- 93% support Council investing in a dedicated food waste collection and recycling service.
- **Post-trial survey**

11% of the trial participants responded, of which all stated they participated in the food scraps collection trial.

- **93% support this program being introduced on a permanent basis.**
- 71% used the food scraps collection service daily and 24% weekly.
- 90% daily used the kitchen caddy and liners daily and 7% weekly.
- 67% used the food scraps collection program the same amount over the trial period, 11% used more often by the end of the trial and 2% used less often by the end of the trial.
- 93% rated the kitchen caddy as good to excellent, 64% rated the compostable kitchen caddy liners as good to excellent, 86% rated the informational/educational material provided good to excellent.
- 81% rated good to excellent the overall experience with the food scraps collection trial.
- Suggestions for improvement: compostable caddy liners be more durable and slightly bigger so that it would not tear and be a better fit in the kitchen caddy.

Costs and benefits

- Preliminary budget estimates to introduce a FO service to all MUDs and a FOGO service to all individual dwellings could be \$5 million or \$140 per household per year.
- It is expected that up to three additional staff will be required in the short term to plan, implement, monitor, and assist the community with the service change.
- NSC food organics project is an eligible abatement activity as specified by the Clean Energy Regulator and able to generate Australian Carbon Credits (ACC) for sale if the service is introduced voluntarily prior to 2030 mandate. Please note that Australian Carbon Credits (ACCUs) are not available after the services are mandated. Anything done under government mandate or regulation is not voluntary abatement and therefore does not qualify.
- Current collection and disposal contracts expire 2029. The next six years allows time for Industry and Government to address the processing infrastructure and capacity deficits and enable Council to effectively consult stakeholders, develop strategic partners, determine the best solution, procure services, engage the community and execute future service changes.

Key considerations

- This is the most significant waste management service change council will introduce in more than a decade. It requires time to be well planned and adequately resourced as it impacts every household.
- Research indicates that to gain maximum food waste recovery NSC needs to provide households with kitchen caddies and specific types of caddy liners that meet Australian Standards.
- In addition, a new, dedicated food bin for unit complexes or a food and garden organics bin for single dwellings is required.
- Some MUDs may have space constraints for accommodating an extra wheelie bin.
- Caddy liners will need to be replaced annually. Although many options exist in supermarket, some do not comply with new EPA guidelines.
- Replacement caddies and liners will be an ongoing cost given the highly transient nature of the population.
- NSC's current collection contract expires on 30 June 2026, with a 3-year extension option.
- NSC's current disposal contract expires 30 June 2024 with a 5- year extension option.
- Both contracts align with an end date of 30 June 2029.
- Negotiating contracts within the contracted period for service changes can be expensive as there is no open market competition.
- NSW EPA expects an additional 1.1 million tonnes of organics will require processing capacity by 2030.
- NSC will generate approximately 1,300 tonnes of food waste plus the existing 2,200 tonnes of garden waste.
- There are expected short-term challenges in processing capacity as new infrastructure is needed to meet demand.
- In the interim, organics processing fees will reflect supply and demand.
- The expected cost of establishment to introduce a FO service to all MUDs and a FOGO service to all single dwellings could be \$5 million or \$140 per household per year.
- Grant support may be available to offset some if not all costs associated with service introduction, including mobile garbage bins, caddies, liners and community education. Additional service costs, however, are estimated at \$3 million per annum.

1. BACKGROUND

The Commonwealth Government National Waste Policy Action Plan and Food Waste Strategy 2017 has set a waste diversion target of 50% of organic wastes from landfill by 2030, which will contribute to Australia's obligations under the United Nations Framework Convention on Climate Change.

This target is also enshrined in the NSW Government Waste and Sustainable Materials Strategy 2041 and aligns with the Commonwealth target of a 50% reduction in the amount of organic waste sent to landfill by 2030. Further, it reaffirms the NSW Government's commitment to net zero emissions from organic waste by 2030, noting that the NSW Net Zero Plan Stage 1: 2020–2030 targets a total reduction in emissions in NSW by 35% by 2030 and net zero by 2050.

To achieve these targets, Local Government Authorities (LGA) have been directed to implement domestic food recovery kerbside services by 2030. This directive seeks to also provide investment security to the private sector for new and expanded processing facilities.

The North Sydney LGA has a population of 73,514 (2016 Census) accommodated in approximately 36,000 residential properties. The North Sydney Council (NSC) housing stock, as reported in the 2021 Australian Bureau of Statistics (ABS) census, demonstrates the unique challenges faced by councils as 90% of all residents reside in multi-unit dwellings (MUDs) including semi-detached and townhouses, with the most densely populated suburbs being Kirribilli, Milsons Point, Lavender Bay and Neutral Bay. The remaining 10% of households live in detached single housing. The average household size is 2 persons per household.

Table 1: Housing stock

Housing type	North Sydney LGA	NSW average
Single dwelling	11%	66%
Semi/townhouse/row/terrace house	13%	12%
Flat/unit	76%	22%

Source: 2021 ABS census

The high proportion of MUDs in the NSC area adds additional complexity to the challenge of food waste recovery. Council's waste management objectives are to provide a high-quality waste and recycling management service that:

- is cost effective, representing good value to its residents;
- maximises the proportion of waste diverted from landfill;
- maximises the opportunity and value of collected materials to be reused and recycled;
- ensures that waste handling, processing and disposal are performed in accordance with Council's commitment to protecting the environment, ecological sustainability and meets all regulatory requirements;
- generates minimal complaints and meets customer satisfaction targets.

Waste collection services are currently provided by URM using a fleet of rear-loader trucks. Council provides a weekly general waste (red-lid bin) and recycling service (yellow-lid bin) in a range of bin sizes based on need, and a fortnightly on-call garden organics (via a mix of green-lid bin and other receptacles) waste service and loose hard waste collection.

Residents in multi-unit dwellings predominantly use 240-litre mobile garbage bins (MGBs) which are shared based on one bin for every three units.

In 2018, the NSW EPA banned the application of mixed waste organics outputs (MWOO) to land owing to risks associated with chemical and physical contaminants. The ban has limited Council's options for the recovery of organics from the domestic waste stream. The current disposal contract for residual waste allows for waste to be sent to landfill with no opportunity to extract the organic fraction. When disposed of to landfill, the organic material breaks down and creates methane, a greenhouse gas contributing to climate change.

A compositional waste audit of the MUDs residual bin in 2021 revealed that loose food waste comprises 35% of the waste in the bin. Council has previously conducted representative sample surveys in the lead up to each waste contract renewal, each time seeking resident opinion regarding services offered. The most recent survey (2018)¹ elicited only a 5% response to the question of level of support for an organics collection for composting.

Many rural and metropolitan councils are now offering combined food and garden services known as FOGO. These services tend to be offered where garden waste collection services already exist on a fortnightly collection cycle. Food scraps are added and the service frequency is increased to weekly, while the general waste bin is then collected fortnightly to maintain cost control. Given the low levels of garden waste generated in an area of high-density living, a food and garden organics (FOGO) service is not a viable option for the North Sydney LGA.

At its meeting on 30 November 2020, Council resolved:

- 1. THAT the Residential Food Scraps Collection and Processing Trial report be received.*
- 2. THAT the Food Waste Collection Trial is progressed in accordance with the budget and methodologies and timeframes proposed in the details outlined in this report.*
- 3. THAT Council seeks three quotations from waste consultancies listed in the Local Government Approved Panel to assist Council in the planning, management and implementation of the trial.*
- 4. THAT a final report is provided to Council on the results of the Food Waste Collection Trial.'*

To research household behaviour and inform NSC policy on managing food waste, a six-month Food Organics (FO) Collection Trial was introduced aimed at monitoring the recovery of food organics in selected MUDs. For any trial it is recommended that a six-month window is provided to achieve sustained behavioural change. Some residents may initially participate and then revert to old behaviours. By monitoring a project over time we can gain insights into the sustained behavioural change that can be expected should the program be rolled out across the entire LGA. This can inform the likely cost implications of a service change.

This report provides context around the need for food waste recovery. It presents the findings of the pilot project with regards to qualitative and quantitative measures and translates this into operational cost.

¹ The engagement outcomes are available via *Council Report 26 March 2018 – Waste Tender and Community Engagement Outcomes*, available from Council's website.

2. CONTEXT

2.1 Commonwealth Policy Framework

2.1.1 The National Waste Policy (NWP) 2018

This policy supports Australia's commitment to the United Nations (UN) Transforming Our World: 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDG), in particular SDG 12 to ensure sustainable consumption and production patterns but also SDGs 3, 6, 8, 9, 11, 13, 14 and 17.

The policy gives effect to Australia's obligations under the UN Framework Convention on Climate Change in reducing greenhouse gas emissions primarily through the diversion of food waste from landfill. The policy commits to treating waste as a resource and to applying circular economy principles to a whole-of-waste-management system.

The NWP prescribes a set of overarching principles and strategic actions designed to:

1. Avoid waste
2. Improve resource recovery
3. Increase the use of recycled material and build demand and markets for recycled products
4. Better manage material flows to benefit human health, the environment and the economy
5. Improve information to support innovation, guide investment and enable informed consumer decisions.

The National Waste Policy Report (2020) measures waste management performance for the period from 2006/7 and 2018/19. During this time waste generation continued to increase reaching 43.5 megatonnes (Mt). Of the 5.09 Mt of food waste generated in 2018/19, only 1.10 Mt or 22% was recovered and processed. The target for halving organic waste to landfill by 2030 will not be met should the current progress trajectory continue.

2.1.2 The National Food Waste Strategy, 2017

This strategy recognises the level of edible food loss and the flow-on economic impacts in the primary production, processing, manufacturing, distribution, retail, hospitality, food services and household sectors. The strategy focuses activities to reduce Australia's food waste by 50% by 2030 by establishing four priority areas, which are:

1. Policy support and setting of national food waste baseline and enabling legislation
2. Business improvements and adopting technologies and processes to avoid and reduce food waste
3. Market development to support repurposing of food waste
4. Behavior change to focus practices and attitudes toward avoiding and reducing food waste.

2.2 NSW Policy Framework

2.2.1 Waste Avoidance and Resource Recovery Act 2001

The Act provides for waste strategies and programs that promote government and industry waste avoidance and resource recovery to reduce waste generation through the following resource management options (in order of priority):

- Avoidance of unnecessary resource consumption
- Resource recovery (including reuse, reprocessing, recycling and energy recovery)
- Disposal.

2.2.2 NSW Waste and Sustainable Materials Strategy 2041

This aligns with the Commonwealth Food Waste Strategy 2017 by targeting a 50% reduction in the amount of organic waste sent to landfill by 2030 and reaffirms the NSW commitment to net zero emissions from organic waste by 2030.

The Strategy effectively updates NSW priorities for waste and resource recovery to reflect the NSW Circular Economy Policy Statement, the Net Zero Plan Stage 1: 2020–2027 and the National Waste Policy Action Plan.

The Strategy has three focus areas:

1. Meeting future infrastructure and service needs;
2. Reducing carbon emissions through better waste and materials management; and
3. Building on work to protect the environment and human health from waste pollution.

The Strategy requires separate collection of:

- Food waste from targeted businesses/entities that generate the highest volumes, including large supermarkets and hospitality businesses by 2025
- FOGO/FO from all NSW households by 2030.

The NSW government will invest \$65 million over five years from FY2023 to support:

- the rollout of new collection services
- the development of more processing capacity

statewide education campaign to help households adjust to the changes and improve recycling habits.

2.2.3 The Protection of the Environment Operations Act, 1997 (POEO)

The Act and its subordinate *Protection of the Environment (Waste) Regulation, 2014* governs the use of waste materials to ensure human health and the environment are protected. On 25 July 2022, the NSW Environment Protection Authority (EPA) set new acceptance standards for food organics (FO) and food and garden organics (FOGO) services across NSW. The new standard states that only three materials are permissible in a FO bin:

1. Food
2. Compostable plastic kitchen caddy liners (AS 4736-2006 compliant)
3. Fibre-based kitchen caddy liners (e.g. paper or newspaper) used to collect and transfer food waste to the FO or FOGO bin.

Common items that have been associated with FO and FOGO services but are no longer acceptable as they have the potential to contain pathogens and additives harmful to human and environmental health are:

- Pet poo and poo bags
- Fibre-based materials such as bamboo, timber or cardboard packaging and cutlery:
 - food contact materials – baking paper, coffee filters
 - paper towels, serviettes
 - fibre-based food containers – coffee cups, pizza boxes, plates, bowls
 - paper bags
 - cardboard packaging
- Compostable or biodegradable plastic products or bags
- Vacuum cleaner dust, washing machine and dryer lint
- Home-compostable plastic kitchen caddy liners not compliant with AS 4736:2006.

2.2.4 NSW Government Circular Economy Policy Statement, 2019 establishes seven key principles for the transition to a circular economy and requires governments to embed circular economy considerations in decision-making for services, infrastructure, purchasing decisions and regulatory frameworks and that such decisions be guided by ‘push’ and ‘pull’ initiatives that include supporting innovation through:

1. sustainable procurement;
2. high-quality consistent recycling;
3. high-value organics;
4. product stewardship;
5. circular design;
6. support of reuse and repair
7. responsible packaging.

3. INTRODUCTION

To gain insight into resident behaviour and respond to the need to separate food waste, NSC designed a pilot project to trial a new service. Council engaged A.Prince Consulting (APC) to oversee the monitoring and evaluation of this trial which included both quantitative (waste audit) and qualitative (survey) data collection to measure system performance and resident behaviour including:

- A baseline waste audit and resident survey completed in June 2021;
- Weekly visual monitoring of bin presentation for the first four weeks of the trial in May 2022;
- Fortnightly monitoring of bin presentation and contamination from June 2022 to November 2022;
- Mid-trial waste audit to measure progress, completed in August 2022;
- Post (end)-trial waste audit and resident survey, completed in November 2022;
- This final report, completed in February 2023.

MUD buildings were randomly selected from a NSC property database using stratified random sampling to ensure the sample accurately represented the small, medium and large MUDs within the Wednesday collection zone.

A total of 10 MUDs accommodating 411 units in four suburbs was selected, as detailed in Table 2.

Table 2: MUD samples characteristics

MUD identifier	Suburb	Address	Size	Number of units
A	North Sydney	37–39 McLaren St	L	81
B	North Sydney	139–143 West St	M	53
C	Cammeray	40–44 Rosalind St	L	53
D	Cammeray	39 Rosalind St	S	15
E	Neutral Bay	9 Wyagdon St	S	20
F	North Sydney	59 Whaling Road	M	41
G	North Sydney	50 Whaling Road	L	80
H	Kirribilli	1 Waruda St	M	36
I	Kirribilli	8 Waruda St	S	11
J	Kirribilli	1 Kirribilli Ave	M	21
Total number of units:				411

MUDs were divided into three size ranges to compare like-sized buildings. The number of units per MUD block size is shown in Table 3.

Table 3: Number of units by block size

Small	Medium	Large	All blocks
< 20 units	21–50 units	> 51 units	
46	151	214	10

All units were provided with a kitchen caddy and rolls of compostable caddy liner bags to aid the separation of food waste at source in the kitchen. Bin room signage and bin stickers depicted the following graphics:

Image 1: Bin room and bin stickers



Each MUD building was also provided with 120L mobile garbage bins (MGB) fitted with a burgundy lid into which the caddy liner bags were placed.

Table 4 FO bin ratio

Address	Units	FO bins	Service notes
Large			
50 Whaling Road NORTH SYDNEY	80	4	Chute to compactor; bins lined up undercover
37–39 McLaren Street NORTH SYDNEY	81	4	Unlocked gate; bins presented in lane
40–44 Rosalind Street CAMMERAY	53	4	Unlocked bin room
Subtotal	214	16	
Medium			
139–143 West Street NORTH SYDNEY	53	4	Unlocked gate
59 Whaling Road NORTH SYDNEY	41	2	Bins opposite carpark
1 Waruda Street KIRIBILLI	36	2	Bins on street
1 Kirribilli Ave	21	1	Bins on street
Subtotal	151	9	
Small			
9 Wyagdon Street NEUTRAL BAY	20	1	Bins in garage (low overhead)
39 Rosalind Street CAMMERAY	15	1	Bin storage room access
8 Waruda Street KIRIBILLI	11	1	Bins on street
Subtotal	46	3	
Total	411	28	

These MGBs were collected weekly on the same day as the general waste bin by URM, the waste collection contractor, in a separate dedicated vehicle.

Image 2: Waste bins presented for collection

The food waste was transported to organics processing facility EarthPower Technologies at Camellia, which currently receives in excess of 300 to 400 tonnes per week from organic kerbside collections across Sydney. This trial was delivering on average 300 kilograms per week of FO material for the duration of the trial, with the amount decreasing over the duration of the trial.

Image 3: Delivered loads for processing

Delivery date – Wed 29/6/22 – 360 kg



Delivery date – Wed 13/7/22 – 300 kg

This delivered material is then bulked up and transferred to Topsoil Organics at Forbes, NSW, for processing into organic fertiliser.

Image 4: EarthPower load arriving at Topsoil Organics Forbes for processing**Image 5: Final slurry product at Topsoil Organics mixed with other materials for land application**

Three methods were used to measure and monitor the trial, as follows:

Quantitative measures

1. A waste audit conducted before, midway and at the completion of the trial to enable direct comparisons over time to determine:
 - any reduction in the general waste bin weight and waste generation
 - the amount of food remaining in the general waste bin
 - the amount of food waste diverted to the new FO bins
 - the amount and type of contamination in the FO bins
2. Regular weekly or fortnightly monitoring throughout the trial

Qualitative measures

3. Resident survey before and at the completion of the trial:
 - assessed residents' level of interest and participation in the pilot
 - sought to identify any issues or challenges experienced
 - sought feedback on use of caddy, biobags and FO bins
 - sought feedback on the program in general.

4. QUANTITATIVE MEASUREMENT

4.1 Waste audit

The waste audits were conducted with reference to the NSW EPA *Guidelines for Conducting Kerbside Residual Waste, Recycling and Garden Organics Audits in NSW Local Government Areas 2008*, including the *Audit Guideline Addendum 2010*. The same 10 properties were sampled before, midway and at the completion of the trial to enable direct comparison to be made. The method is described below:

4.1.1 Sample collection

Both general waste bins and food organics bins were sampled on the night prior to the regular collection without residents' knowledge. APC staff recorded the volume of all bins presented and which bins were sampled. All food waste bins were collected for auditing. Due to the large amount of general waste presented, proportional sampling of the general waste bins occurred due to space constraints in the collection vehicle. All waste was bagged, labelled by a property identifier, loaded into a Pantech truck hired for the purpose and conveyed to the sort site.

Image 6: MUD block bin presentation – 37–39 McLaren Street



Image 7: Bin room with wall posters – 40–44 Rosalind Street



Representative sample

Figure 1: Sample limitations overview

- The sample for this audit is necessarily small due to the high per-capita cost and resource-intensive nature of waste auditing.
- There is always a small probability of inadvertently collecting waste from atypical households, resulting in non-representative data.
- As high-rise households are sampled by building, waste generation is calculated as an average per number of households in the building, regardless of occupancy and use of the bins provided. This is the same approach as used for MUD generation calculation in kerbside audits.
- Weekly generation rates are calculated based on the proportion of waste sampled, which is extrapolated.

4.1.2 Sorting

All bags for each address were grouped together and sorted as a single sample.

Image 8: Samples ready for sorting



The samples were sorted into 20 categories. The general waste stream was sorted into four (4) key material categories and the food organics sorted into 16 material categories consolidated into acceptable and contamination.

Table 5: General waste sorting categories

General waste sorting categories			
Loose food	Containerised food	Vegetation	Other
Food waste sorting categories			
Acceptable	Contamination		
Loose food	Food in other bags	Paper/cardboard	Hard plastics
Food in compostable bag	Containerised/package food	Flowers	Glass
Food in paper bag	Vegetation/wood/timber	Textiles	Metals
	Soft plastics	Contaminated paper	Dog poo/kitty litter
	Others (specify)		

Separated materials were placed into appropriate containers. Each bin and contents were weighed on a set of electronic scales zeroed to the weight of the tray/bin. The weight and volume for each material were recorded together with the property ID.

Image 9: Acceptable food organics



4.2 Data analysis

Data analysis was performed by APC's statistician. The analysis is based on the materials being accepted in each bin type. To standardise data to kilograms per unit per week (kg/unit/week), all waste was extrapolated by the total amount of waste collected versus the total amount observed and divided by number of units in each complex to gain kg/unit/week.

Units of measurement: Unless otherwise stated, the standard unit of measurement for reporting is weight.

- **Generation** is the amount of waste generated per unit. Generation is reported in *kilograms per unit per week* and can refer to a total weight of single or multiple waste streams per week, or weights of individual or consolidated categories within a single waste stream.
- **Composition** is the percentage, by weight, of individual or consolidated categories comprising the waste stream.

Individual material categories vs. consolidated material categories: The 20 individual categories to which materials were sorted have been consolidated in some charts and tables in this section. Charts are generally based on consolidated categories while tables list the details of individual material categories.

- **Individual material categories** are the agreed sorting categories for this audit, as agreed at the commencement of the project.
- **Consolidated categories:** this report aggregates some materials by grouping individual material categories to assist with interpretation and to present a large amount of data clearly and visually in charts.

Contamination has been calculated based on acceptable and non-acceptable materials in the food organics stream.

Other details: results are presented to whole numbers or one decimal place. Consequently, data in charts and tables may not add up to 100%.

4.3 Quantitative Results

This section shows the results of the three audits and a time series of six months from trial commencement to completion. To make meaningful comparisons we used the pre-pilot, mid-pilot and trial completion data from waste audits conducted at the same buildings to determine system performance and household behaviour.

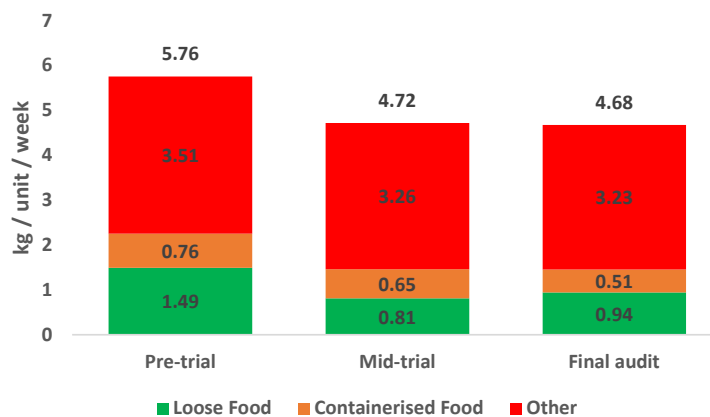
There are four key measures of performance in any trial. These are:

- **Generation** – amount of general waste generated per household
- **Yield** – amount of food waste generated for separate collection
- **Contamination** – how clean is the food waste being separated
- **Recovery rate** – how well are households diverting food from the general waste bin into the food scraps bin.

4.3.1 General waste – Generation

By weight, the general waste generation declined by 1 kg/unit/week with the introduction of the food organics bin throughout the trial period. The new average for MUD households in the trial is 4.7 kg of general waste per week of which 0.94 kg is loose food and 0.51 kg is containerised food that if decanted could be added to the kitchen caddy.

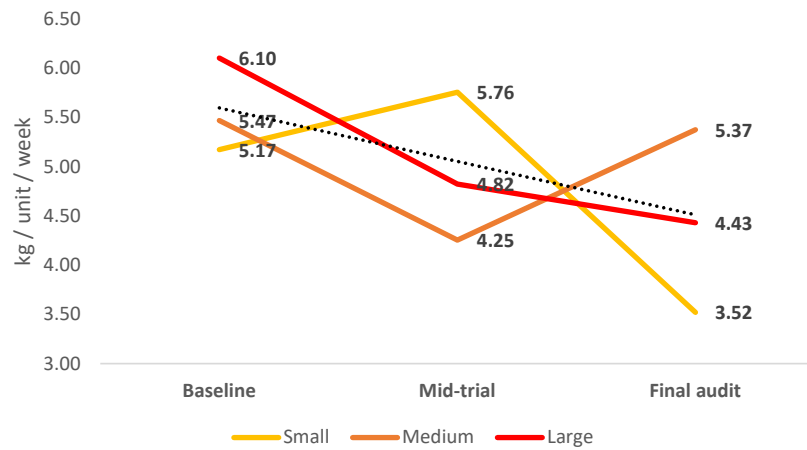
Figure 2: General waste stream generation across the trial period



General waste generation by block size

When comparing general waste generation by block size as illustrated in Figure 3, small MUD blocks have decreased waste generation by 1.9 kg/unit/week while large MUDs have decreased by 1.6 kg/unit/week. Medium-sized units were static or demonstrated a small increase of 0.2 kg/unit/week.

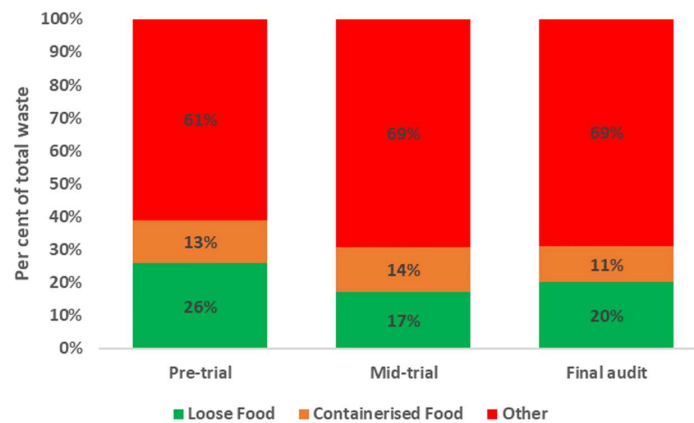
Figure 3: Comparison of general waste generation by size of block



General waste bin composition

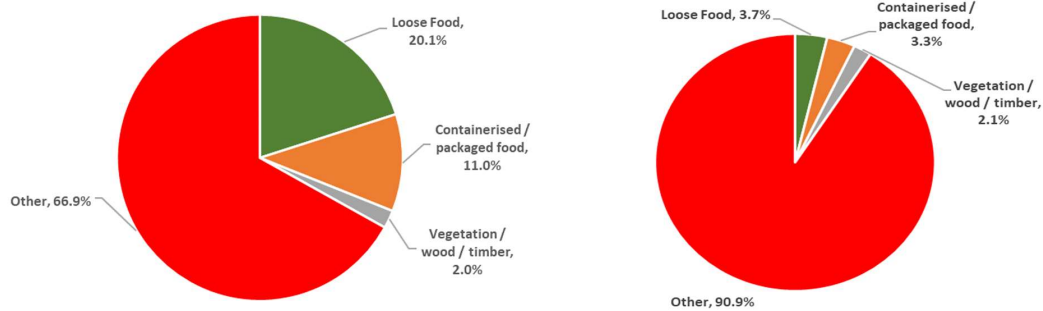
Figure 4 compares the general waste bin contents during the pre-, mid- and post-trial audits. The trend shows a decrease in loose food by weight over the trial period of 6% and a small decrease in containerised food of just 2%.

Figure 4: Composition of general waste stream across the trial period



The new food recovery program has the potential to divert up to 20% by weight and only 4% by volume of loose food waste in the general waste bin. Food takes up less space because it is dense in nature. A further 11% by weight and 3% by volume could be diverted if containerised/packaged food were decanted.

Figure 5: General waste composition by weight and volume



4.3.2 Food organics

Figure 6 shows the comparison of food organics composition from the mid-trial audit to final audit. Almost all food waste was presented in compostable bags, with 88% in mid-trial audit and 80% at the final audit. Some loose food was presented with just 4% in mid-trial and 7% at the final audit. Contamination, which is anything other than food and biobags, was 13% at the final audit and had almost doubled between the two audits.

Figure 6: Comparison of percentage of waste from the food organic bins

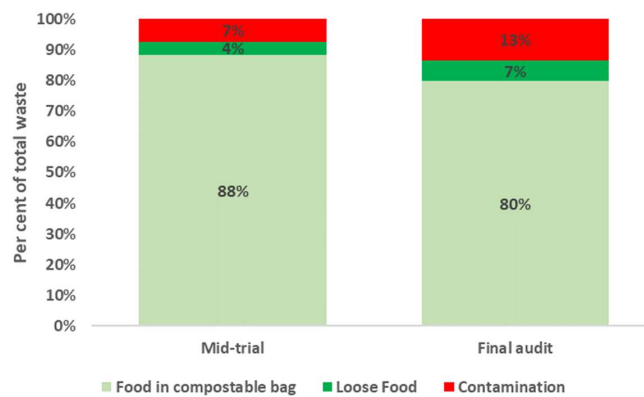
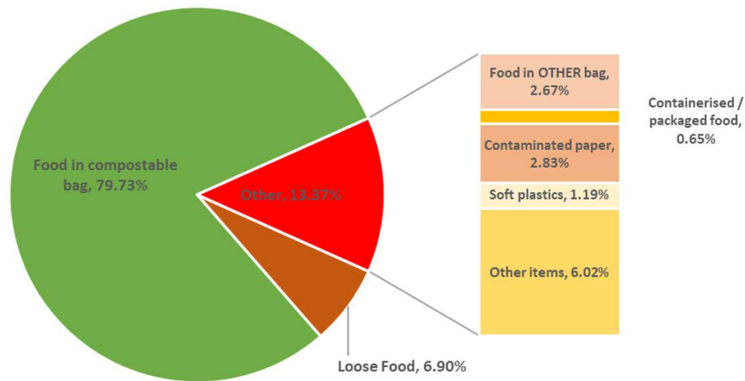


Image 10: 80% of all food was presented in Council-issued biobags and 7% as loose food



By weight, food in compostable bags and loose food comprise 87%, with the remaining 13% being contamination, where residents are placing the wrong thing in the food bins. Typical contractual arrangements for processing requires contamination to be less than 5% by weight or penalties may apply.

Figure 7: Food organics composition by weight



By volume, acceptable food waste comprised 58% and contamination by volume is 42%.

Figure 8: Food organics composition by volume

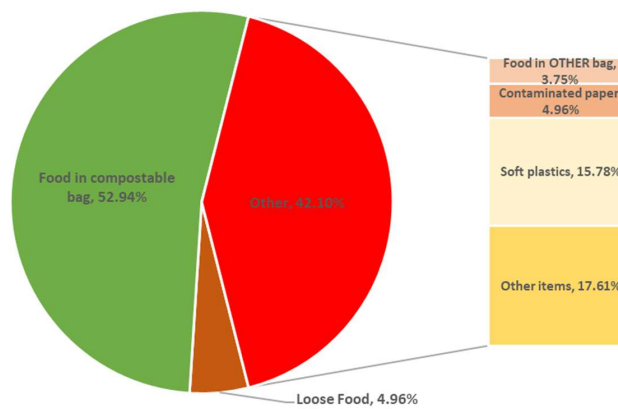
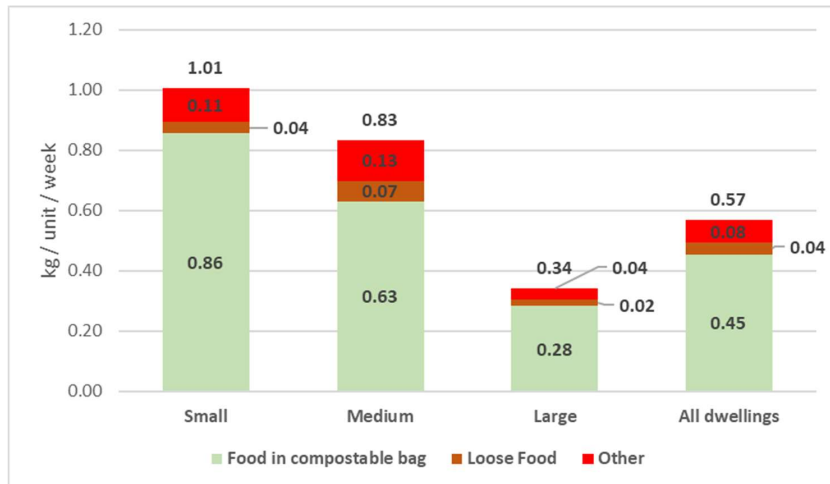


Image 11: Food in other bags and soft plastics contaminating FO bins



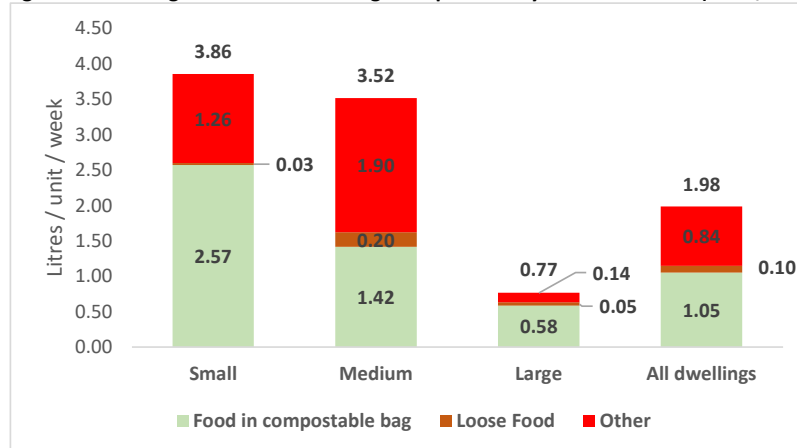
By weight, the average MUD unit generates 0.57 kg of food organics per week for collection. Small-sized MUDs generate the most, at 1.01 kg, medium-sized MUDs 0.83 kg and large MUDs generate the least at 0.34 kg.

Figure 9: Average weight of food organics per unit by MUD block size (kg per unit per week)



By volume, the average MUD unit generates 1.98 litres of food organics per week for collection. Small-sized MUDs generate the most, at 3.8 litres, medium-sized MUDs (3.5 L) and large MUDs generate the least at 0.7 litres.

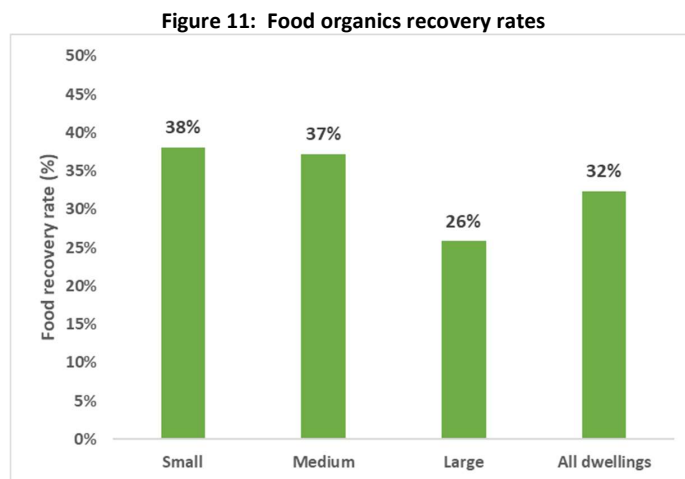
Figure 10: Average volume of food organics per unit by MUD block size (litres/unit)



The behaviour of residents in different block sizes as manifested in the audit results should be also considered when planning for an extended food scrap collection program. The trends over the entire trial period indicate higher waste reduction and more food waste recovery in small MUDs than large MUDs. Contamination of food waste bins was similar by weight in small to medium but significantly higher in medium-sized MUDs by volume due to the nature of the contamination.

Recovery rates

This tells us how well households are diverting food from the general waste bin by weighing the amount of food found in the FO bin and dividing by the total amount of food found in both the food and general waste bins. The overall recovery rate is 32% or just less than a third of all available food is separated. Both the small- and medium-sized MUDs at very similar at 38% and 37% respectively and outperform large MUD buildings at just 26%.



Bin volume capacity

Council provided a 120-litre MGB based on a ratio of one per 20 units. However, as the average food organics bins are only 20% full, a significant decrease in the number of FO bins per MUD property could be realised. Table 6 shows that the bin fullness of all 20 x 120 L food organic bins presented for collection. Of the bins presented, 10% were between 90–95% full, 5% between 65–80% full and 70% less than 60% full.

Table 6: Food organics bins fullness by count and proportion

Per cent full	Number	Per cent
<40%	11	55%
40% to 50%	1	5%
55% to 60%	2	10%
65 to 80%	1	5%
90%, 95%	2	10%
NP	3	15%
Total	20	100%
Median bin fullness	20%	

The median bin fullness of all food organics bins is 20%.

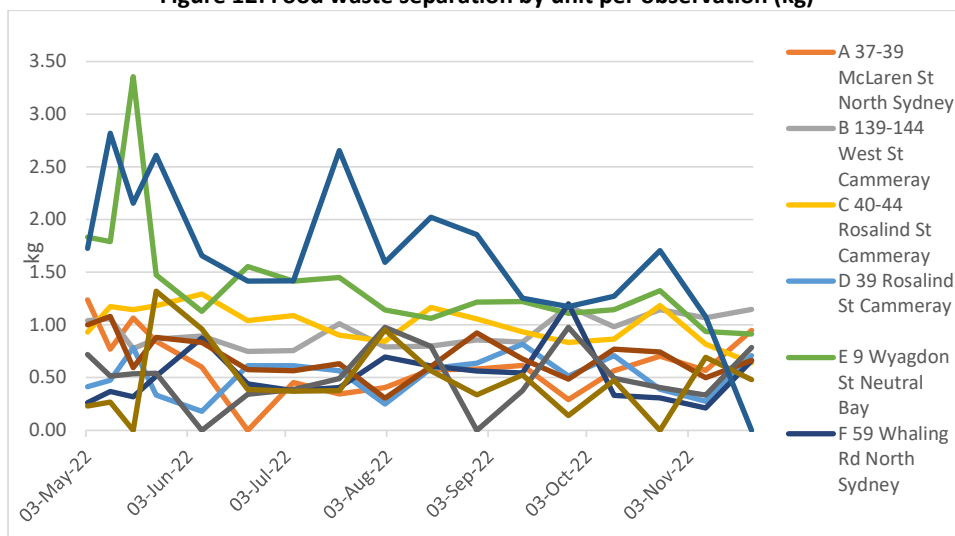
Image 12: More than half of the bins are less than 20% full



4.3.3 Field monitoring

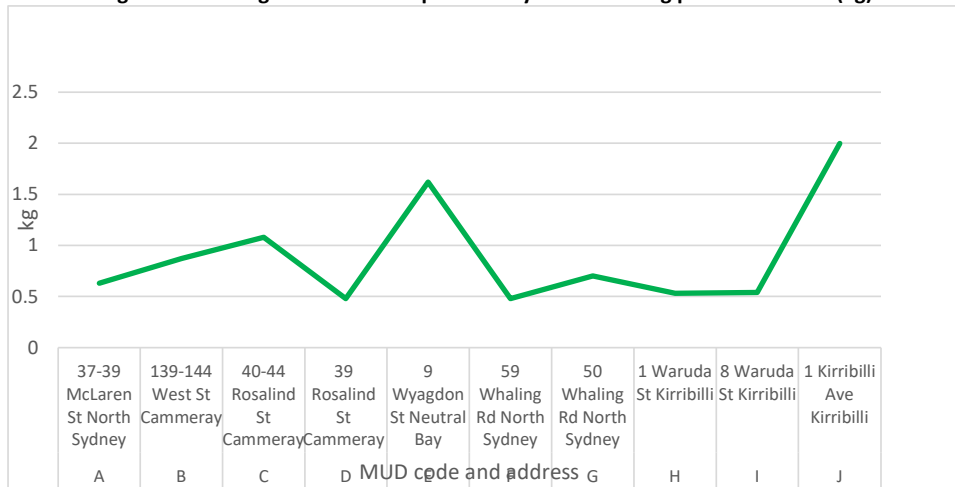
APC staff monitored both general waste and FO bins at each address – initially weekly for the first four weeks and then fortnightly to gauge residents’ participation and activity over time. Figure 12 shows the variation by MUD address by week in relation to the trial.

Figure 12: Food waste separation by unit per observation (kg)



The chart below shows the average food waste separated for recovery across the pilot per unit by address based on 10 observations.

Figure 13: Average food waste separation by MUD building per observation (kg)



The top three MUD performers were 1 Kirribilli Avenue, Kirribilli recorded the highest separation at 2 kg/unit/week followed by 9 Wyagdon Road, Neutral Bay with 1.5 kg/unit/week and 40–44 Rosalind Street, Cammeray recorded just over 1 kg /unit/week. There was an overall decline in food recovery over the six months of the trial.

Figure 14: Total food waste separation by observation (kg)

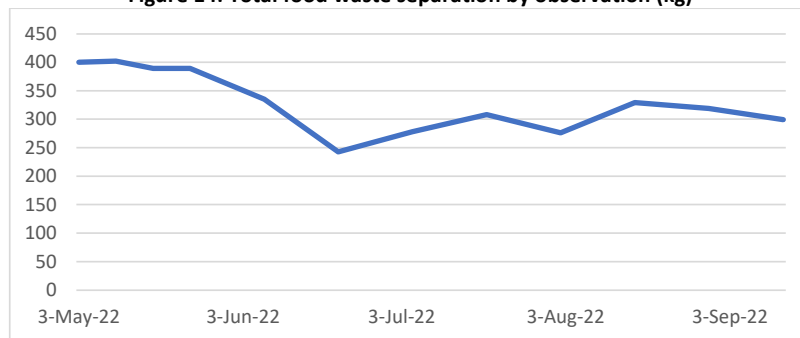
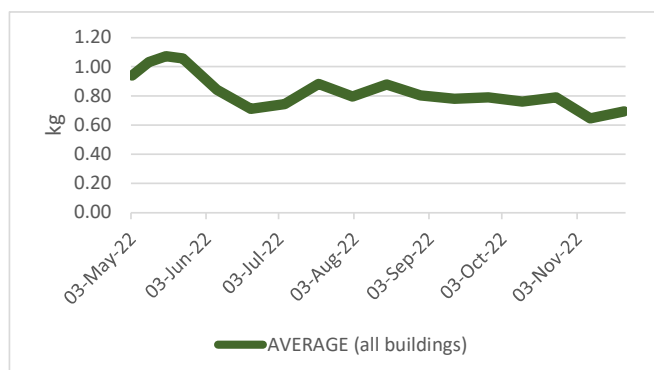



Figure 15: Average food waste separation by unit, all buildings, per observation (kg)



APC's supervisor made the following observations per building from his visual assessment over the course of the trial.

Table 7: Observer comments per MUD building

Address	Units	Observer comments
37-39 McLaren St North Sydney	81	Regular instances of cat litter wrapped in newspaper throughout the entire trial despite NSC alerting the building of this persistent error but to no avail. Four FO bins allocated but only 1 or 2 presented.
139-144 West St Cammeray	50	Regular contamination by generic plastic bags, food packaging, polystyrene, general waste and recyclables including cardboard & glass. Each FO bin was located on each floor of the building for convenience. All were presented for collection regardless of fullness with some only 5% full. Need to consolidate bins prior to collection by building maintenance.
40-44 Rosalind St Cammeray	53	Consistently good performers. Food bins were at back of bin room and difficult to access. Sometimes FO bags were left on top of other bins in the hope someone else would be able to access the FO bins. Issue with size of bin storage rooms. Refer to image 3. 
39 Rosalind St Cammeray	15	Worst performers in trial. Consistently low FO presentation and consistently high contamination.
9 Wyagdon St Neutral Bay	20	Consistently good performers with high participation and low contamination rates.
59 Whaling Rd North Sydney	41	Always presented unbagged loose food often with a liquid which is acceptable except it requires bin cleaning and poor visual aesthetics which may have impacted or dissuaded other users.
50 Whaling Rd North Sydney	80	APC intervened and presented bins as necessary as no-one took responsibility for presenting bins as directed/requested. On average half of the bins were contaminated with recycling in generic plastic bags.
1 Waruda St Kirribilli	36	Inconsistent participation and presentation. Some strong vocal opposition by body corporate to being included in the trial at the beginning may have influenced residents.
8 Waruda St Kirribilli	11	Poor participation. Poor presentation. Possibly attributable to cleaning contractor being the same as for #1 Waruda St. Refer comments above
1 Kirribilli Ave Kirribilli	21	Best performers of trial. Consistently low contamination and high participation rates.

5. QUALITATIVE RESEARCH

A community engagement plan is provided in **Appendix A**. Pre- and post-trial surveys were distributed to trial households and the results are provided in this section. Both surveys were completed by 46 households or a 11% response rate. A summary of the baseline survey is provided in Table 8 and the post-trial survey results in Table 9. The demographics of respondents are provided in **Appendix B**.

Table 8: Baseline survey results

Question	Response
Q1: How important to you is reducing household waste to landfill?	<ul style="list-style-type: none"> 89% important
Q2: How important is it to you that Council investigate options for reducing waste to landfill through programs such as food scraps recycling?	<ul style="list-style-type: none"> 91% important
Q3: Do you support Council investing in a dedicated food waste collection and recycling service?	<ul style="list-style-type: none"> 93% support
Q4: How likely are you to separate your food scraps and dispose of them in a dedicated bin?	<ul style="list-style-type: none"> 96% likely
Q5: Do you usually separate general waste and recyclables in your home before disposing of into the bins?	<ul style="list-style-type: none"> 98% yes
Q6: Does your household or apartment block currently have a worm farm or compost bin?	<ul style="list-style-type: none"> 87% no 11% not sure 2% yes
Q7: If yes, which type?	<ul style="list-style-type: none"> 2% compost bin
Q8: To help Council gather more information would you be willing to participate in the following?	<ul style="list-style-type: none"> 74% online forum 30% telephone survey 22% focus group discussion

Pre-trial survey summary

- 89% said it is important to reduce household waste to landfill.
- 91% said it is important that Council investigate options for reducing waste to landfill through programs such as food scraps recycling.
- 93% support Council investing in a dedicated food waste collection and recycling service.

Table 9: Post-trial survey evaluation

Question	Response
Q1 Did you participate in the food scraps collection trial?	<ul style="list-style-type: none"> 100% yes
Q2: How often did you use the food scraps collection service?	<ul style="list-style-type: none"> 71% always (daily) 24% sometimes (weekly) 2% other/comment 2% no response
Q3: How often did you use the kitchen caddy and the compostable caddy liners provided by Council?	<ul style="list-style-type: none"> 90% always (daily) 7% sometimes (weekly) 2% no response
Q4: How has your use of the of the caddy and food scraps collection changed over the trial period?	<ul style="list-style-type: none"> 67% used the same 11% used more often at end of the trial 2% used less often at end of the trial 2% no response
Q5: On a scale of 1–5, where 1 is poor and 5 is excellent, how would you rate the kitchen caddy?	<ul style="list-style-type: none"> 69% – 5, 24% – 4, 2% – 3, 2% – 1, 2% – no response
Q6: On a scale of 1–5, where 1 is poor and 5 is excellent, how would you rate the compostable kitchen caddy liners?	<ul style="list-style-type: none"> 45% – 5, 19% – 4, 19% – 3, 10% – 2, 5% – 1, 2% – no response
Q7: On a scale of 1–5, where 1 is poor and 5 is excellent, how would you rate the informational/educational material provided overall?	<ul style="list-style-type: none"> 62% – 5, 24% – 4, 7% – 3, 2% – 2, 2% – 1, 2% no response
Q8: On a scale of 1-5 where 1 is poor and 5 is excellent, how would you rate your overall experience with the food scraps collection trial?	<ul style="list-style-type: none"> 69% – 5, 21% – 4, 5% – 3, 2% – 1, 2% – no response
Q9: Would you support this program being introduced on a permanent basis?	<ul style="list-style-type: none"> 93% – yes, 5% – no, 2% – no comment
Q10: What percentage of your household's food waste was separated for recycling?	<ul style="list-style-type: none"> 69% all (100%) 14% most (more than 75%) 5% some (around half) 5% not much (less than half) 7% no response
Q16: Is there a waste chute present in your building?	<ul style="list-style-type: none"> 52% – yes, 43% – no, 5% – no response
Q17: Did you use this chute to dispose of food waste during the trial?	<ul style="list-style-type: none"> 52% –no and 48% – no response
Q18: Do you wish to be added to the 'keep informed' list	<ul style="list-style-type: none"> 57% – yes, 38% – no, 5% – no response

Post-trial survey summary:

- 100% of respondents participated in the food scraps collection trial.
- 93% support this program being introduced on a permanent basis.
- 71% used the food scraps collection service daily and 24% weekly.
- 90% daily used the kitchen caddy and liners daily and 7%% weekly.

- 67% used the food scraps collection program the same over the trial period, 11% used more often by the end of the trial and 2% used less often by the end of the trial.
- 93% rated kitchen caddy as good to excellent, 64% rated the compostable kitchen caddy liners as good to excellent, 86% rated the informational/educational material provided good to excellent.
- 81% rated good to excellent the overall experience with the food scraps collection trial.

A number of open-ended questions were asked. A summary of key themes is provided below and the full responses are provided in **Appendix C**.

Has there been any positive aspects from the food scraps program?

- *I am having a more sustainable lifestyle.*
- *Significantly reduced the amount of rubbish going into the regular bin.*
- *We were able to reduce our waste into the landfilled bins by at least 60%.*
- *I now only have to empty my garbage bin once a week. There's basically nothing in there now and it never smells as all perishables are in my caddy. Also I noticed that everything I was putting into my garbage was mostly soft plastics. This encouraged me to be more mindful of my waste and encouraged me to make an effort to return my soft plastics to the supermarket. I also found that the introduction of the food scraps scheme helped develop a community feel among my apartment block. We would often stop and chat about the program and positive changes in being mindful of our waste. We would congratulate ourselves when the outside waste bin was full.*
- *I was unaware of how much food waste two adults can produce.*
- *Reduced volume of waste from household. Communal bins are less full and less smelly.*

Can you suggest any practical improvements to this trial?

- *The bags need to be more resilient.*
- *Improve the durability of the bin liners.*
- *Stronger (if possible) caddy liners.*
- *The bags would often have started to decompose and would fall apart.*
- *The compostable caddy liner could be slightly bigger so that it would not tear and be a better fit in the kitchen caddy.*
- *My building could have had better signage indicating the bins were for FOOD WASTE ONLY as some people threw plastic containers in the bins. I did raise this matter with building management.*
- *It would be good if the caddy lid was secured. We had to put ours outside as it attracted cockroaches and the lid blows open in the wind.*
- *More convenient caddy emptying points closer to each building rather than the central garbage room.*

Do you have any other comments?

- *Please make it permanent!*
- *It was a great initiative and should be continued; it all helps minimise landfill.*
- *Thank you! Please keep doing this!*
- *Yes ... please extend and continue the program.*
- *I'm sure everyone in our building wants the trial to become a permanent program. We totally support it!*
- *Please bring it back permanently ASAP!*
- *Please continue this service!*
- *The trial should be now permanent.*
- *Would be interesting to know what happened to all the food scraps collected and what the environmental impact was.*

- *This is a great service and I do hope that the Council continues to provide it.*
- *I think it is an excellent idea and encourage it to be adopted by the council as long as the cost is not too burdensome, i.e. bags are supplied FOC.*
- *Most of the people in our building did the right thing.*
- *Recycling food waste (or food organics garden organics) could be used to fertilise Council's gardens and sporting fields. I would imagine waste is one of the most expensive items on any council's bill. Reducing waste going to the landfill would not only have environmental benefits, it would reduce the costs for Council and myself as a council ratepayer.*
- *We would like to continue to use the food waste bins.*
- *Love it, please bring it back. It's the right thing to do.*

6. DISCUSSION

Research over many years has indicated several factors influence recycling behaviour, including socio-demographics, infrastructure, convenience, tenure (own or rent), real estate value, building age and block size. Any sample should aim to gain as much representation of these diverse factors as possible. Caution should be applied as this is a very small sample, but it provides an indication of the likely community response to the introduction of such a project.

6.1 Key performance indicators

The key performance indicators of this trial are both quantitative and qualitative, and each is discussed below:

- **Generation** – amount of waste generated per household
- **Composition** – what is left in the general waste bins that could be diverted
- **Contamination** – how clean is the food waste being separated
- **Recovery rate** – how well are households diverting food from the general waste bin into the food scraps bin
- **Resident support** – do they support the project and what suggestions do they offer to improve, change or modify.

General waste generation – General waste generation decreased by an average of 1 kg/unit/week. This is a substantial shift and represents a decrease of 20%. Some of this material was diverted to the food organics bin. The remaining decrease could be due to smart shopping, reduction in overall food waste, improved recycling practices or other factors unknown at this time. There was a consistent trend over the trial period.

General waste composition – Overall food waste in the general waste composition reduced from 26% to 20%

Food waste generation – Range from 0.5 kg in high rise to 4 kg in low- and medium-sized MUDs with an overall average of 1.1 litres/unit/week.

Food waste composition – Contamination of the food scraps stream increased from 7% to 13% by weight and 42% by volume, in part due to the change of EPA requirements that paper was no longer acceptable. Without this change, contamination would be 10% by weight. The industry standard for food-only collections is contamination rates of 5%. Common issues were food in non-biobags, contaminated paper, soft plastics and textiles.

Recovery rate – Overall, the recovery rate was 32%, which means 68% of food waste was not diverted to the food program. While disappointing that the desired outcomes of greater food waste separation have not been achieved at all sites, the results reflect the variation in individual household behaviour in any setting. While the program sought to encourage residents to separate food scraps, there is also 11% containerised food (by weight) which could also be diverted if residents decanted packaged food and put the food in the caddy and the container, if suitable, in the recycling bin.

Image 13: Containerised food not decanted



Audit summary – Overall, the trends are positive, with an overall decrease in general waste generation, although only a third of all food waste was placed in the food organics bin. The audit indicates that the amount of food diverted has decreased over the trial duration. The expectation is that at the six-month mark we are measuring sustained behaviour change. Contamination has increased throughout the trial and is above acceptable industry limits.

Resident support – Of the survey respondents, an overwhelming 93% support the food scraps program being introduced on a permanent basis with 81% rating good to excellent the overall experience with the food scraps collection trial. Most residents (90%) used the kitchen caddy and liners daily with 67% maintaining the behaviour change over the entire trial period. The kitchen caddies were liked by 93% who said they were good to excellent while only 64% rated the compostable caddy liners as good to excellent, with several noting the liners must be more durable and slightly bigger so as not to tear and be a better fit in the kitchen caddy. Council informational/educational material and resources were rated at 86%.

6.2 Other studies

6.2.1 Analysis of NSW EPA Food and Garden Bin audit data

NSW EPA commissioned a report of 23 waste audits of FOGO programs across the state². On average, 38% of available food waste was diverted from landfill across the audited areas/councils. This performance ranged significantly across councils from 5% to 78%. Most of these audits (22 out of 23) were undertaken for councils that have a weekly organic recycling service.

The diversion efficiency performance by bin configuration (highest to lowest) is as follows:

1. 54% – small bin general waste fortnightly and large bin FOGO weekly
2. 45% – user-select general waste bin size and/or collection frequency and large bin FOGO weekly
3. 41% – large bin general waste fortnightly and large bin FOGO weekly
4. 28% – small bin (120/140 L) general waste weekly and large bin FOGO weekly
5. 14% – large bin (240 L) general waste weekly and large bin FOGO weekly.

It must be recognised that NSC have a distinctly different housing profile to other local councils.

The analysis of food waste performance by service configuration shows, in general:

- councils providing a fortnightly general waste collection achieved higher food waste diversion efficiencies compared with those on a weekly service
- councils providing smaller general waste bins (120/140 litre) achieved higher food waste diversion efficiencies compared with councils with larger general waste bins (240 litre).

6.2.2 Northern Sydney Regional Organisation of Councils (NSROC)

NSROC sought to provide an evidence base to inform councils on which service options will maximise food recovery and diversion from the general waste bin from residents living in single, medium and high-density apartment buildings.³ In 2022, three NSROC member councils – Lane Cove, Ryde, and Willoughby –

² Analysis of NSW Food and Garden Bin Audit Data, Rawtec for NSW EPA 2018

³ Food Organics research Project, NSROC 2022

participated with sample groups of residents in three different housing types with 2,383 households in eight geographic areas over 14 weeks. The trials included:

- food organics (FO)
 - single-unit dwellings (SUDs)
 - low-rise/medium-density multi-unit dwellings (LR MUDs)
 - high-rise multi-unit dwellings (HD MUDs)
- food organics and garden organics (FOGO)
 - single unit dwellings (SUDs).

Each household was offered a kitchen caddy, supply of compostable caddy liners, new food-only mobile garbage bins and educational materials on correct separation techniques to encourage participation was provided. Food waste recovery was found to be 33% in MUDs and 34% in single dwellings, which compares with this trial of 32%.

6.3 Other considerations

The success of any pilot is based on resident participation. This can be influenced by many factors including:

Communication – NSC provided both the reasons for introduction of the service with environmental, economic and compliance with government directives and how to support the program.

Infrastructure support – Kitchen caddies and caddy liners were delivered to each unit door, not just to MUD building foyers. Each MUD received at least one 120-litre mobile garbage with a burgundy lid and sticker as the dedicated food organics bin. The ratio of bins allocated was based on 1 x 120-litre bin per 20 units. However, the trial showed us that large MUDs generate on average <1 L per week of food and small to medium MUDs up to 4 litres per week. Based on this outcome, the bin ratio per MUD block could be adjusted as in 60% of cases the FO bins were less than 50% full. Ideally, MUDs would be grouped based on number of units and bins allocated accordingly.

Building managers, bodies corporate and strata managers – Co-operation and support from these key stakeholders holding power in unit developments can influence the outcome by being positive (supporting) or negative (hindering) any proposed service changes. These groups influence resident behaviour directly and indirectly as bins located in difficult-to-access places, buried at the back of bin rooms or without adequate signage can be disincentives to participation. A qualitative evaluation of the program with building managers, strata and bodies corporate might yield some interesting insights of what worked and what needs to be modified prior to any further extension.

Building maintenance staff – Staff is also important to the effective running of a FO collection. Over the trial period, bins would sometimes not be presented (e.g. 8 Waruda) if there were only a few bags in the bin but this does not encourage the initiative, especially with recalcitrant or unconvinced users.

Education – Clear, concise and consistent visual aids (posters, stickers on bins, signage in bin rooms) were all imperative. However, the NSW EPA changed the acceptable materials during the trial, ruling out paper towels and serviettes (napkins). These materials were on all resident information as 'paper', however, and deemed

acceptable at the outset of the project. As a result, 3% of the contamination at the post-trial waste audit was due to residents placing paper products in the food bins as previously instructed to do.



6.5 Implementation considerations

Collection contract – The current base service per MUD property for general waste collection is 80L per household per week, which translates to three units sharing a 240L MGB. Council services approximately 30,000 MUD properties weekly. Due to space constraints, some properties' garbage bin rooms are serviced more frequently. All single dwellings have their own bins for general waste and recycling. All households have access to an on-call fortnightly bulky waste clean-up service and an on-call fortnightly bulky garden waste service. Any new service mid-contract would require a significant variation to cover this FO service component, should Council seek to introduce a new service mid-contract. The current collection contract expires 30 June 2026 with an option to extend for a further three years to align with the waste disposal contract.

Disposal contracts – All general waste is currently delivered to Cleanaway's Lucas Heights Landfill via the Artarmon Transfer Station. NSC is currently paying [*commercial in confidence \$319.00 per tonne ex. GST*] for waste disposal of which a proportion is the landfill levy, collected by disposal facilities and paid to the NSW Government. The current landfill levy is \$151.30 per tonne of waste disposed and this component is non-negotiable. The current contract expires 30 June 2024 with an extension option of five years to June 30 2029 to align with the collection contract.

Organic processing – The NSW EPA has identified approximately 1.1 million tonnes per annum (tpa) coming online by 2030 as a result of the new government policy, with much of this post 2025. Of this amount, NSC will only have about 1,300 tonnes of food only and the existing 2,200 tonnes of garden waste. There will be short-term challenges, in that there is finite processing capacity. As with any free market, pricing reflects supply and demand. It is difficult to know what the processing gate rate per tonne will be without going to market but current estimates indicate a range of between \$250–\$350 per tonne, subject to quality and quantity.

The majority of the current facilities are located in western and south-western Sydney, which provides further challenges. In most cases, NSC would be required to deliver the material to the facility as no bulking-up or consolidation facilities are available at this time on the north shore. There is a possibility that Artarmon, Ryde or Belrose transfer facilities may provide such an option in the future, subject to sufficient volumes and commercial viability for the operator.

A summary of current organic processing facilities is provided below:

ANL

- ANL are processing material at Badgerys Creek and have limited capacity for additional FO
- ANL also transfer material comprising varying organics with processing at Blayney
- Technology is generally open windrow
- New fully enclosed FOGO receival facility at Eastern Creek, minimal processing and transferring to Blayney.

Global renewables – Eastern Creek

- The GRL AWT 220 ktpa capacity facility was established in 2004 to process mixed MSW with energy recovery and an organic fraction output from a fully enclosed and automated system.
- Site is now processing MSW and is disposing of material under the levy exemption.
- FOGO processing limited capacity.

SoilCo

- Two enclosed tunnel composting facility located at Kembla Grange
- Currently building a combined new in-vessel tunnel system facility in western Sydney
- Council and commercial customers

Veolia – EarthPower Technologies

- EarthPower was an Australia-first food-waste-to-energy facility using anaerobic digestion to convert food waste into combustible gas. The by-product sludge is dried and granulated into a fertiliser
- Located at Camellia.
- Only accepts FO not FOGO with strict contamination thresholds and limited capacity.
- Processing has been suspended.

Veolia – Elizabeth Drive, Kemps Creek

- Site is now processing MSW and is disposing of material under the levy exemption. Some transfer to Topsoil.

Veolia – Woodlawn

- Transfer from Banksmeadow or Clyde rail terminus by rail to Woodlawn precinct
- Fully enclosed processing facility accepting GO and FOGO
- Currently at operating capacity for FOGO. Future availability subject to expansion of current processing capacity.

Single dwellings (SDs) – Council currently collects 2,200 tonnes per annum of bulky garden waste mainly from SDs. To collect organics generated by single dwellings, the NSW state government is strongly encouraging councils to implement FOGO services. To maximise recovery and diversion, households need to be provided with a kitchen caddy and bag liners, with FOGO bins typically collected weekly and the general waste bin converted to fortnightly collection. Council needs to be able to accommodate weekly services for special

circumstances, for example for families with small children using nappies, aged occupants using incontinence products and families with at-home medical care.

7. COST IMPLICATIONS

Complying with State and Commonwealth government directions regarding diverting food from landfill will take a concerted effort by all. There is both capital and operational expenditure required to roll out a FO/FOGO service and a number of other considerations.

7.1 Benefits

7.1.1 Avoided landfill fee

This trial has shown that a reduction in the general waste bin of 1 kg/unit/week or a reduction of 20% in weight has been achieved. Assuming this waste reduction was achieved across all MUDs in the entire council LGA, a saving of 1,358 tonnes of waste from landfill could be achieved. [*Commercial in Confidence: At a disposal rate of \$319 per tonne, a saving \$433,202 per annum could be realised*].

7.2 Implementation costs

7.2.1 Bin infrastructure

Based on a revised ratio of bin sharing of one bin per 30 MUD units for FO bin, approximately 1,000 x 140-litre bins would be required. For SDs, each residence requires a bin, therefore approximately 6,000 x 240-litres are required. The prices below are indicative and indicate bin hardware of \$350,000.

Table 10: Indicative bin infrastructure cost

Bin description	Quantity	Price today	Distribution	Total
140 L bin	1000	\$33.50	\$9.50	\$43,000
240L bin	6,000	\$38.50	\$10.50	\$294,000
RFID tags	7,000	\$1.95	0	\$13,650
Total				\$350,650

7.2.2 Kitchen caddies – 7 L capacity, 8 L singlet compost-a-pak liners per annum with delivery to each door for first year is \$640,000 and \$450,000 for each year for caddy liners and delivery.

Table 11 Indicative kitchen caddy and liner costs

Bin Description	Quantity	Price Today	Total
Caddies	36,000	\$4.62	\$166,320
Compostable bags (12 months) 2 x pack of 150, secured in a 60um outer sleeve with paper band insert, custom printed	36,000	\$9.51	\$684,720
Assembly and distribution	36,000	3.67	\$132,120
Total			\$983,160
On-going caddy liners and delivery			\$792,360

7.2.3 Education

A number of resources are required to ensure the community is both aware of the new service and is instructed on how to engage with it and use it correctly. The feedback from the community stated that the artwork, design and educational materials (posters, bin stickers, brochures) resonated with residents. Based on this response, the existing resources appear adequate and will require printing.

Table 12: Indicative kitchen caddy and liner costs

Resource	Quantity	Source	Budget
Bin lid stickers for 120 L MGB	7,000	HH Global	\$28,080
Brochure	36,000	COJO	\$12,474
'Caddy is coming' postcards	36,000	COJO	\$4,282
A3 wall corflute posters – MUD garbage storage rooms	1,000	HH Global	\$2,550
Posters for MUD foyer noticeboards	1,000	HH Global	\$687
Postage and insertion of letters	36,000		\$35,402
Printing and posting each bulk delivery of letters	36,000		\$11,500
Contingency for extra			\$5,085
Total			\$100,000

7.2.4 Food waste education officers – There are always issues to be managed with any new service, and it is important to manage them swiftly, so the community does not become disengaged. This requires 'boots on the ground' to manage the pre and post rollout of the collection service, conduct site visits and undertake community outreach including education and contamination management. It is expected that three new staff would be required for a period of at least two years to oversee and manage this new service to ensure issues are managed expediently. Indicative costs are \$300,000 per annum plus additional budget for resources and equipment.

Council may consider extending this initial engagement to effectively manage anticipated ongoing contamination, exacerbated by a transient population.

Table 13: Indicative food waste education officers 'cost

Resource	Quantity	Unit cost	Budget
Food Waste Education Officers	3	\$100,000	\$300,000
Resources and equipment		\$50,000	\$50,000
Total			\$350,000

7.3 Ongoing operational costs

7.3.1 Collection

URM, as the incumbent contractor, has provided indicative pricing for the collection of the new FO and FOGO bins, on the following assumptions:

- The new services are offered to and provided to all residents.
- The processing and delivery locations at this time are unknown so material collected will be delivered to a disposal facility approximately up to 50 km. Transport costs will vary based on the location of the transfer station or processing facility.
- The trucks will only collect one load per day due to the distances of the potential facilities.
- All trucks will be fitted with scales for bin weighing and URM trace software for real time tracking.
- URM recommends that Council place RFID tags on the bins to ensure the collection compliance and contamination management is maintained.
- As delivery destination is unknown, the daily road tolls are also unknown. Current tolls to western Sydney are \$2,800 per week for four vehicles over five days.
- For a FO/FOGO service, an additional 4 x 6*4 rear-loaders will be required whereas for FO only 4 x rear-loaders 2 x 6 x4 and 2 x 4 x2 will suffice as less volume is required due to the density of food.

Table 14: Indicative FO/FOGO collection charges

Description	Cost/truck/labour	Budget p.a.
Truck, driver and loaders	\$3,250.00 per day	\$3,380,000

7.3.2 Organics processing fees

EarthPower's processing charge for FO is indicatively \$230 per tonne ex. GST, as no landfill levy applies. Assuming 0.5 kg/week/household, an expected 1,000 tonnes will require treatment at \$230,000 per annum.

7.4 Budget summary

Table 15 provides an overall summary, based on the costs outlined in this section and the avoided fees.

Table 15: Indicative costs to introduce new FO/FOGO services

Description	Year 1 Costs	Year 2 Costs
Bins – FO and FOGO and delivery	\$350,000	-
Caddies with liners and delivery	\$983,160	-
Compostable liners 2 x 150 per annum, on-going	-	\$742,360
Resources – stickers, brochures, signs, posters, postcards, letters	\$100,000	35,000
Education officers and resources	\$350,000	\$350,000
Collection – 4 x truck and crew	\$3,380,000	\$3,380,000
FO/FOGO processing gate fee	\$230,000	\$230,000
Subtotal	\$5,393,160	\$4,737,360
Less avoided landfill 1 kg/household/week	\$433,000	\$433,000
Subtotal	\$433,000	\$433,000
Total	\$4,960,160	\$3,052,000
Per household per year increase	\$137.80	\$119.57

7.5 Australian Carbon Credits Offsets

We have also calculated that the total carbon emissions saved by introducing a FO service and avoiding 1,300 tonnes of food from landfill could be 2,852t CO₂-e.

If Council introduces FO or FOGO voluntarily, Australian Carbon Credits (ACCUs) can be claimed, however these are not available after the services are mandated in 2030. Anything done under government mandate or regulation is not voluntary abatement and therefore does not qualify.

The Clean Energy Regulator provides information regarding participation in the Emissions Reduction Fund. For a project to be eligible for registration under the Emissions Reduction Fund it must:

not have commenced before it has been registered with the Clean Energy Regulator nor be required to be carried out by or under a Commonwealth, State or Territory law.

Acceptable projects are listed on the Emissions Reduction Fund project register. Project types include, among others:

- *alternative treatment of organic waste*

Projects generating abatement create ACCUs which are then eligible for sale on the Australia's Carbon Marketplace, with a current market value of \$35 in March 2023.⁴ One tonne of avoided carbon emissions is eligible for one ACCU. This means that 1,402 tonnes of CO₂-e would generate \$99,820.

⁴ [ACCUs.com.au](https://www.accur.com.au)

8. SUMMARY

While both the Commonwealth and NSW state governments have enshrined the reduction of organics by 50% by 2030, and NSW state government has mandated local councils introduce FO/FOGO collection by 2030, it is local government that will be responsible for both designing, implementing and financing the service changes.

The introduction of this new service is the most significant waste management service change council will introduce in more than a decade. Implementation needs time to be well planned and adequately resourced as it impacts every household in the council area. The implications of getting it wrong cannot be underplayed.

A comprehensive Communication Strategy, with strategic key stakeholder framework, timelines for the implementation of proposed service changes, key issues, resources required to deliver, appropriate communication channels and collateral is recommended.

The introduction of this mandated service change will require a considerable shift in our behaviour starting in the kitchen, how residents and others such as building managers and cleaners manage our waste disposal on site, through to collection, processing and managing contamination and, creating confidence in and demand for a new organic product in the market. It also relies on the support of the waste processors who are still reeling from changes in legislation which effectively resulted in the cessation of waste processing in New South Wales in 2018.

Currently, more than 50 other NSW councils across the state have introduced food and garden organics services, however the majority of these councils are in rural areas where organics processing is close by, properties do not have space constraints, populations are stable, medium-density housing is minimal and high density non-existent.

In terms of metropolitan councils, a number with similar population densities to North Sydney have introduced food-only services or have undertaken extensive trials to multi-unit dwellings as a precursor to service introduction. These councils include the City of Randwick, City of Sydney, Parramatta City Council, Inner West Council and Willoughby Council. In almost all cases, household separation and recovery of food waste is around a third or 33% by weight, with the remaining food placed in the general waste stream.

There are several key issues that require consideration as they pertain to NSC's specific circumstances, including that the current NSC collection disposal-based contract expires on 30 June 2024 with an extension option of five years to 30 June 2029 to align with the collection contract. The collection contract expires on 30 June 2026 with option to extend for a further three years to align with the waste disposal contract. Both contracts align with an end date of 30 June 2029.

Negotiating contracts within contractual timelines can be problematic and may hand contractors an advantage, whereby they can effectively name their price because they are not competing in an open market. Accordingly, APC recommends that Council take advantage of the timeframe afforded by the options provided under the current waste disposal and collection contracts to adequately prepare for the significant impending service changes.

Council will need time to prepare contract documentation for public tender for both collection, receipt and processing of organics as well as the provision of bins, caddies and liners.

In preparation for the transition to a new service, Council will also need time to consult with the community and stakeholders to review and update planning controls to the Local Environment Plan (LEP) and Development Control Plan (DCP) to include specifications for food waste collection and ensure that new developments adequately consider in their design the requirements for access, additional bins, location, construction and servicing.

We are advised that as a result of the government's new policy, more than 1 million tonnes of organics will require processing. NSC's contribution to this staggering amount is just 1,300 tonnes. Given the small amount of material, Council will be a price taker as this amount will not attract any opportunity to negotiate with processors. Currently, there are limited organics-processing facilities available and those that do exist have limited spare capacity. In the interim given the time required to build new facilities to expand capacity, organics-processing fees will reflect supply and demand and are likely to increase significantly.

The NSW EPA is also in discussion with technology providers to develop accessible and commercially viable processing facilities for food organics and municipal solid waste streams. We also note the recent amendments to the NSW EPA'S criteria for what is acceptable to place in FO bin and anticipate that further developments are likely as we move toward 2030. The key message is that Council has time to plan and re-evaluate as Industry and the Government's position evolves.

To increase North Sydney's commercial leverage, APC recommends that Council continues to engage with councils in the region to collectively tender for a processing solution that aligns with the local community's needs. There is concern amongst local government that the introduction of food waste to vegetation will contaminate what is otherwise a clean stream, increasing processing costs and negating the value of this product, in a metropolitan market that is already saturated with high quality composted vegetation. The introduction of a food only service mitigates this risk.

Research has found that to gain maximum food waste recovery Council needs to provide households with kitchen caddies and specific types of caddy liners that meet Australian Standards. Caddy liners will need to be replaced annually and while many options exist in the supermarket, some do not comply with current new EPA guidelines. Also, given the highly transient nature of the population in the LGA, replacement caddies and liners will be an ongoing cost.

The anticipated costs to introduce a FO service to all MUDs and a FOGO service to all SDs will be in the vicinity of \$5 million or \$140 per household per annum in today's dollars. The year two costs and ongoing years will be less, however with inflation and a number of unknowns, it is worth considering that year one prices may be the norm.

The next three to six years afforded by the current collection and disposal contract terms, directly benefits Council. Firstly, by allowing time for Industry to rebuild confidence in the market and invest in much needed processing infrastructure to address the current capacity deficits. Secondly, it provides the time necessary for

Council to effectively consult stakeholders, develop strategic partners, determine the best available solution, procure services at competitive prices, engage the community and execute proposed future service changes.

To encourage implementation, the NSW EPA has offered a number of grants to councils to support the transition. Grant support may be available to offset some if not all costs associated with service introduction, including mobile garbage bins, caddies, liners and community education. Additional service costs, however, are estimated at \$3 million per annum.

Subject to the number of units in each complex and the site configurations, many premises will have limited space and will have difficulty providing adequate room for one or more bins. It will be important for Council to have dedicated staff to assist residents in addressing their issues and concerns in a timely manner.

Based on the above APC recommends the following:

- Council continues to engage with key stakeholders such as NSROC and other councils within the region to identify potential for alignment of Council's preferred service model and tender timeframe in order to leverage opportunities arising from a joint tender.
- Use the time afforded by the current collection contract terms, to review and update the Local Environment Plan (LEP) and Development Control Plan (DCP) to include specifications for food waste collection and ensure that all new developments adequately consider in their design the requirements for access, additional bins, location, construction and servicing.
- Develop a comprehensive Communication Strategy, with a strategic key stakeholder framework, timelines for the implementation of proposed service changes, management of key issues, identifying resources required to deliver and developing effective collateral and communication channels.
- Lobby Government to invest in and secure waste infrastructure to future proof waste management for the Sydney metropolitan region.
- Council liaises with the NSW EPA to identify funding opportunities and/ or opportunities to participate in pilot programmes for emerging technologies.
- Conduct a market analysis/ review closer to the time of tendering to re-assess infrastructure capacity, emerging accessible technologies and market pricing.

Image 15: Food waste recovery



APPENDIX A COMMUNITY ENGAGEMENT STRATEGY FOOD SCRAPS COLLECTION TRIAL

Prepared June 2021

Councils are required under the *Local Government Act 1993* to inform the community of particular issues that potentially affect their way of life. North Sydney Council is committed, both in principle and in practice, to engaging on matters affecting the North Sydney community.

1. Introduction

Council has resolved to undertake a Food Scraps Collection Trial to gauge the community's level of interest and support in the delivery of a food waste collection service. This Strategy outlines the steps Council will take to engage stakeholders in the Trial.

The Trial will be conducted with a randomly selected representative sample of households from multi-unit dwellings (MUDs), representative of the majority of the housing stock in the North Sydney local government area (LGA) and home to 90% of the population. The Trial will evaluate general attitudes to the proposed service; actual involvement by monitoring over a six-month period and analyse the quantity and quality (in terms of contamination) of food scraps being diverted from the general waste stream.

1.1 Council's Community Engagement Protocol

This Strategy has been prepared in accordance with Council's *Community Engagement Protocol*. The Protocol is used to determine the level of impact and community engagement applicable to this project. Community engagement opportunities will be provided across a range of 'engagement' levels. This proposal has been determined as:

LEVEL OF IMPACT	LEVEL OF ENGAGEMENT
High/LGA-Wide	Inform/Consult/Involve

Council used the framework shown below to select the most appropriate 'level(s) of engagement' and range of methods for this proposal:

LEVEL OF IMPACT	LEVEL OF ENGAGEMENT
Inform	Providing balanced and objective information to help the community understand problems, alternatives, opportunities and/or solutions to food waste and Council's options for diversion from landfill
Consult	Obtain feedback from participating households on their experience and suggestions for improvement or otherwise
Involve	Work directly with the participating households throughout the process to ensure that concerns and aspirations are consistently understood and considered
Collaborate	Partner with the public in each aspect of the decision including the development of alternatives and identification of the preferred solution

Table 1.1 Derived from the IAP2 Public Participation Spectrum

2. Background

At its meeting on 30 November 2020, Council resolved:

- “1. THAT the Residential Food Scraps Collection and Processing Trial report be received.*
- 2. THAT the Food Waste Collection Trial is progressed in accordance with the budget and methodologies and timeframes proposed in the details outlined in this report.*
- 3. THAT Council seeks three quotations from waste consultancies listed in the Local Government Approved Panel to assist Council in the planning, management and implementation of the trial.*
- 4 THAT a final report is provided to Council on the results of the Food Waste Collection Trial.”*

The North Sydney LGA has a population of 73,514 people (2016 Census) accommodated in approximately 36,000 residential properties, with medium and high-density housing making up 90% of all dwellings. The most densely populated suburbs are Kirribilli, Milsons Point, Lavender Bay and Neutral Bay. The average household size is 1.99 persons per household.

Council’s waste management objectives are to provide a high-quality waste and recycling management service that:

- is cost effective, representing good value to its residents;
- maximises the proportion of waste diverted from landfill;
- maximises the opportunity and value of collected materials to be reused and recycled;
- ensures that waste handling, processing and disposal are performed in accordance with Council’s commitment to protecting the environment and ecological sustainability and meets all regulatory requirements; and
- generates minimal complaints and meets customer satisfaction targets.

Waste collection services are currently provided by URM using a fleet of rear-loader trucks. Council provides a weekly general waste (red bin) and recycling service (yellow bin) in a range of bin sizes based on need, and a fortnightly on-call garden organics (green bin) waste service and loose hard waste collection. Residents in multi-unit dwellings predominantly utilise 240-litre mobile garbage bins (MGBs) which are shared based on one bin for every three units.

In 2018, the NSW EPA banned the application of mixed waste organics outputs to land due to risks associated with chemical and physical contaminants. The ban has limited Council’s options for recovery of organics waste. Thus, the current disposal contract for residual waste allows for waste to be sent to landfill with no opportunity to extract the organic fraction. The organic material when disposed of in landfill breaks down and creates methane, a greenhouse gas contributing to climate change. Council is investigating other options for capturing the organics waste material and diverting it from landfill.

A compositional waste audit of MUD residual bins in 2021 revealed that loose food waste comprises 35% of the waste in the bin.

Council has previously conducted representative sample surveys in the lead-up to each waste contract renewal, each time seeking resident opinion regarding services offered, with the most recent survey (2018)⁵ eliciting only a 5% response to the question of level of support for an organics collection for composting. Many rural and metropolitan councils are now offering combined food and garden services known as FOGO. These services tend to be offered where garden waste collection services already exist on a fortnightly collection cycle to which food scraps are added and the service frequency increased to weekly, while the general waste bin is then collected fortnightly to maintain cost control. Given the low levels of garden waste generated due to the high-density living, a FOGO service is not a viable option for the North Sydney LGA.

3. Community Engagement Strategy

3.1 Who are our community stakeholders?

The Trial identifies a randomly selected sample of residents within MUDs in the Wednesday waste collection zone as representative of the entire MUD population. The sample target is 410 households including both owner/occupiers and tenants. Contact with residents will be made directly with householders and the owner's corporation (via the appointed strata manager) for each MUD.

3.2 Key Communication Messages

Council is currently achieving a 34% diversion rate (this includes green waste and recyclables from the yellow bin), a significant shortfall from the waste diversion target of 70% Diversion from landfill by 2030 as set out in NSW legislation and Council's *Environmental Sustainability Strategy 2030*.

- Council is investigating options to achieve greater diversion, hence the proposed Food Scraps Collection Trial.
- Participation in the Trial is free for selected households, and Council will provide all the necessary materials to make it easy for participants to take part.
- All food waste collected will be sent to a NSW EPA-approved facility for composting and recycling, recovering material that can be used to nourish soils.
- Council has received a Local Government Transition Fund grant of \$180,000 from the NSW EPA to enable the trial.
- Recycling food waste is good for the environment, stopping food waste from going to landfill and contributing to climate change.
- Council will use community feedback and experience to determine the viability and delivery of a future service.

3.3 Timetable

Stakeholder engagement will occur at various times during this six-month period. The key project phases are outlined in the following table:

⁵ The engagement outcomes are available via *Council Report 26 March 2018 – Waste Tender and Community Engagement Outcomes*, available from Council's website.

Phase	Timing
1. Research and scoping	May/June/2021
2. Consultation	Inform: February 2022 Consult: February to March 2022 Involve: March 2022 to September 2022
3. Review and report Trial outcomes to Council	November 2022

3.3.1 Phase 1 – Research and Scoping

This phase involves meeting with Council’s key stakeholders to determine the best community engagement approaches for the Trial and resources required to support delivery over the Trial period.

3.3.2 Phase 2 – Consultation

Between February and March 2022, Council will inform and consult with the randomly selected participating households about the Trial. This will involve contact with the strata managers/bodies corporate and then residents to inform them about the Trial and confirm their participation. This will be informing (educating) the selected households about their involvement (i.e. what they need to do, what equipment is provided, etc). The six-month trial will run from March 2022 to September 2022 in order to generate robust data.

During the Trial it is intended that an online platform (closed forum) be used to help participants to engage with each other to find out more information, build a community of practice, discuss user experience and feedback/ideas for improvement, etc. This approach will facilitate participant self-service and enable a central point of communication to and by Council.

The following engagement methods will be used, not listed in priority order:

Method	Target Stakeholders	Engagement Level	Purpose
Introduction letter	Strata and participating residents	Inform	Inform strata and participants of the trial, what is involved, what they are asked to do and how they can provide feedback
Council website (and Your Say North Sydney web page)	All		Inform the community and participants about the Trial and why Council is undertaking it. Include FAQs.
Postcards (advising of Trial prior to commencement and delivery of caddies and liners)	Participants		Inform the participants about the Trial and encourage involvement in it
Survey (hard copy and online)	Participating	Consult	Obtain feedback on the Trial as a potential solution to diverting waste from landfill and desired user experience, via a two-stage survey (onset and completion)
Online Forum	Participants	Consult/Involve	Closed forum open only for registered Trial participants to find out more information, build a community of practice, discuss user experience and feedback/ideas for improvement, etc.

Note: In accordance with Council's Community Engagement Framework described on page 1, the 'level of engagement' per engagement method is indicated.

3.3.3 Phase 3 – Reporting

This Phase involves presenting the outcomes of the Trial. This will include a synopsis of participants experiences, responses from surveys and participation rates. These results will inform Council decisions on the future of a possible food scraps collection and recycling service across the LGA.

4. Opportunity Cost/Rationale

Engaging the community in this proposal may entail financial costs to Council to achieve a high-quality engagement process. If the process is robust, community ownership of the decisions made will ensure efficient outcomes. Insufficient or poor-quality engagement can result in poor long-term decisions requiring further resources to rectify. The aim of a high-quality community engagement process is to make sustainable decisions. The engagement process will help Council staff and/or councillors to understand the related recommendations rationale.

5. Further Information

For further information contact Bo Karaula, Waste Management Co-ordinator, Open Space & Environmental Services Division:

Phone: 9936 8100
Email: yoursay@northsydney.nsw.gov.au
Website: www.northsydney.nsw.gov.au

APPENDIX B SOCIO-DEMOGRAPHIC OF SURVEY RESPONDENTS

Table 16: Socio-demographic of survey respondents

Question	Baseline survey	Post-trial survey
Q10: Do you own or rent your home?	<ul style="list-style-type: none"> • 59% own/mortgage • 37% rent • 2% other • 2% no response 	<ul style="list-style-type: none"> • 62% own/mortgage • 36% rent • 2% no response
Q11: How many people live in your home?	<ul style="list-style-type: none"> • 50% 2 people • 28% 1 person • 9% 3 people • 7% 4 people • 4% other (please specify) • 2% no response 	<ul style="list-style-type: none"> • 50% 2 people • 31% 1 person • 10% 4 people • 5% 3 people • 2% 5 people • 2% no response
Q12: Who resides in your home?	<ul style="list-style-type: none"> • 43% couple • 28% single person • 11% family with young children • 11% family with older children • 4% other (please specify) • 2% sharing homes 	<ul style="list-style-type: none"> • 50% couple • 31% single person • 12% family with young children • 5% sharing with mates • 2% no response
Q13: What age groups are in your household?	<ul style="list-style-type: none"> • 37% aged 35-49 • 28% aged 70-84 • 17% aged 25-34 • 17% aged 50-59 • 7% aged 0-4 • 7% aged 18-24 • 4% aged 5-11 • 2% aged 12-17 • 2% prefer not to disclose 	<ul style="list-style-type: none"> • 29% aged 70-84 • 26% aged 35-49 • 21% aged 25-34 • 21% aged 60-69 • 12% aged 50-59 • 10% aged 0-4 • 7% aged 18-24 • 7% aged 5-11
Q15: How long have you been living in your home?		<ul style="list-style-type: none"> • 93% more than six months • 2% less than six months • 5% no response

APPENDIX C FULL RESPONSES TO OPEN ENDED POST PILOT SURVEY QUESTIONS

Has there been any positive aspects from the food scraps program?

- I am having a more sustainable lifestyle
- Incentivised to actually compost in an apartment building. It is quite hard otherwise.
- I definitely noticed a decrease in the amount of waste being put in our regular bins
- Realised how much food scraps we are producing everyday
- We definitely separated out all our food scraps
- Feeling we may be making a positive difference
- **Significantly reduced the amount of rubbish going into the regular bin**
- **Yes....reduction in landfill**
- **We were able to reduce our waste into the landfilled bins by at least 60%.**
- Yes, saves food waste going down the building rubbish chute, breaking and making the chute smell
- Yes, more aware of recycling and composting
- No change to existing garbage habit
- I was happy that I was chosen to participate in the Food Scraps Program as I had been feeling for a long time that I wanted to be able to do this. It was good to see my non-food scraps bin being lighter, as well as not having to throw it away as often in landfill
- Yes. Good to see good scraps not wasted and not end in landfill or contribute to global warming
- I'm now helping the environment
- I now only have to empty my garbage bin once a week. There is basically nothing in there now and it never smells as all perishables are in my caddy. Also I noticed that everything I was putting into my garbage was mostly soft plastics. This encouraged me to be more mindful of my waste and encouraged me to make an effort to return my soft plastics to the supermarket. I also found that the introduction of the food scraps scheme helped develop a community feel among my apartment block. We would often stop and chat about the program and positive changes in being mindful of our waste. We would congratulate ourselves when the outside waste bin was full.
- A big reduction in waste in the red bins in our building!
- I feel I'm helping with care of the environment
- Decrease in general waste
- I was unaware of how much food waste two adults can produce.
- No – it is a waste of time and resources
- Excellent initiative. I have hated not being able to recycle scraps
- Yes, more awareness in food consumption. Overall less rubbish
- Much less general waste
- Reduction in waste collection for our building
- It is very convenient and makes you feel good that you are helping to keep rubbish from landfill
- Seems environmentally better to compost food scraps, also other compostable items rather than putting them in landfill
- It's great to know that the food waste is being reused.
- Amazed at amount of food scraps now going to compost
- Yes! Most of my household waste is food scraps which has stopped going to landfill
- I think we absolutely must commit to this initiative and just ensure that participants fully understand what should and shouldn't go in these bins. It takes people a while to get used to separating out their plastics/PET bottles, etc. and paper, so further education might be needed around food scraps
- Many people in our apartment block seem to have used the program.
- Food scraps are being kept out of landfill. I like being able to separate it out of normal rubbish
- No personal benefit
- Significantly reduced the waste that would be sent to landfill and thus would reduce the amount of greenhouse gas emissions from the landfill. The food scraps program would have environmental benefits and help meet the demand for organic compost
- Reduced volume of waste from household. Communal bins are less full and less smelly

Can you suggest any practical improvements to this trial?

- No, it is a great initiative
- The bins should be cleaned regularly after collection
- The bags need to be more resilient. As there are only two of us we would empty the caddy after 3 or 4 days. The bags would often have started to decompose and would fall apart.
- My building could have had better signage indicating the bins were for FOOD WASTE ONLY as some people threw plastic containers in the bins. I did raise this matter with building management.
- We feel that the food scrap collection program was excellent and would like to see it continue. No practical improvements as far as we are concerned.
- The bags disintegrated too quickly as I am the only one in my household and bags really did not have to be taken from apartment to appropriate bin on a daily basis but started to disintegrate on day 3
- Better quality, better smelling bin liners
- Stronger (if possible) caddy liners
- Improve the compostable bag and prevent leaks
- I'm worried the bin may be contaminated by passers-by who see a bin and just throw anything in.
- A cleaning service for the bins perhaps once a month. The bags often leaked and the bin got a bit stinky and prone to fruit flies. Not a major thing.
- Improve the durability of the bin liners
- Have the bin designed to replace the standard bins found in kitchens. The bag was too weak to handle a half filled bin. The waste sweated and produced moisture in the base of the bin once the bag was removed.
- Do not make it permanent. It is pointless. Food scraps are organic and so therefore breakdown if added to the general waste bin. Diverting these scraps is a waste of time, effort, money and resources.
- Stronger bags
- The plastic bags/liners provided were a bit too small
- I thought the trial went well but clearance was important to avoid smells. Some people in the apartment building had a problem with discreet storage of the caddy so for some design/size options may increase appeal.
- I live in a unit block and did notice that the bins for the waste got fuller as the trial went on, so bit more education might be the GO
- It would be good if the caddy lid was secured. We had to put ours outside as it attracted cockroaches and the lid blows open in the wind.
- Thicker biodegradable bags. I wrapped my scraps in newspaper to stop the bags from disintegrating. More education perhaps. I put the sign up behind where the bin was located which obviously some people didn't read.
- Bin should be clean and accessible inside, not out in weather. Green bags should at least last until taken to bin.
- The compostable caddy liners could be slightly bigger so that it would not tear and be a better fit in the kitchen caddy
- More convenient caddy emptying points closer to each building rather than the central garbage room.
- Bags that do not leak moisture

Do you have any other comments?

- Please make it permanent!
- It was a great initiative and should be continued. It all helps minimise landfill
- Very happy with the trial
- Thank you! Please keep doing this!
- Great to see North Sydney getting around to doing this. Have lived in a part of the UK where food scraps are collected and used to generate fuel, so very comfortable with the arrangement.
- Yes...please extend and continue the program
- We would strong like to see the program continue as it has changed our way of dealing with all food scraps.
- I'm sure everyone in our building wants the trial to become a permanent program. We totally support it!
- Please bring it back permanently ASAP!
- Resources could be better used on improving recycling of plastic and glass instead of wasting the effort and resources on diverting organic matter

- Please continue this service!
- The trial should be now permanent
- Would be interesting to know what happened to all the food scraps collected and what the environmental impact was.
- This is a great service and I do hope that Council continues to provide it.
- I think it is an excellent idea and encourage it to be adopted by Council as long as the cost is not too burdensome, i.e. bags are supplied FOC
- Most of the people in our building did the right thing; several thought it was a good thing
- How do we get the liners if we have this on a permanent basis?
- Bring it back please
- Please make it permanent!
- Please keep it going!!
- Recycling food waste (of Food Organics Garden Organics) could be used to fertilise Council's gardens and sporting fields. I would imagine waste is one of the most expensive items on any council's bill. Reducing waste going to the landfill would not only have environmental benefits, it would reduce the costs for Council and myself as a council ratepayer
- We would like to continue to use the food waste bins
- Love it, please bring it back. It's the right thing to do