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Commercial Waste Study

Double Bay Commercial Centre

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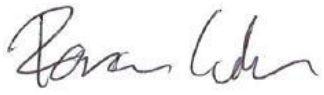

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Definitions and Acronyms

Commercial Waste	Business or commercial waste material (including general waste and recyclable materials) generated as part of ordinary business activities. It does not include construction and demolition waste, or special waste, liquid waste and restricted solid waste as defined by the *New South Wales (NSW) Environment Protection Authority (EPA) Waste Classification Guidelines 2009*
CoM	City of Melbourne
CWS	Commercial Waste Study
DA	Development Application
DCP	Development Control Plan
FOGO	Food Organics Garden Organics
GFA	Gross Floor Area
LBWMS	Laneways Business Waste Management Survey
LSPS	Woollahra Local Strategic Planning Statement
PDS	Double Bay Centre Public Domain Strategy
SSROC	Southern Sydney Regional Organisation of Councils
SWMMP	Site Waste Minimisation and Management Plan
SWOT	Strengths Weakness Opportunities Threats
WMC	Woollahra Municipal Council

1 Introduction

Woollahra Municipal Council (WMC) recognises the importance of sustainable waste management services for its communities and the necessity for clear, forward-planning as embodied in the Woollahra *Local Strategic Planning Statement 2020* (LSPS) (WMC, 2020).

A key approach to waste management by WMC is the concept of 'placemaking'. This vision looks to improve the gathering places within a community—its streets, sidewalks, parks, buildings, and other public spaces—so they invite greater interaction between people and foster healthier, more social, and economically viable communities and create vital public destinations (*Chicago Metropolitan Planning Council, 2008*). WMC looks to improve the overall viability of the Double Bay Commercial Centre by activating lane ways for business and community activities like events and alfresco dining.

Within the Double Bay Centre, the vision for laneways and small streets is set out in the Double Bay *Public Domain Strategy* (PDS) which envisions a transformation of how these spaces are used and their physical form (WMC, 2016a). This approach is also incorporated within the *Double Bay Place Plan 2019 to 2023* (WMC, 2019a) and *the Community Strategic Plan, Woollahra 2030*.

Talis Consultants has been engaged by WMC to deliver a Commercial Waste Study (CWS) for transforming laneways in the Double Bay Commercial Centre into attractive, activated places that also serve the practical needs for waste management.

The CWS will complement WMC's comprehensive urban design and planning strategy and strategies and recommendations can be applied to other centres in the municipality.

1.1 Background

The Double Bay Centre is in Sydney's Eastern Suburbs between the two ridges of Darling Point/Edgecliff and Bellevue Hill. The site is adjacent to, but visually separated from the harbour foreshore.

The Double Bay Centre contains a mix of small-scale specialty retailing, commercial, service, and residential uses. The retail activity is concentrated between Knox and Cross Streets, and along New South Head Road, Bay Street and Cross Streets.

Under *the Woollahra Local Environmental Plan* (LEP) *2014* land use within the centre is zoned "B2 Local Centre" (**Figure 1-1**). These are described and constrained under the LEP and the land uses that are permitted under relevant State Environmental Planning Policies (SEPPs).

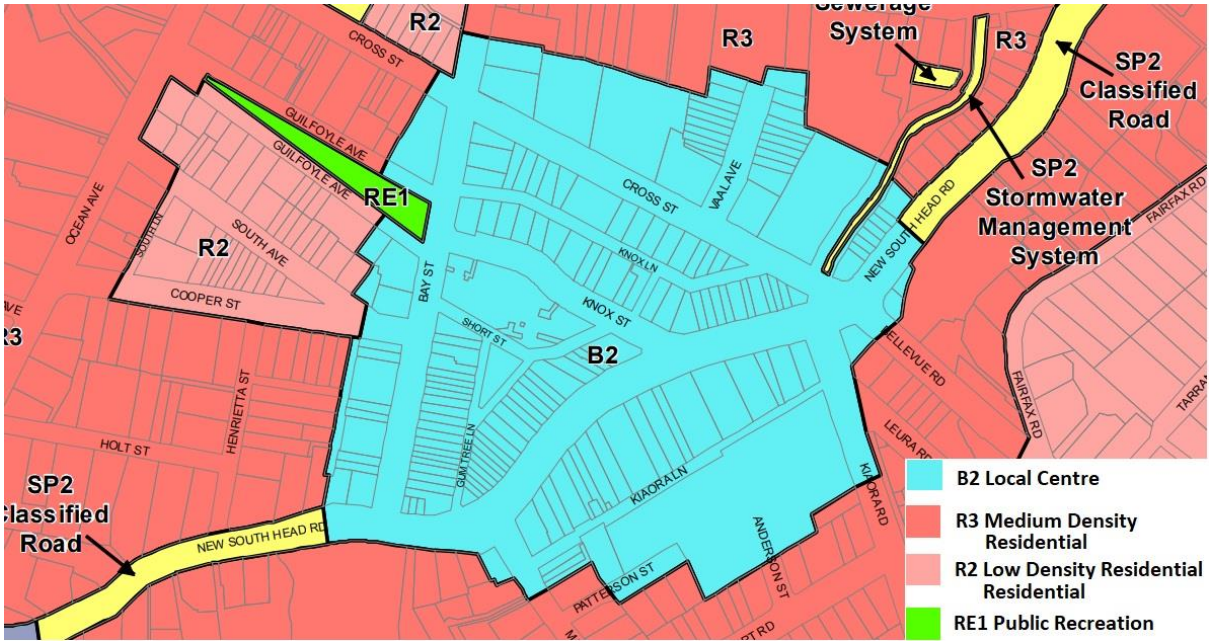


Figure 1-1: Land Use Zones Commercial Centre and Surrounds

WMC planning data (Hawley, G. pers comm. 23 Oct. 2019) and commercial trade waste data (Kauter, P. pers comm. 25 Oct. 2019) in hand with internet research, informed on the number and addresses of businesses within the Double Bay Centre. Businesses were subsequently classified in line with the *Australian and New Zealand Standard Industrial Classification* (NSIC) business types (NSW EPA, 2015b). This research indicates that there are currently approximately 430 businesses within the Double Bay Commercial Centre (WMC, 2019). Key business types are Health/Beauty, Commerce, Retail and Restaurants as shown in **Figure 1-2**.

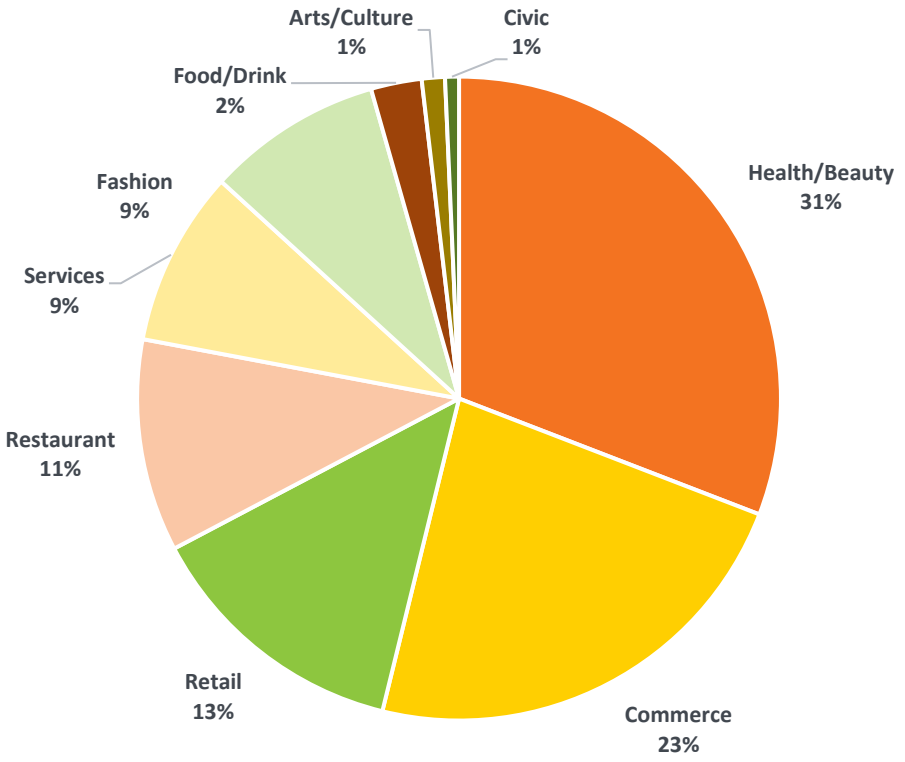


Figure 1-2: Total No. Of Businesses by Type - Double Bay Commercial Centre

1.1.1 Issues in Laneways Waste Management

Laneways were originally planned as access points to back–of–house areas for businesses for storage of materials and waste collection. This is now creating conflict where existing businesses are looking to trade on these lanes and small streets.

Current waste management concerns within the laneways include the following:

- Narrow laneways, constrained kerbside spaces and insufficient bin storage spaces for businesses;
- Exposed large and small wheelie bins;
- Unattractive bin shields;
- Multiple waste collectors and arbitrary waste collection times which impact negatively on local traffic, pedestrian access and amenity; and
- Loose rubbish and Illegal dumping.

In addition, WMC cleansing staff have reported a large increase during 2019, in shops using public litter bins for their waste (Kauter, P. pers comm. Dec 2019).

1.1.2 Problem Laneway Locations

The principal entry into Double Bay is New South Head Road which traverses the centre. Key street connections include Ocean Avenue, Bellevue, Kiaora, and Manning Roads and Greenoaks Avenue. The centre has limited street connections to the surrounding area along New South Head Road, Manning Road, Kiaora Road and Bellevue Road. This limits pedestrian access and concentrates traffic into

several key access points. Parking is concentrated in council car parks on Cross Street and Kiaora Road. On-street parking is somewhat congested throughout the centre and adjoining areas.

Knox Lane, Gumtree Lane, Goldman Lane, Brooklyn Lane, Transvaal Avenue and Kiaora Place have been identified as key problem waste areas (WMC, 2016) as shown in **Figure 1-3**.

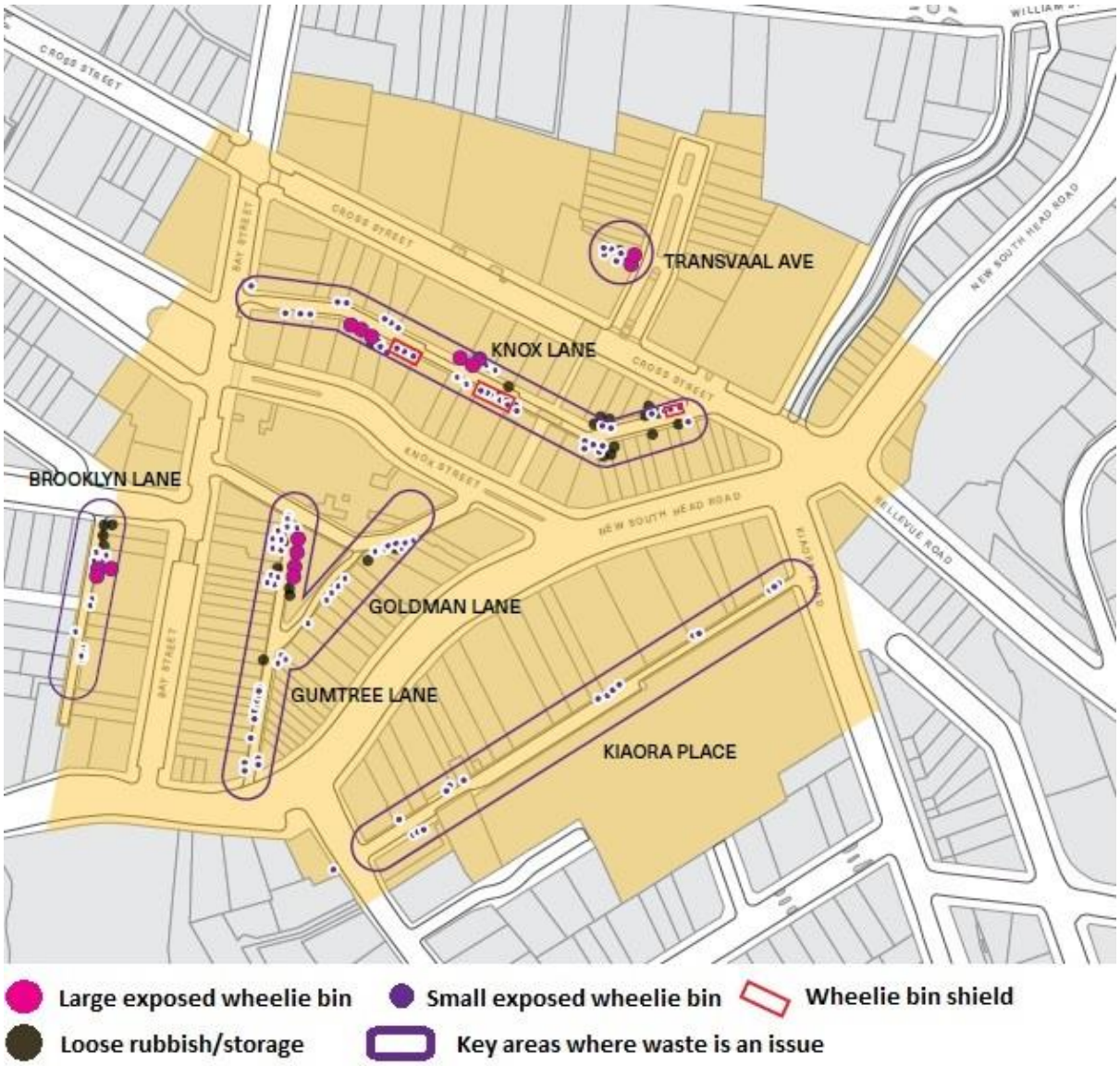


Figure 1-3: Key Problem Laneway Locations

Double Bay Public Domain Strategy 2016

A visual inspection by Talis in November 2019 found that these areas continue to be problematic in terms of littering and poor amenity.

1.2 Objectives

WMC's objectives to improve commercial waste management within the lanes and small streets in the Double Bay Commercial Centre via a planned, wholistic approach are summarised in the PDS and outlined below (WMC, 2016a pg. 38):

1. *Adopt the laneway and small streets hierarchy*
2. *Engage with property owners and business operators*
3. *Plan lane and street upgrades*
4. *Design and install new lighting*
5. *Improve overall public amenity and reduce impact of commercial waste and deliveries at rear of properties.*

WMC looks to improve amenity, community pride, 'alfresco' experiences, and pedestrian safety within public outdoor spaces. Actions Planning controls, activities and public domain improvements aim to maintain, enhance, and activate the laneways of Double Bay with improving waste management in laneways earmarked as a priority operational action plan between 2019 and 2023 in the *Double Bay Place Plan* (WMC, 2019a). In line with the broader WMC objectives, the key objectives of the CWS are to:

- Improve the attractiveness and physical appeal of Double Bay Commercial Centre;
- Minimise the impact of commercial waste such as noise, odour, amenity and the congestion associated with the management and location of business waste;
- Provide quality cleansing, maintenance, and waste services;
- Maintain and improve Double Bay's pedestrian network of roads, footways and laneways and reduce the impact of waste management on these networks; and
- Provide a waste management framework which can be extended to other centres within the municipality.

The CWS addresses and recommends solutions that will assist WMC to achieve these objectives while adequately catering for the future projected waste volumes (refuse, recyclables, food, and other commercial waste) typically generated from high density, mixed-use commercial centres. The objectives shall also be consistent with the planning priorities and actions in the LSPS which include:

- Manage future growth, new technology and changing community needs;
- Conserve our heritage, villages, local character and environment;
- Ensure resilience and sustainability despite challenges such as climate change;
- Identify areas for further detailed strategic planning; and
- Link our plans to the implementation of the NSW Government's strategic plans.

1.3 Scope

The scope of the CWS is summarised below:

- Desktop review and analysis of key WMC documentation;
- Review existing practices in the Double Bay Commercial Centre in relation to regulations and strategy impacts on local traffic and WMC from the limitations in the use of laneways for waste servicing;
- Survey of waste management practices and issues across a range of laneway business types;

- Costs estimates for recommendations; and
- The scope of the CWS was constrained to commercial (business) waste.

The CWS discusses key issues and best practice methods relating to waste management within the laneways, with the objective of minimising waste and maximising recycling opportunities, while seeking solutions for transferring, storing and collection of waste materials from businesses within the Double Bay Commercial Centre.

2 Waste Regulation and Policy Frameworks

The CWS is undertaken within the context of key regulations, policies and guidelines relating to waste management which may impact on WMC's current and future waste management operations. These documents have been reviewed and discussed below.

2.1 Waste Legislation

Key legislation, policy, strategy, educational and economic tools relating to waste management in NSW include the *Protection of the Environment Operations (POEO) Act 1997*, the *Waste Avoidance and Resource Recovery (WARR) Act 2001*, the *Protection of the Environment Operations (Waste) Regulation 2005* and the amended draft *Protection of the Environment Operations (Waste) Regulation 2017*. These main legislative documents describe the requirements for transporting, storing, processing, managing, recovering, and disposing of waste and recyclable material.

2.1.1 WARR Strategy

In particular, the *WARR Strategy 2014-2021* provides a framework for waste management until 2021. It sets to minimise waste, alter public behaviour through education and increase investment, innovation and improvement of environmental practices. In doing so the *WARR Strategy 2014-2021* aims to achieve the waste diversion from landfill targets shown in **Table 2-1**.

Table 2-1: NSW WARR Strategy diversion targets

Waste Type	2022 Diversion Target
Commercial and Industrial (C&I)	70%
Municipal Solid Waste (MSW)	70%
Construction and Demolition (C&D)	80%
Waste Diversion from Landfill	75%

2.2 Circular Economy and Waste Management Hierarchy

The circular economy is an aspirational concept that is gaining momentum and will continue to drive improvement in many industries globally.

> *A "circular economy" is an economic system aimed at minimising waste and making the most of resources. In a circular system, resource input and waste, emissions and energy leakage are minimised by slowing, closing, and narrowing energy and material loops; this can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling. As such, Australian state governments are actively targeting opportunities to incorporate circular economy principles into their respective Waste Strategies (NSW EPA, 2019)*

However, the adaptation of the circular economy to existing systems has been largely difficult, time consuming and potentially quite costly.

A more practical system may combine elements of the circular economy and align them with the implementation of the Waste Management Hierarchy resulting in a sustainable waste management cycle.

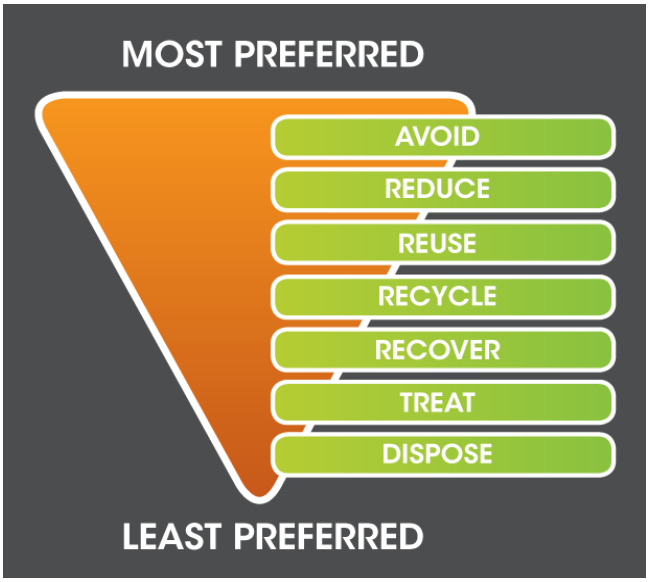


Figure 2-1: Waste Management Hierarchy

The 'Waste Management Hierarchy' is an internationally adopted principle and concept which lists waste management recommendations in order of preference according to their sustainability and environmental impacts.

As shown in Figure 2-1 recommendations which achieve outcomes higher up the Waste Management Hierarchy are preferred over those located further down the Hierarchy.

3 Waste Planning and Case Studies

This section provides an outline of the relevant local planning framework and regional planning initiatives considered applicable to the Double Bay Commercial Centre, along with a case study where laneway waste management was delivered.

3.1 Local Planning Frameworks

Local plans and controls which influence the management of waste by WMC are discussed below.

3.1.1 Local Strategic Planning Statement

The LSPS sets out the 20-year vision for land-use in the local area, the special character and values that are to be preserved and how change will be managed into the future. The LSPS looks to improve the sustainability of the built environment, businesses, transport, and lifestyles by using resources more efficiently and reducing emissions, pollution, and waste generation. Planning supports efforts to raise awareness and substantially reduce waste generation including:

1. *Reviewing waste management controls to improve management, separation and collection for (our) places and multi-unit residential buildings (including organic food waste collection);*
2. *Investigating opportunities to move towards a circular economy; and*
3. *Education initiatives to encourage reduction and re-use.*

(WMC, LSPS Action 67)

3.1.2 Double Bay Place Plan

The *Double Bay Place Plan 2019 – 2023* (WMC, 2019a) continues a placemaking approach to the management, future planning and development of Double Bay and provides a framework for decision making for both Council and other organisations/people. Waste management objectives within the Plan include:

- Provision of high-quality cleansing, maintenance and waste services (s. 3.4);
- Implementing a commercial waste management program to improve the look and feel of the lanes including attractive design recommendations for the placement and enclosure of commercial waste bins (s. 3.5); and
- Improving waste management in laneways ensuring that planning controls, activities and public domain improvements will maintain, enhance and activate the laneways of Double Bay (s. 3.7).

3.1.3 Woollahra Development Control Plan (DCP)

The 2015 Woollahra Development Control Plan (DCP) applies to development that requires development consent, including both demolition and construction activities. It identifies that a Site Waste Minimisation and Management Plan (SWMMP) is to be submitted with a development application (DA).

Key objectives are to identify on-site requirements for waste and recycling storage and management, having regard to access and amenity and to ensure waste management systems are compatible with collection services.

3.1.3.1 Site Waste Minimisation and Management Plan (SWMMP)

The WMC SWMMP is designed to complement the Woollahra DCP and is required as part of all DA's. Chapter E5 of the SWMMP provides guidelines for the preparation of site waste minimisation and management and must address all phases of development, including demolition, construction and occupation of site/premises. This document highlights the method of recycling or disposal and the waste management service provider.

The SWMMP is required to identify:

- Estimated volume and type of waste and recyclables to be generated;
- On-site storage and treatment of waste and recyclables;
- Disposal of residual waste and recyclables;
- Operational procedures for ongoing waste management once the development is complete; and
- Information to be shown on the DA plans.

In addition to submission of a SWMMP, DA plans must also clearly illustrate the proposed waste management facilities where waste/recycling will be taken.

3.1.4 Constraints under Local Planning

The WMC PDS looks to categorise and create a hierarchy within the laneways and small streets with a consistent 'service lane palette' for storage of commercial waste. Key points include:

- Integration of bins and bin storage areas within new developments in accordance with the commercial waste management plans for the centre;
- Reducing the impact of commercial waste near arcades; and
- No commercial waste storage in parts of some lanes such as Goldman Lane and Gumtree Lane.

In addition, the constraints as outlined within the SWMMP are shown in **Table 3-1.**

Table 3-1: SWMMP Planning Constraints

Section	Details
E5.3 All developments O3 – C2 - 6	• Waste and recycling storage areas are: - designed so recyclable materials are separated from general waste; - located behind building line / within non-habitable building areas; - designed to be integrated within an overall development and do not detract from the streetscape; - located so that the facility: - a) is convenient and safely located for occupants to access; - b) has an unobstructed access to the waste and recycling collection point, free of steps and kerbs and does not have a grade more than 1:8;

Section	Details
	- c) is secure and designed to minimise opportunities for vandalism; and - d) does not reduce amenity for occupants of the site and adjoining properties, by way of visual, noise or olfactory impacts. • Bulk bins, where permitted, are designed to be manually manoeuvred by one person in order to be serviced.
E5.3 All developments O4 -C7 - 10	• Waste and recycling collection points do not impact on traffic and pedestrian safety; • Bins may be collected from a kerb side location where site characteristics, number of bins and length of street frontage do not compromise safety - alternatively bins are collected on site; • Where a collection vehicle is required to enter a property, access driveways and internal roads are designed in accordance with Australian Standard 2890.2.
Commercial and non-residential developments	• Bulk waste bins are not encouraged and should only be considered for developments containing 12 or more tenancies; and • Size of waste and recycling storage area/s designed to accommodate rates of waste generation and recyclable material generation identified in WMC's Chapter E5 Waste Management.
Mixed-use developments	• Waste and recycling storage area for residential separated from commercial storage areas.

While such plans are primarily designed for new developments, WMC should consider to what extent they may constrain any proposed changes or future recommendations in laneway waste management. For example, the SWMMP identifies operational procedures for ongoing waste management once a development is complete and under the PDS, WMC may need to identify traffic and bulk waste bins constraints.

3.2 Regional Waste Planning

WMC is one of eleven municipal and city councils within the Southern Sydney Regional Organisation of Councils (SSROC). SSROC provides a forum for sharing ideas between member councils, and an interface between governments, other councils and key stakeholders on issues of common interest.

SSROC strongly supports the development of a Circular Economy Policy, where a robust Implementation Plan for NSW is evident and where such policy is adequately funded and resourced to create the transformational changes required to transition to a circular economy (SSROC, 2018b).

A core objective of the SSROC *Regional Waste Avoidance and Resource Recovery Strategy 2014-2017-2021* is to promote responsible citizenship where people avoid making waste and reuse more. (SSROC, 2017a).

SSROC members vision for the *Regional Waste Avoidance and Resource Recovery Strategy* is:

> *To manage waste for the highest level of environmental and social benefit though cost-effective resource recovery, including reducing the environmental impact of waste and using resources more efficiently (SSROC, 2018a).*

3.3 Laneways Waste Minimisation Case Study

Councils across Australia are experiencing similar issues as WMC regarding waste management in laneways and small streets. The following case study provides a brief outline of how a solution to this problem can be successfully achieved. However, this is not considered the only potential solution as discussed in detail in **Section 5**.

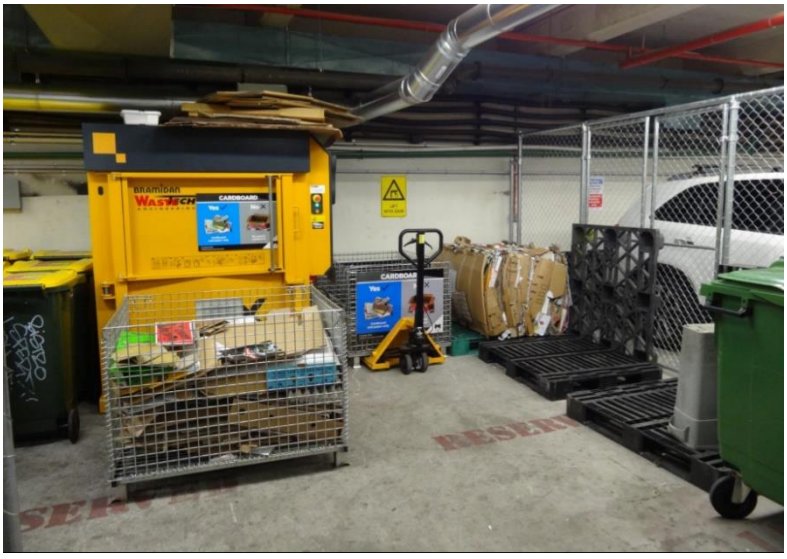
City of Melbourne Business Waste Hubs: *Degraves Street Recycling Project*

Project Objectives: *The City of Melbourne (CoM) objectives were to better manage a highly visible amenity problem with overflowing bins, dumped rubbish, litter, vermin, odour, and access issues in four laneways in a high-density business and residential area within the CBD. Secondly, CoM wanted to trial the processing of food waste as this material was not currently being recycled.*

Smart Community Waste Hubs: *A series of smart compactors were installed replacing traditional waste bins. The compactors are configured with user identification systems and are accessible at any time using an access card.*

https://www.melbourne.vic.gov.au/waste-reclcing/Pages/degraves-street-recycling-facility.aspx.

Recycling Station: *CoM has established two recycling stations at Degraves Street which cater for approximately 130 businesses. The service is free to all traders and residents in the precinct.*



Results: *The project has received strong community support and has improved amenity issues including odour, nuisance, overflowing bins, rubbish dumping and the number of collection vehicles.*

https://www.melbourne.vic.gov.au/waste-reclcing/Pages/degraves-street-recycling-facility.aspx

Future: *CoM is utilising the Internet of Things (IoT) and smart waste technology (**Section 5.4.3**) to expand and tailor a network of smart waste hubs to suit the profile of key precincts around the city. For example, more food waste and plastic recycling hubs in hospitality precincts (CoM, 2019).*

This is a "boutique response" to the high-density café demographic and is strategically located due to the high volume of businesses in the area.

4 Laneways Business Waste Management Survey (LBWMS)

A waste management survey of the laneway businesses, in the Double Bay Commercial Centre, was undertaken by Talis in conjunction with WMC between the 18th and 20th November 2019. The survey area constituted that mapped within the PDS as shown in **Figure 1-1.**

WMC planning data (Hawley, G. pers comm. 23 Oct. 2019) and commercial trade waste data (Kauter, P. pers comm. 25 Oct. 2019) in hand with internet research informed on the number and addresses of businesses within the Double Bay Centre. The latter dataset was further filtered to identify top business waste producers which were automatically included in the survey. Businesses were subsequently classified in line with the *Australian and New Zealand Standard Industrial Classification* (NSIC) business types (NSW EPA, 2015b) to sample across a range of business types as summarised in **Figure 1-2**.

98 businesses were surveyed to gain a clearer understanding of commercial waste quantities, waste management activities and issues for businesses (by business type) within the Double bay Commercial Centre. Refer to **Figure 4-1**.

Businesses within Goldman Lane, Gum Tree Lane, Kiaora Lane, Knox Lane, Brooklyn Lane, Cross Street and Transvaal Avenue were sampled, dependent on their availability at the time of the survey. Refer to **Appendix A**, regarding the mapping of the surveyed businesses.

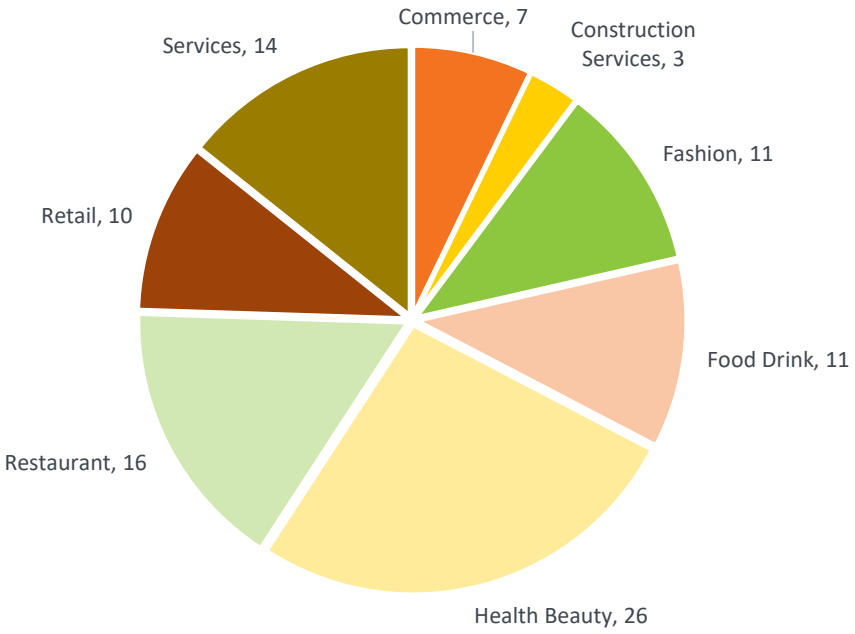


Figure 4-1: Surveyed Business by Type (incl. Brookfield/Cosmopolitan)

Brookfield Buildings 1 and 2 (27 businesses) and the Cosmopolitan Centre (25 businesses), were included in the survey area for the following reasons:

- An opportunity to understand how waste management in these laneway businesses has been transformed under centralised waste management;

- To gain perspective on their recycling habits both front and back of house; and
- To understand waste opportunities/issues currently undertaken.

Management at each centre was consulted to gain an understanding of how waste was diverted and collected and what issues were relevant for each. Businesses within these complexes typically shared common docks and waste storage locations and internal/external waste collection services to streamline waste management under their lease agreements.

4.1 Survey Questions

The LBWMS addressed the following waste management practices:

- Bin types, waste contractor used and collections;
- Waste characteristics, in broad terms, including key waste types;
- Use of waste processing equipment;
- Waste management issues; and
- Suggestions for improvement.

Feedback on business attitudes and suggestions to improve waste management were also sought from responders.

4.2 Bins, Contractors and Collections

Principal bin types utilised by businesses within the laneways and excluding the Brookfield complex and Cosmopolitan Centre were 240L wheelie bins (94%). Very few businesses used 120L bins (2%) or 660L bins (4%).

The LBWMS found all bin types to be in poor condition with no uniformity in colour-coding by waste type and older bins sometimes being incorrectly labelled under the original contractor's name. Lockable bins were employed WMC bins and were viewed by responders as being an effective deterrent to unauthorised use by other business and pedestrians (Refer to **Figure 4-2**).

Figure 4-2: Kiaora Lane Multiple Bin Types and Labelling

4.2.1 Waste Contractors

Survey responses show that laneway businesses are utilising a minimum of ten waste contractors to service the various core waste types. These are summarised in **Table 4-1**:

Table 4-1: Survey Waste Contractors by Waste Type (t. p/w)

General Waste		Comingled Recycle		Paper Cardboard	
WMC	17.3	Wasteflex	1.75	WMC	1.79
Dump It	12.6	WMC	0.54	Wasteflex	1.52
Bingo	5.5	Sydney Waste	0.46	Bingo	0.15
Sydney Waste	2.6	Cleanaway	0.37	Sydney Waste	0.15
AnyWaste	0.6	Dump It	0.21	URM	0.04
Cleanaway	0.4	URM	0.04	WMC	1.80
URM	0.2	Bingo	0.03	Wasteflex	1.52
		JR Richards	0.02	Bingo	0.15
TOTAL	**39.2**		**3.42**		**7.12**

As this is a representative sample of laneway businesses it is likely that there are more waste collection vehicles contributing to congestion and noise within the laneway environments.

Figure 4-3, **Figure 4-4** and **Figure 4-5** show the break down by percentage of each contractor by material type.

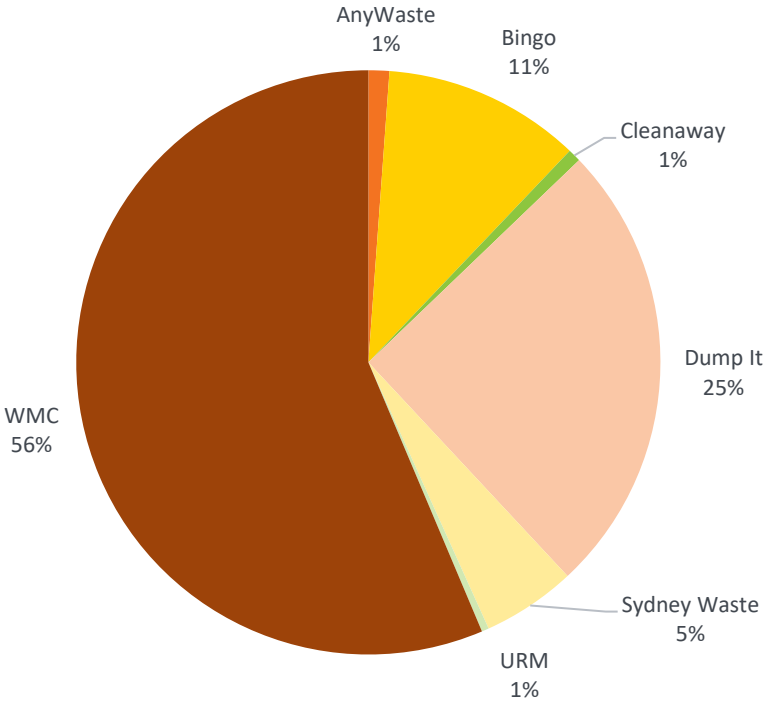


Figure 4-3: General Waste Contractors % Collections

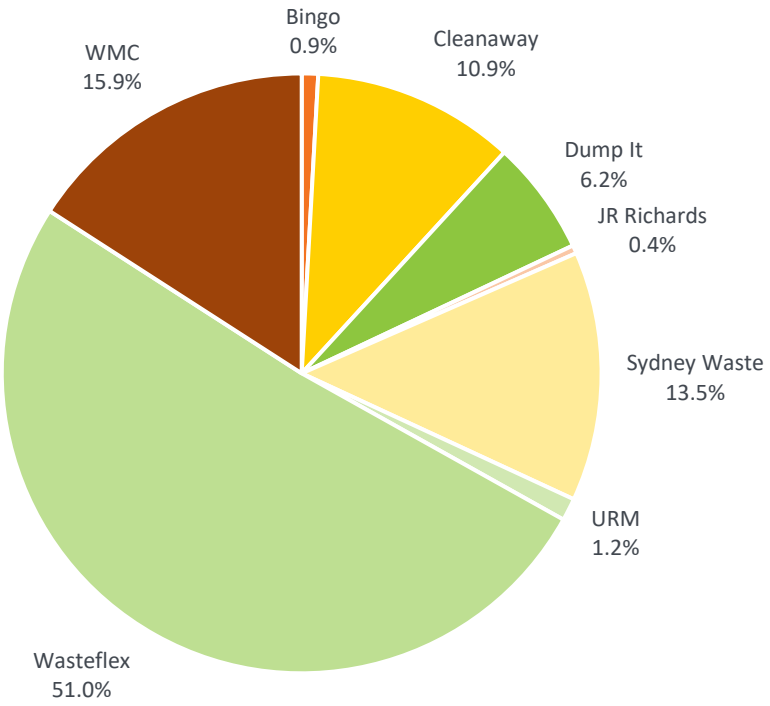


Figure 4-4: Comingled Recycling Contractors % Collections

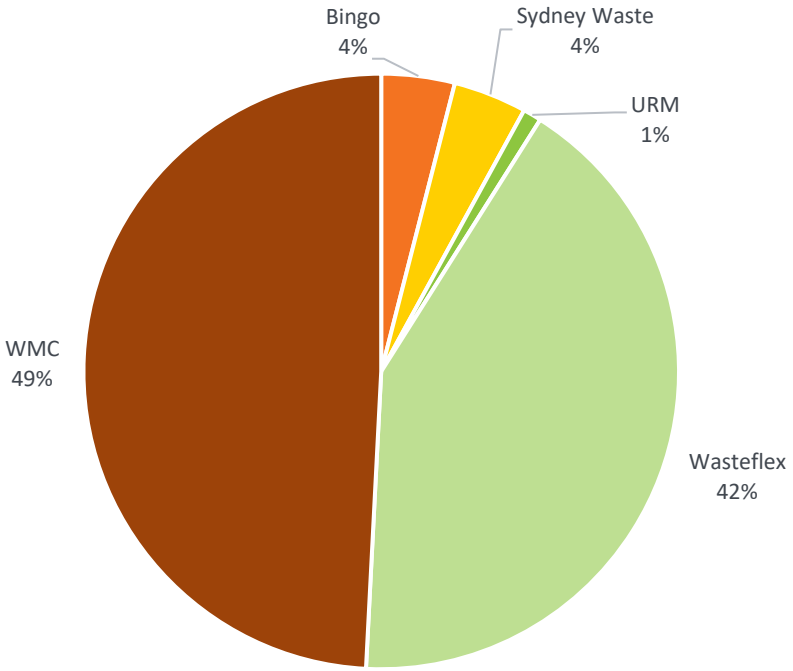


Figure 4-5: Cardboard Recycling Contractors % Collections

From those businesses surveyed, WMC and Dump It are the key providers of general waste collection services while WMC and Wasteflex are the key contractors for comingled and paper/cardboard collections.

These results indicate broad trends only, since waste collections for businesses in the largest complexes, Brookfield and Cosmopolitan Centre, are centrally managed. For example, Wasteflex operates exclusively in the Brookfield complex to service comingled recycling and paper/cardboard collections however, subcontracts these collections to other service providers. WMC provides all general waste services to Brookfield.

Some gaps existed in the LBWMS responses to bin collection schedules. For example, responders or groups of businesses under a lease agreement had no first-hand knowledge of collection schedules or responders were not involved in managing waste in their business.

General trends, however, indicate that collection schedules for retail, services, fashion, and commerce business types have collections of general waste and paper/cardboard, two to three times per week. Restaurant general waste collections were generally daily with comingled collections two to three times per week.

Where several different business types shared a lease agreement there were instances of mutual sharing of paper/cardboard bins and in rare instances general waste bins which enabled the presentation of full bins to the kerbside while minimising collections and costs.

Results from the LBWMS evidence multiple collection companies with multiple, overlapping timetables. Discussion with responders saw many businesses drawing a link between collection practices, amenity issues and the physical constraints of the laneways to handle this type of traffic.

Approximately 35% of responders indicated that they would prefer fewer contractors operating within the laneways. During discussion, numerous businesses indicated their preference for sole waste contracting within the laneways to be undertaken by WMC, with the proviso that WMC offer more competitive costing and services.

Therefore, consideration should be given by WMC to reducing the number of collection vehicles moving through the laneways and improving the timing of collections (see sections **5.4, 5.4.2**, **5.4.3**)

4.2.2 Public Use Bins

Results from the LBWMS and visual inspection of the Commercial Centre laneways indicate the following issues regarding the use and placement of public use bins including:

- Insufficient number of public use bins and large gaps in bin locations; and
- Many examples of littering, particularly coffee cups, adjacent to business waste bins.

The presence of dumped coffee cups and takeaway waste near commercial bins suggests that laneway patrons and visitors are unable to easily access public bins as they walk along laneways.

Responses indicated general concern by businesses with laneway shopfronts that lack of public bins and associated littering impacted negatively on the attractiveness of their kerbside spaces.

4.3 Waste Characteristics

As shown in **Figure 4-6**, the LBWMS found that the core waste collection types within the laneways were general waste, comingled recycling, and paper/cardboard.

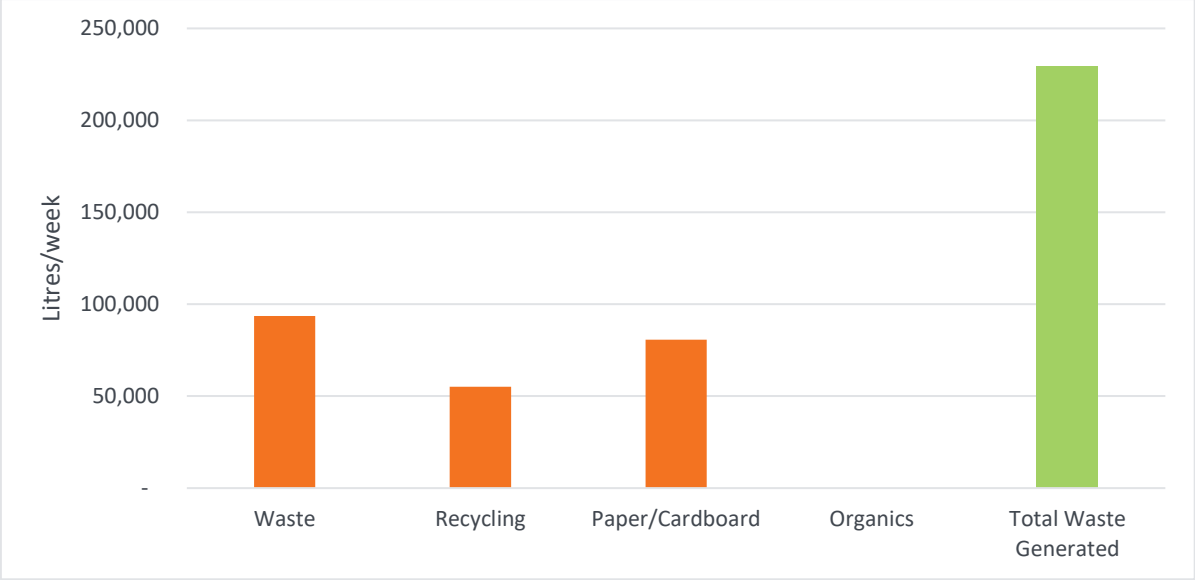


Figure 4-6: Weekly Waste Generation Rates Laneway Businesses (excl. Brookfield/Cosmopolitan)

These results indicate broad trends only and exclude the Brookfield and Cosmopolitan complexes and suggest that no laneway businesses are currently diverting organics.

The 2014 EPA *Sydney Metropolitan Waste Audit* found that the primary composition of garbage bags in Commercial & Industrial (C&I) waste was mostly food organics (26.3 %), paper (25.2 %) and plastic (20.9 %).

Discussion with businesses and visual inspection of general waste bins located in laneway public spaces during the LBWMS suggested that the principal waste types within most general waste bins align broadly with the 2014 EPA audit - food organics, paper / cardboard, and plastics.

A subset of the largest businesses within the Brookfield complex were also surveyed to gain a clearer understanding of how and to what extent they were diverting waste. Waste diversion for these businesses is shown in **Table 4-2.**

Table 4-2: Brookfield Waste Diversion – Largest Businesses (t. p.w.)

Business	Type	General Waste	Comingled Recycling	Paper Cardboard	Food Organics	Food Reuse	Plastics	Sharps
Goodstart Early Childhood Learning	Services	2400	1800					
Woolworths	Food Drink	3360		7000	5040	3360		
Dan Murphys	Food Drink	5390		8000			1000	
Double Bay Hospital	Health Beauty	5390		2450				1080

Woolworths management provided details of its core waste-related activities however follow-up with this business is recommended as waste bills were not available for review during/post the LBWMS.

It is interesting to note however, that Woolworths diverts both food organics and utilises *OzHarvest* to regularly divert substantial amounts of food back into the community.

Recommendations for WMC to divert substantial amounts of waste from laneway businesses via food donations is discussed in Section 5.3.3.

Figure 4-7 shows average waste by business type, excluding the Brookfield Complex and Cosmopolitan Centre.

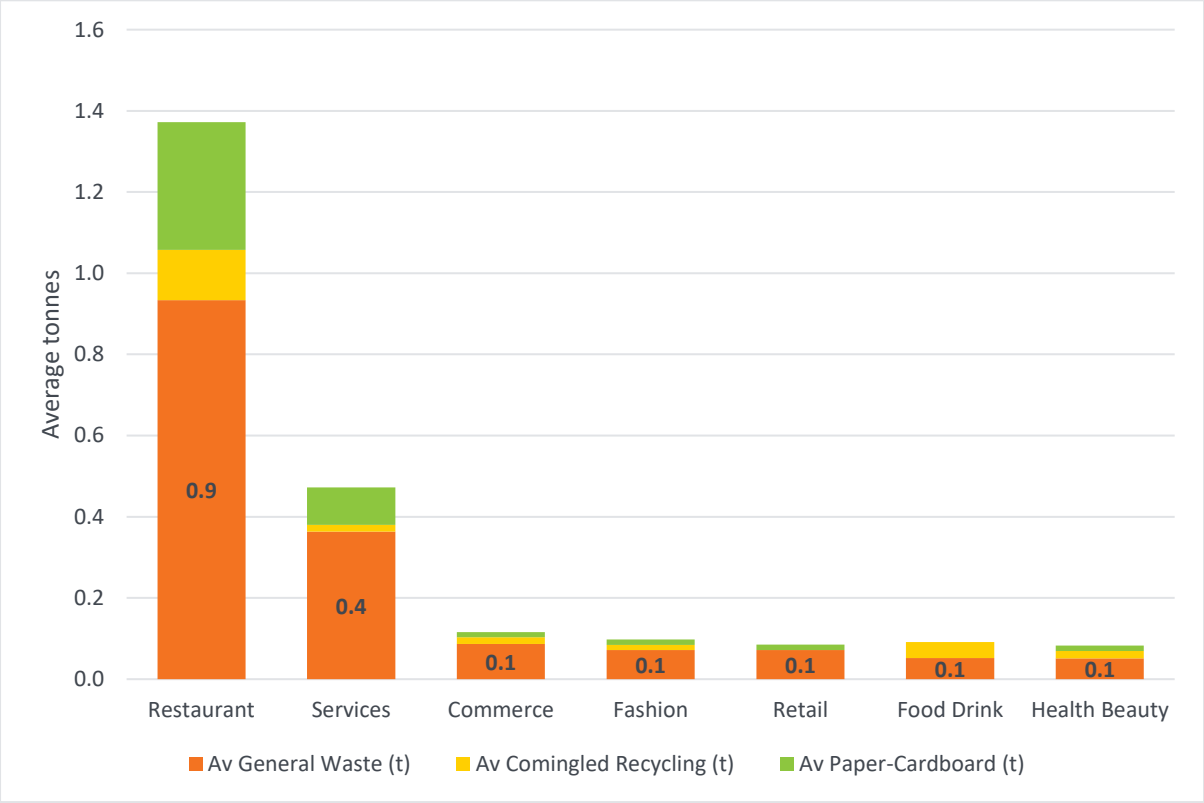


Figure 4-7: Average Waste Diversion by Waste Type and Business

As businesses surveyed varied substantially in size and in business type across the various laneways, results are best interpreted as broad trends.

Survey results suggest that businesses in the hospitality sector are likely to be the largest producers of general waste, commingled recycling, and paper/cardboard. These businesses produce approximately 53% of total laneway general waste and discussions indicate that they struggle to manage the high daily volumes of general waste produced, especially within current space constraints for bins. Between one third to half of general waste in these businesses are likely to be food organics.

All restaurants surveyed were interested in undertaking further recycling, particularly of food organics. However, due to space constraints and potential issues in engaging contractors to service this waste, most restaurants could not envisage a path forward.

Thus, solutions for targeting food organics appears to have excellent potential for waste diversion from landfill.

4.4 Discussion

Laneways are characteristically narrow and winding with limited pedestrian space, multiple waste bin types and illegal dumping.

All responses to the LBWMS indicated that the key problem in the laneways is lack of space for storage and presentation of bins, whether this be their own bins or their neighbours.

Conclusions from the LBWMS were:

- There are several constraints associated with waste management within the laneways including available space, local traffic issues, multiple waste contractors and multiple overlapping waste collections;
- There is significant waste generated within the Double Bay Commercial Centre which requires daily management;
- Composition of the waste is comprised largely of food organics, paper/cardboard, and plastics, with the largest producers of waste being the restaurants/cafes; and
- There appears to be a lack of public bins which may be causing litter issues.

Figure 4-8: Space Constraints in Laneways

These issues and recommendations to address these are discussed further in **Section 5**.

5 Recommendations

The following section outlines the proposed recommendations for consideration by WMC in devising tailored solutions to the current waste management issues faced within the Double Bay Commercial Centre. A Strengths Weakness Opportunities Threats (SWOT) Analysis and cost estimates are provided in **Appendix B** for the recommendations described.

5.1 Planning

5.1.1 Business Data Management

WMC waste planning must prioritise diversion of waste from landfill and account for future growth in the commercial sector within the confined physical footprint of the laneways.

Table 5-1 shows the estimated residential and commercial gross floor area (GFA) for opportunity sites within the commercial centre. The table shows the total number based on 100% uptake.

Table 5-1: Commercial Centre Floor Area - Projected Growth

Use	Total Gross Floor Area (m2)
Non-residential	61,946 – 65,590 (Efficiency 85%-90%)
Residential	39,924 – 42,586 (Efficiency 75%-80%)

WMC, Pers Comm, 2021

Such growth will primarily be because of redevelopment and waste planning should be accounted for.

The CWS recognises that the WMC business-related planning data for the Double Bay Commercial Centre which underpins the CWS and ideally all future waste planning, needs to be current and accurate. Ideally, this should be inclusive of key business information such as total gross floor area.

However, WMC data available to Talis prior to the LBWMS for business type, location and floor area within the Commercial Centre was outdated and did not align with data on WMC contracted commercial waste data received from Civil Operations. This type of commercial data is always changing however WMC should strive to keep data accurate where possible. Accurate data is essential in underpinning any trials implemented.

It is recommended that WMC Civil Operations, Placemaking, Strategic Planning, Chief Financial Officer the Business Chamber and other relevant stakeholders collaborate in the development and maintenance of a centralised data set on business information within the Commercial Centre.

Waste IoT applications such as smart cards and smart waste infrastructure such as Smart Community Waste and Recycling hubs (**Section 5.4.3.4**) offer the potential to automatically capture key business details including name, key contacts, address, billing, and waste tonnages to such a data set. The evolution around the use of smart cards and IoT data is rapidly developing, and can be challenging for councils and other organisations that are starting to amass increasing amounts of data from new IoT initiatives. How do we best leverage this data across the organisation? How do we manage security?

> *Combining IoT data with other sources, mining and making it available in ever more flexible and tailored ways to a variety of stakeholders is a complex task, requiring expertise and teamwork (Sacke, N., 2020) .*

Therefore, consideration should be given in this process to how this technology might drive improved business data management and sharing within WMC and beyond.

5.1.2 Planning Controls

WMC supports improved waste management in laneways via ensuring that planning controls, activities and public domain improvements will maintain, enhance, and activate the laneways of Double Bay (WMC, 2019a).

Planning controls need to accommodate evolving community waste trends including the flexibility of DAs to incorporate infrastructure such as small recycling stations in constrained commercial footprints. For example, to initiate the transfer and storage of recycling from other premises in Degraves Street, CoM needed to apply for an amendment to the Melbourne Planning Scheme.

When considering recommendations WMC should weigh the advantages of deploying smart IoT community waste and recycling hubs with smart card access, small footprint, odour reduction, sealed waste containment and compaction waste features versus the planning constraints associated with recycling stations. Whilst recycling stations are a comparatively cost-effective solution, they will likely require a range of small recycling equipment and offer in-situ waste processing or temporary waste storage. This will necessitate careful planning to satisfy local planning constraints and community expectations. Either or both approaches offer improved waste management however the key will be to meet existing WMC planning controls or evolve such to incorporate the changing needs of laneways waste management in line with state waste frameworks, recycling, and improved waste diversion from landfill.

WMC should strengthen planning instruments to solve wider waste issues. It is recommended that WMC review its *Pre DA Service* in order to address waste management at the initial planning stages for new developments. Ideally, relevant internal WMC waste management staff could attend these meetings to counsel developers.

Developers should be required to engage waste management experts to advise on optimising building design, waste separation and storage, collections, and transport considerations to deliver more robust waste management within the laneways.

Key WMC waste planning documents such as the SWMMP and DCP should also be reviewed in light of the opportunities and trends offered by smart cities waste infrastructure within the laneways environment.

5.2 Education: Waste and Sustainability

5.2.1 Integrated Community Education and Behavioural Change Program

Providing waste education is a key factor in the success of a waste management system and is important in supporting existing and new waste management services. The best performing waste

management systems are supported by strong waste education programs. Information provided within a Waste Education Program should cover the following two key questions:

- ***Why?*** Outlining the benefits of sustainable waste management practices and environmental justification for undertaking such activities; and
- ***How?*** How the community can participate in waste management services provided.

Waste education usually focuses on initiatives at the top of the Waste Management Hierarchy (Avoid, Reduce, Reuse and Recycle) as well as informing on the services provided. For maximum benefit, WMC's education program should be directed not only to local businesses and contractors but also to residents.

As part of the waste education program, a behaviour change communications plan could be developed for the WMC to focus on waste reduction and recycling. WMC Community Development, Marketing, Civil Operations and Open Space and Trees teams could collaborate to undertake a study on behaviour change to gain understanding of how changing an individual's social standard behaviour through pro-environmental behaviour change interventions can assist in encouraging long-term sustainable behaviour change.

The '4Es model' focuses on four key elements, namely **Enable, Engage and Encourage** people to help them towards achieving sustainability and for the organisation leading the change to **Exemplify**, or lead by example.

Figure 5-1 illustrates the concept of the 4Es behavioural change model.

Source: Diagram developed by Talis Consultants from Defra and Waste Authority (WA) information

Figure 5-1: The 4Es Behavioural Change Model

The Doug McKenzie-Mohr method of promoting sustainable behaviour through community based social marketing focuses on the belief that behavioural change is most effective when undertaken at the community level, with direct contact with the target audience (McKenzie-Mohr, 2000).

Using a "Collective Impact" framework Waverley Council's *Collaborating for Impact* (C4I) program designed, implemented, and evaluated education activities targeting single-use plastics, litter, and waste avoidance. The program successfully expanded the collective capacity and capabilities of ten environmental groups. Key stakeholders were identified via a stakeholder analysis, a common vision was developed for the program and the skills and knowledge needs of partners were assessed. Council helped coordinate resources and facilitated capacity building and training opportunities including grant writing, strategic planning, and project management (Local Government NSW, 2020).

Feedback from the LBWMS lends support to a general desire by stakeholders to increase recycling where this is physically and logistically possible. There exists an opportunity to leverage the increasing knowledge and commitment to recycling by the community in their own homes and extend this into the commercial sector. This aligns with WMC's objectives to inform on how waste services can be improved and delivered at the right level, cost and to meet community expectations. Engaging and informing the community is imperative to achieving these goals.

Lack of clarity by stakeholders on how best to separate and store commercial waste in constrained physical locales and a desire to present front-of-shop spaces which are uncluttered and visually appealing, are key identifiers and indicate that there are clear opportunities to clarify knowledge gaps and improve confidence in better recycling habits.

Whilst educational activities may be relatively inexpensive in financial terms it is critical to consider the timeframes required to change community perceptions.

5.2.2 Sustainable Events Policy

Existing WMC policies such as those for single use plastics could be amalgamated into a Sustainable Events Policy to guide waste management for the numerous markets and events which are held in the Double Bay Commercial Centre. Key waste reduction targets could include the following:

- No single-use plastic or Styrofoam at these events etc for internal and external events to reduce items that could become litter;
- Recommendation of materials to avoid/ban at events and alternatives where available;
- Materials that could/should be sourced in bulk, or with minimal packaging;
- Recommendations regarding sustainable catering including sustainable foods and suppliers;
- Recommendations regarding sustainable sourcing of promotional materials (ie print materials, paraphernalia, signage, merchandise);
- Recommended recycling streams (by event type/size) and what is accepted in each;
- Identify or develop appropriate education/ awareness materials - bin signage, general signage, blurb for event attendees;
- Ways to encourage correct source separation/ minimise contamination at events;
- Specifications to waste management contractors to maximise diversion from landfill using legitimate facilities, while reducing service costs;

- Information about event waste management target setting such as waste generation/attendee and diversion from landfill targets; and
- Waste monitoring/ audit tips – for regular events to check performance and examine areas for improvement for the next event.

Local examples include Waverly Council's *Bondi unwrapped: metro and beach hotspots* (NSW EPA, 2018a).

An Education SWOT analysis summary for expanding educational initiatives within the laneways environment and garnering the business community's commitment to recycling is shown in **Appendix B Table B-1.**

Although community engagement and education can be labour intensive and the time taken to create behaviour change may seem excessive, the value of engagement and education is underestimated. It is critical to empower people to make change and provide them with the tools to implement these changes.

Cost estimates for implementing an integrated community and behavioural change program are highlighted in **Appendix B Table B-2.**

5.3 Service Management

5.3.1 Waste Wheel-Out Service

From the LBWMS, a small number of businesses prioritised their selection of waste contractor on the contractor's ability to offer a bins wheel-out service. This applied particularly to restaurants who traded on a laneway, sought to improve public amenity, and possessed adequate off-street storage to facilitate the operation of this service.

In the shorter term, WMC may consider offering a Wheel-Out Service to laneway businesses currently utilising WMC waste collection services within the commercial centre. Council staff could collect the bins from an agreed location on the business's property and return them after service. An example of a Wheel-Out Wheel-Back contract provision is outlined below.

> *The Contractor shall provide a Wheel-Out Wheel-Back Service to any Service-Entitled Premise where it is deemed by the Principal to be required. At any time during the Contract, the Contractor may also identify any Premise that it deems to require the service and upon Principal's approval may be included on this list. The Wheel-Out Wheel-Back Services List may be updated by the Principal at any time during the contract and any updates will be notified in writing to the Contractor.*
>
> *The Contractor's employee(s) must obtain Mobile Waste Containers from the storage location, convey each Mobile Waste Container and its contents to the Collection Vehicle, transfer contents into the vehicle, and then return the completely emptied Mobile Waste Container(s), within two (2) hours to the same location from which it was first removed.*

The Contractor's Representative shall visit all Wheel-Out Wheel-Back Service locations prior to the first Service being undertaken at the Premise, to confirm storage locations of Mobile Waste Containers, access arrangements and letters of indemnity

A Wheel-Out Service SWOT analysis is summarised in **Appendix B Table B-3** and costs are summarised in **Appendix B Table B-4.**

Whilst this option requires no infrastructure investment and eliminates the presentation of bins at the kerbside, it relies on the availability of adequate bin storage locations. Due to the nature of this service, the lift rates are considerably higher than standard kerbside lift rates and there is the potential for traffic obstruction during servicing.

5.3.2 Businesses Recyclables Collection Service

Similar to the CoM Degraves Street model (**Section 3.3**), WMC could initiate a business recyclables collection service to collect and trolley recyclables for collection by a waste contractor at recycling spokes (**Section 5.4.2.1**) or for further processing at a WMC recycling station (**Section 5.4.2.2**) as per the Degraves Street model.

Figure 5-2: Degraves Waste Team Collects Business Recycling

Collecting recycling from each business will provide WMC with a clear understanding of waste types and issues for various business sectors. It would facilitate personalized recycling education, enable

contamination monitoring, and provide ongoing opportunities to engage with local businesses at a variety of levels.

The key outcomes for WMC in providing recycling collections for businesses will be removal of comingled bins from the streets and associated improvements in amenity, ability to align with best waste practices and the opportunity for WMC to build rapport and a common set of values for "placemaking" within laneway businesses.

Associated infrastructure for this recommendation is discussed in **Section 5.4.2.2**.

5.3.3 Food Donation

The NSW *Waste Avoidance and Resource Recovery Strategy 2030* guides WMC's waste strategies and places increasing demands for separation of organics and recyclables from waste.

EPA audits between 2008 and 2014 show that food waste has reduced, possibly due to the introduction of new organic waste processing facilities, the introduction of food waste collections at commercial premises, and wide support for charitable organisations such as OzHarvest and Foodbank which aim to collect food waste from the commercial sector (NSW EPA, 2015a).

A key strategic action in the SSROC *Regional Waste Avoidance and Resource Recovery Strategy 2017 - 2021* is reducing the amount of material in the waste stream (especially food) and capturing more recyclables and organics from the general waste (red) bin (SSROC, 2017a). However, actions to achieve this have been historically constrained by the lack of re-use infrastructure that services the top of the waste hierarchy in the region, particularly waste transfer stations, which are viewed as critically important to member councils (SSROC, 2017b).

WMC's commitment to diversion of residential organics to landfill is evident. Approximately 55% of general domestic waste was processed into compost in 2018 (WMC, 2018) and organics waste reduction strategies such as *Compost Revolution* and *Grow It Local* have supported this approach.

The *LBWMS* has highlighted the hospitality sector as having the potential to generate over 50% of general waste within the laneways with the possibility of up to 50% of this waste comprising food organics.

However, in contrast to residential organics diversion strategies the *LBWMS* indicates that commercial organics diversion and/or associated programs are minimal within the Double Bay Commercial Centre.

Due to the high volume of food organics waste produced within the laneways, it is recommended that WMC looks to ways in which it can encourage businesses to optimise diversion of this waste stream from landfill. Source separation can provide a higher quality compost product, and it is generally cheaper to process source-separated organics than mixed waste. Food organics (FO) collections are being trialled by Canterbury Bankstown, Inner West, Randwick City Councils and in certain locations already with WMC. SSROC will help facilitate the sharing of key learnings and recommendations from these trials between councils (SSROC, 2017b).

It is recommended that WMC engage with the businesses community and relevant organisations which specialise in managing and diverting food waste to charities to investigate food donation program within the laneways.

For example, *OzHarvest* is a National not-for-profit organisation that diverts excess food which would otherwise be discarded and distributes this resource to local charities. Food donors are protected by the Civil Liability Amendment (Food Donations) Act 2005, which absolves anyone who donates food from civil liability if someone dies or is injured because of the food being contaminated provided the food was donated in good faith for a charitable purpose, was not to be sold and was safe to consume at the time it left the donor.

Within the Brookfield complex for example, Woolworths currently successfully diverts significant quantities of food organics and utilises *OzHarvest* to supply substantial amounts of food back into the community.

In 2015, SHOROC members Manly, Mosman, Pittwater, Warringah, Ku-ring-gai, Lane Cove, North Sydney, and Willoughby councils partnered with *OzHarvest* in collecting surplus food from local businesses to give to charities rather than being thrown away. *OzHarvest* received grant funding to supply the delivery van as part of the NSW EPA's Waste Less, Recycle More initiative while the driver was supported by the eight local councils. WMC could also consider liaising with SSROC on such a program in a similar approach to the SHOROC initiative to improve efficiencies and management.

Businesses save money by not having to pay to get rid of surplus food, but more importantly they have the satisfaction of knowing they are making a valuable contribution to those in need in their local community.

A food donation SWOT analysis is summarised in **Appendix B Table B-5.**

The key advantages of this option are:

- Decrease in laneway odours due to reduced organics in the red bin;
- Opportunities for individual businesses to significantly increase red bin capacity and associated reduction in overflowing, unsightly bins, collection frequency; and
- Negligible costs for WMC.

5.3.4 Business Waste Avoidance Programs

Tackling business waste at the source by avoiding production of waste in the first instance demonstrates current best practice in waste management and reflects higher order initiatives within the waste hierarchy (**Section 2.2**). Alternatives for reducing business waste are outlined below.

5.3.4.1 Responsible Cafés Program

The *Responsible Cafés Program* encourages owners of cafés and restaurants to reduce waste generated by takeaway cups and lids. Participating cafés offer a discount or other incentive to customers with a reusable takeaway cup, promoting responsible decisions and sustainable practices. Registered cafés receive customised posters, hints and tips and are included on the *Responsible Cafés* directory of participating cafes.

This program encourages consumers to choose reusable cups over disposable cups and helps to address waste at the source. More than 3,500 cafes have already signed up with *Responsible Cafés* in Australia to reduce waste and do their bit for the environment. Councils such as the City of Parramatta are currently embracing this initiative.

5.3.4.2 Refill Don't Landfill Program

Eight Western Sydney councils supported by 180 cafés, have partnered on a new program with swap-and-go pioneers *Green Caffeen* to roll out the '*Refill Don't Landfill*' campaign under the *Waste Less Recycle More* initiative. The program, which commenced in February 2020 provides free reusable café cups for customers. It utilises Australian-made products and the *Green Caffeen* app to drive a better approach to take-away by rejecting the concept of 'waste' as being part of the deal. Patrons drop their cup back at any participating café within 30 days resulting in a clean and green takeaway; activating a 'circular economy' and moving away from single-use products that generate unnecessary waste.

Participating councils are Blacktown City Council, Cumberland Council, Hawkesbury City Council, Fairfield City Council, Liverpool City Council, City of Parramatta Council, Penrith City Council and The Hills Shire Council (WSROC, 2019).

It is recommended that WMC Marketing, Placemaking, Civil Operations, and Open Space and Trees teams coordinate to promote and collaborate with businesses and the community to establish programs such as these.

5.3.4.3 Single Use Plastic Bans

There is growing public momentum for limiting the availability of plastic products in food retail businesses to reduce environmental impact. Some Australian councils are setting a precedent by implementing by-laws to ban such products.

For example, in 2019 Hobart City Council voted in favour of a by-law that could see the city become Australia's first to ban single-use plastics by 2020. The ban will apply to any business that provides or sells takeaway food. Under the changes, plastic containers, straws, coffee cups and plastic lids will be required to be phased out in favour of re-useable or compostable packaging. The by-law will apply as follows:

- Encourage retailers to replace current single use plastic containers which are smaller than one litre (1L) in volume or an area equivalent to A4 (210 mm by 297 mm) in size;
- All packaging larger than these dimensions is excluded; and
- Does not apply where a retailer provides or sells food packaging supplied by the customer or the customer was not provided food packaging by the retailer (e.g. a bottle of soft drink).

City of Hobart's strategy for implementation of this forward-thinking approach to takeaway business waste was underpinned by robust consultation across various stakeholder groups. A business survey was undertaken to address current knowledge, attitudes, and perceptions of takeaway food business operators in tandem with a community *Your Say* survey. Consultation also occurred between other Tasmanian councils via the Local Government Association of Tasmania to gauge the level of support for a state-wide approach to ban single-use plastics together. A vigorous community information programme and web presence supported the process (City of Hobart, 2019).

5.4 Hard Infrastructure

5.4.1 Laneway Infrastructure – Paving / Bollards

Waste management recommendations within the CWS should align with the vision of placemaking (**Section 1**) and address issues of traffic /waste collection congestion and unattractive kerbside bins as discussed in the LBWMS.

It is recommended that consideration of revamping waste management within laneways should be accompanied by a holistic rethink in laneway design.

Paving can play a key role in placemaking within laneways. It can remove the distinction between kerb, gutter, and roadway, in favour of wider, uniform surfaces and less wasted space (**Figure 5-4**). Where laneways currently have dual footpaths, paving the full laneway width dramatically increases usable space. Full width paving offers the potential to aggregate waste infrastructure into small smart community waste and recycling hubs (**Section 5.4.3.4**), compact recycling spokes (5.4.2.1) or incorporation of waste solutions into street furniture such as smart tree hubs (5.4.3.3).

This will enable removal of all individual business waste bins from what would previously have been the kerbside or gutter.

A contiguous laneway surface will enable WMC to effectively design new spaces within each laneway - install bollards, allocate parking, and waste infrastructure spaces and incorporate street furniture and tree plantings. This will also potentially increase leasable laneway space for alfresco activities and dining.

Use of bollards and planting can assist in demarcating laneway activities and guide pedestrian activity where required. The character and opportunities offered by each laneway will vary. This adds a sense of uniqueness. However, the underlying redesign concepts are the same.

Introduction by WMC of bollards in the adjacent Brookfield complex has been successful in regulating the location and timing of waste collections to significantly enhance outdoor recreational spaces.

Within the Double Bay Commercial Centre, a modified approach employing bollards to constrain vehicular movements within certain portions of the laneways at set times can offer the opportunity to improve laneway amenity and constrain waste collections by multiple vehicles through laneways during peak business hours. It means waste collectors must optimise routes within priority laneways to better suit business amenity and access. The advantage of this option is that WMC in consultation with businesses would determine and prioritise waste scheduling.

It is recommended that a business laneways trial incorporates full-width paving, bollards, and smart community waste solutions such as smart community waste and recycling hubs (**Section 5.4.3**) which can remotely manage users, data, reporting, waste compaction and beautify public spaces. Consideration within the trial should also be given to recycling spokes (**Section 5.4.2.1**) in more constrained spaces. Limitations on business service delivery times would need to be established.

WMC could consider parking concessions during peak hours for relevant business trial participants at local parking stations.

Following trialling and evaluation, sections of selected laneways could be permanently closed using bollards to enable planting and installation of street furniture. Potential outcomes include improved laneway amenity, safety, and promotion of laneways as enjoyable community spaces.

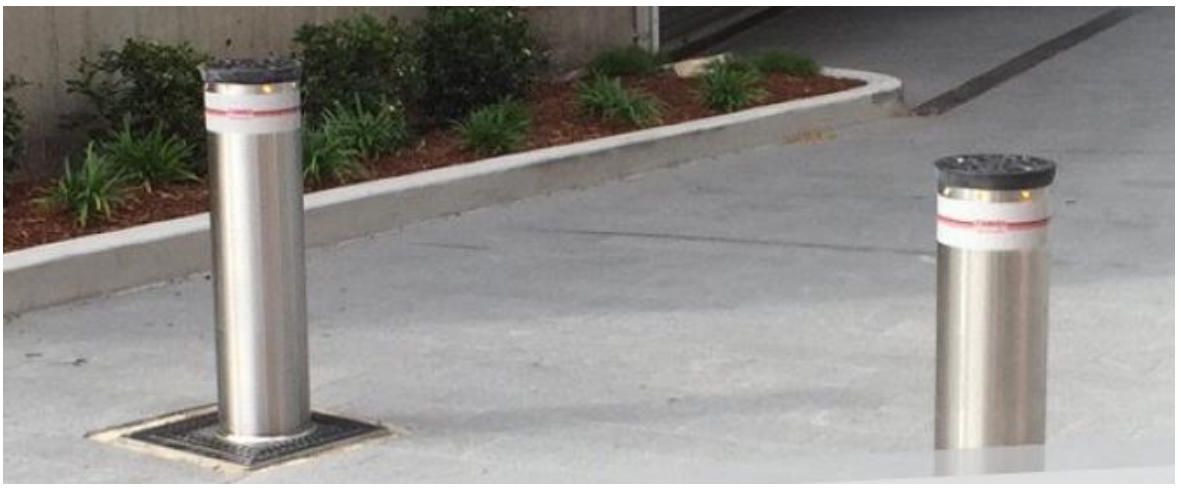


Figure 5-3: Bollards Example

Installation of bollards could be a low-cost initial step in a phased rollout of laneway redesign. However, a rethink of traditional laneway usage and removal of individual waste bins and collections in favour of a growing trend both here and overseas for community business waste hub solutions will require rigorous planning, community consultation and evaluation.

This recommendation would require a holistic planning approach inclusive of traffic management planning. A laneway infrastructure paving / bollards SWOT analysis is summarised in **Appendix B.**

5.4.2 Recycling Infrastructure

The LBWMS noted that the characteristics of red bins within the laneways broadly mirrored the 2014 NSW EPA *Sydney Metropolitan Waste Audit,* being characteristically food organics, paper, and plastic (roughly 26%, 25%, 20%). The LBWMS found that the hospitality sector was the prime output for general waste, commingled recycling, and paper/cardboard with up to half the red bin potentially constituting food organics. Key issues for these businesses were the inability to manage the high daily volumes of general waste produced, especially within current space constraints for bins.

Laneway businesses have great potential therefore to further divert waste from landfill via recycling.

Key approaches for WMC laneway businesses to divert waste from landfill, increase recycling and simultaneously remove waste from the kerbside, are summarised below.

5.4.2.1 Recycling Spokes

WMC could consider offering a free service to businesses within the laneways via provision of a series of small, community recycling “spokes” which act to centrally collect organics and other recyclables such as paper/cardboard within screened enclosures in suitable laneway locations.

A key objective in deploying recycling spokes would be the removal of all comingled bins from the kerbside.

WMC or a collection contractor/s would be responsible for servicing spokes to transfer recyclables to relevant external waste collection facilities. Alternatively, recyclables could be consolidated at a small WMC-owned or outsourced recycling station in the vicinity of the Commercial Centre for further separation and reuse.

Both options offer a key benefit of removing all laneway comingled bins in favour of several business service points. This reduces vehicular traffic to one or two contractors servicing all laneway recycling.

The City of Melbourne (CoM) has successfully adopted, monitored, and evaluated a recycling spoke and recycling station model since 2013 to dramatically improve the waste and amenity culture in an inner-city café precinct, Degraves Street, to provide for food waste, cardboard, and co-mingled recycling like that shown in **Figure 5-4**.

Figure 5-4: Business Recycling "spoke"
Source: https://greenmagazine.com.au/degraves-street-recycling/

CoM provides a no-charge service and deploys a small, dedicated laneways waste team to walk and collect recyclables from spokes and consolidate these at a “station”.

- If WMC chose to collection recyclables for aggregation to a WMC recycling station, potential collections by Civil Operations or waste contractor might include:
    - Small vehicle with bin lifter – swap and go;
    - Ute with elevated platform - swap and go; and/ or
    - Small rear-lift collection vehicle.

Figure 5-5: Example small vehicle to manage waste

Collections would be dramatically simplified by using "smart sensors" in bins to automatically notify WMC or contractor on bin fullness and need for collection. Recycling spokes could also offer smart compactor bins or small smart community waste hubs to dramatically increase waste volumes. As this type of infrastructure is sealed, issues with odour and visual amenity are improved. Smart technology is discussed more in **Section 5.4.3**.

A recycling spokes SWOT analysis is summarised in **Appendix B Table B-9** and costs are reviewed in **Appendix B Table B-10**.

Laneway Design and Spoke Locations

Installation of laneway paving removes the distinction between kerb, gutter and roadway replacing these structures with wider, uniform surfaces and less wasted space (**Figure 5-4**) (**Section 5.4.1**). In laneways with footpaths on both sides paving the full laneway width further increases usable space.

Considerations for location of waste spokes include:

- Full-width paved laneways;
- Distance between recycling spokes and businesses should be minimal to encourage easy 24 hour access;
- Spoke footprint will be dependent on design, waste types diverted and whether compaction / smart waste technology is used to increase capacity and minimise the footprint;
- A typical spoke footprint would be equivalent to one parking space or less;
- It is recommended that WMC undertake walk-time analysis (walking distance /time to spoke) to determine optimal locations;
- Spokes should be located away from front of business to reduce odour; and
- Mode of collection will determine space required adjacent to a spoke – if collected by a waste team or small vehicle required space will be minimised.

5.4.2.2 WMC / Contractor Recycling Station

A business recycling station has been successfully trialled, long-term, by CoM in the Degraves Street precinct, a high-density urban area where reduced amenity, traffic congestion and litter waste-related issues closely parallel those currently faced by WMC in the Double Bay Commercial Centre.

Under the Degraves Street model the CoM recycling station service is a free service provided to registered laneway businesses by a designated waste team which collects recycling daily (or more) from each business. This provides invaluable opportunities for the team to connect, train and build rapport with the local traders. The team monitors and maintains equipment, bin stores, receptacles and docks and supervises various contractor's collections. These recycling stations can operate as summarised below.

Business Recycling Station

Target Group: *High density urban centre with limited access and poor amenity.*

The Business: *Recycling is either deposited at no charge at a recycling spoke by the business and/ or collected at the business at no charge by council or single selected contractor. Thus, businesses are intrinsically motivated to generate minimal general waste and divert maximum waste.*

WMC: *Offers a no-charge trial to registered businesses - businesses are intrinsically motivated to divert maximum recycling materials which reduces general waste volumes. Manages or outsources station operations. Small permanent team liaises daily with registered businesses to collect recycling OR offers collection service from recycling spokes only.*

Benefits to WMC and Community: *Maximises laneway amenity, minimises waste collections/vehicles, builds a sense of community and a common recycling philosophy.*

This approach drives commercial recycling by reverse psychology. The more effectively a business recycles the less it will pay for waste collection services.

Potential Recycling Station Locations

A recycling station should securely store recycling prior to processing and collection by waste contractor/s and provide a base for the waste team so will be dependent on appropriate maximum distance from recycling spokes and method of transport. The Degraves Street recycling station is within a nearby carpark and occupies a footprint of approximately 10 carpark spaces.

Location of a recycling station will also be constrained by the following:

- Pedestrian and traffic management requirements;
- Suitable distances to offset noise and odour and address potential issues around visual amenity;
- Height requirements for equipment and processing; and

- Minimum access requirements of various collection vehicles

Consideration of internal rather than external locations is recommended.

Key development control strategies under the *Woollahra Development Control Plan 2015* for the Double Bay Centre encourage multiple uses of Council car park sites such as providing community services and facilities at the ground floor (WMC, 2015). Recycling station locations utilise existing /planned WMC car parks or suitable building with a long-term lease. Most parking facilities within the municipality are owned by WMC. WMC could consider the proposed redevelopment of the Cross Street Car Park which could provide a unique opportunity to integrate a best practice recycling station.

Car parks in the vicinity of the laneways are at the locations shown in **Table 5-2**

Table 5-2: Carparks/Parks Vicinity Commercial Centre

Name	Location
Carparks	
Cross Street	Cross Street and corner of Jamberoo Lane, Double Bay.
Kiaora Place	1 Kiaora Road, Double Bay
Premier Parking	1-13 Cross Street Double Bay
Wilson Parking	33 Cross St, Double Bay

The station itself should meet the following physical criteria:

- Suitable clearance to enable safe operation and unimpeded storage of diverted waste types. Clearance to buildings, hard and soft landscaped elements, and on/off-site parking is to be considered;
- Flooring shall be minimum 75mm concrete floors grading to a 100mm industrial floor waste (including a charged 'water-trap' connected to sewer or an approved septic system), with a hose cock to enable bins and/or the enclosure to be washed out. An alternate floor surface may be approved by the Civil Operations;
- Internal walls shall be cement rendered (solid and impervious) to enable easy cleaning. Ceilings shall be finished with a smooth faced, non-absorbent material capable of being easily cleaned and shall be finished or painted in a light colour;
- Construction shall be in a manner that prevents the entry of vermin;
- Artificial lighting, sensor or switch controlled both internal/external to be provided to the space with all lighting in open areas complying with AS4282-1997 (Control of Obtrusive Outdoor Lighting);
- Signage should be displayed as follows:
  - A sign stating, "NO STANDING" and "No UNAUTHORISED ACCESS" at the entrance to the space/room;
  - A clearly visible "DANGER" sign in the vicinity of the entrance to the room/area;
  - Equipment-specific signage including operational instructions should be clearly displayed; and
- Space is required for the larger hook lift collection vehicles required for collection of large compactors which are best suited to areas where there is a centralised collection points.

Infrastructure and equipment requirements such as balers, compactors and organics processing units would be determined after undertaking analysis inclusive, but not limited to the following activities:

- Business profiling;
- Determination of proposed recycling material types and targets; and
- Cost analysis.

Equipment selection should incorporate the viability of both lease and purchase options. Equipment type can vary from small, simple, and inexpensive units to sophisticated processing units.

Organics Recycling

Organics recycling, particularly of food waste, can lead to substantial diversion of waste from landfill. Selection of organics recycling equipment should consider any statutory requirements that apply to the land application of recycled organics and which ensure human and animal health and the environment are protected when these materials are put on the land. The NSW Environment Protection Authority (EPA) closely constrains organics technology to ensure that end products are safe and useable. The EPA provides resource recovery orders (orders) and resource recovery exemptions (exemptions) which enable councils and other users to process organics. Currently Eco Guardians rapidly dehydrated food waste technology and Closed Loop rapidly decomposed food waste technology meet these exemptions.

Simple organics equipment such as the "Bio-Bin", act as onsite storage units to commence breakdown of food organics into compost prior to further treatment offsite. This would be a cost-effective solution to store food organics (FO) from businesses for collection as part of WMC's kerbside FOGO collections. More complex units require feedstock loading (via bin lifts) and emptying at the end of each processing cycle. Food dehydrators such as Closed Loop and Eco Guardians produce a nutrient-rich soil enhancer. Dehydrators are generally quieter. They process food waste in batches at high temperatures into a dry, soil-like odourless output which can reduce volume by up to 90%. Steam is condensed and discharged into a trade water outlet or sewer.

WMC could utilise products as "organic fertiliser" at a specified application rate in a similar fashion to the Melbourne Cricket Club (Waste Management Review, 2018). Some companies such as Eco Guardians offer end-product and market coordination.

Considerations for organics processing include power and water supply, management of contamination and training.

Recent successful examples of councils and organisations which undertake reprocessing of food organics to fertiliser / compost are highlighted in **Table 5-3**.

Table 5-3: Organics Reprocessing Examples

Organisation	Project Title
AMP Capital Investors Limited	**Macquarie Centre public area food waste organics collection**
Council of the City of Sydney	**Plates to parks: recycling food waste locally**

Organisation	Project Title
David Jones Pty Ltd	**Organic food waste project**
Taronga Conservation Society Australia	**Wild about recycling: diverting food waste and compostable packaging**
University of Sydney	**On-site organic waste aerobic digestor**

https://www.environment.nsw.gov.au/funding-and-support/nsw-environmental-trust/grants-available/organics-infrastructure/stream-2-business-organics-recycling/grants-awarded-and-project-summaries#city

Refer to **Appendix C: Technical Review – Recycling Station Organics** for detailed technical specifications on various types of on-site organics management technology. A SWOT analysis for recycling stations is outlined in **Appendix B Table B-11**. Cost recovery considerations are reviewed in **Appendix B Table B-12**.

A risk rating for three organics units are shown in **Table 5-4**.

Table 5-4: Organics Processing Risk Summary

Processing Option	Technology		
	Closed Loop (CLO100)	BioBin (4.5m)	Eco Guardians (GC 1200 Composter)
Operational risk			
Footprint requirements			
Management requirements			
Contamination tolerance			
Feedstock			
Flexibility of input Volume			
Volume reduction			
Processing time			
Further processing required			
Field tested			
Scalability			
Waste hierarchy			
Cost			

Low *Medium* *High Risk*

WMC could outsource management of the recycling station to address potential equipment and contamination issues. SSROC supports consideration of on-site processing for Food Organics Garden

Organics (FOGO) (SSROC, 2018, NSW EPA, 2018b) thus collaboration on recycling organics with one or more SSROC councils to overcome space and processing constraints is an option.

Other Recycling Equipment

Simple processing of paper, cardboard can be undertaken via use of an all-round vertical baler to minimise space requirements.

Table 5-5: Baler Specifications

Details	Footprint	Capacity	Cost	Details
Baler				
Kompac K300x Vertical Baler	2300w x 1800d x 1400h	- <300kg bales 1000x800x1200	$19,950 plus GST & freight	30t pressure 3 phase 415 volt

5.4.3 Smart Waste Infrastructure

All responses to the LBWMS indicated that the key problem in the laneways is lack of space for storage and presentation of bins. Other constraints to waste management were local traffic issues, multiple waste contractors and multiple overlapping waste collections.

Smart waste management addresses these issues together with improved odour control and visual amenity and delivers scaled solutions ranging from cost effective applications at the individual bin level to more sophisticated community waste solutions. A range of smart waste management recommendations targeted to improve waste management and address space, vehicle management and amenity issues within the Double Bay Centre laneways are discussed below.

Information and communications technologies (ICT) are driving many new waste management solutions. Common technologies within this new approach include:

- Wi-Fi or radio frequency identification technology that can charge users for the amount of waste calculated or disposed;
- Smart card, tap technology which can bill users via a pay-as-you-throw waste management system;
- Smart sensors and bin weights to monitor bin levels;
- GPS tracking to help truck drivers know when a bin needs emptying; and
- Ability to compact a variety of waste streams for easier storage and collection.
  (Waste Management Review, 2019a)

The Australian Government's $50 million *Smart Cities and Suburbs Program* is supporting investment in innovative technology-based solutions to urban challenges for Australia's cities, suburbs and towns. Under this program, the Commonwealth matched funding of over one million dollars with the City of Canterbury Bankstown, to roll out a large-scale waste management smart city project, *Closing the Loop on Waste.* The project is using advanced analytics to reduce contamination in waste collections.

5.4.3.1 Smart Sensors WMC Commercial Collections / Recycling Spokes

Overflowing waste bins and multiple over-servicing of waste collections were laneway issues emerging from the LBWMS. Smart Sensors for bins in tandem with community recycling spokes offer one solution in improving these problems.

Smart sensors can be installed into new or existing bins. They are a simple, low-cost smart IoT technology which utilises a bin fullness-level sensor and a software platform. When bins are full and ready to be picked up, a sensor sends a signal to the waste team. Fill-level and temperature information is available directly on any web enabled device including smartphones.

Key advantages of incorporating smart sensors into a recycling spoke solution are:

- Cost effectiveness;
- Communication of information on fill levels ensure collections occur only when bins are full;
- Reduced litter;
- Reduced collection costs; and
- Improved waste reporting.

Capital costs and technical specifications for typical smart bin sensors are highlighted in **Appendix B Table B-13.**

Smart bin sensors offer WMC and waste team members a low-cost opportunity to effectively manage waste collections to reduce excessive collections and to respond to increased needs for servicing in busy periods.

It is recommended that a trial be undertaken in a selected laneway where a high proportion of businesses utilise WMC commercial waste collections.

This is a low-cost opportunity for WMC to maximise collection efficiencies, remove unnecessary WMC waste collection vehicles from laneways and provide an opportunity for WMC to start embedding IOT technologies and data into its operations and more effectively springboard into IoT infrastructure projects.

Were WMC to introduce business community recycling spokes (**Section 5.4.2.1**) smart sensors would offer vital notifications of bin fullness levels to Civil Operations and keep the waste team abreast of servicing requirements.

5.4.3.2 Smart Compactor Public Bins

Responses from the LBWMS indicated that a perceived lack of public place bins contribute to littering around business waste bins and public bins within the laneways, increasing odour and reducing visual amenity.

To reduce littering, improve visual amenity and reduce the number of waste collections and waste vehicles in the laneways, it is recommended that WMC install smart, compactor public bins within laneways within the Commercial Centre.

Smart bins use solar panels to harness solar energy and sensors to continually compact the waste that is deposited, increasing the capacity by up to 700% and reducing waste collection by up to 85%.

When bins are full and ready to be picked up, a sensor sends a signal to the waste operators, who send a truck for collection. Employing this technology also offers WMC an opportunity to improve visual amenity by reducing odour and vermin due to a sealed compactor unit.

Waverly Council's *Bondi Unwrapped* program successfully employed solar compactor bins. This reduced the number of collections by 84% and the number of public bins by over 80%, it also reduced the number of reports of overflowing bins by 48% (SSROC, 2017a).

Key advantages of employing smart public waste bins include:

- The "smart bin" communicates information on fill levels and ensures collection only when the bin is full;
- Fewer WMC collection visits reduce congestion and traffic interruption, resulting also in cleaner and safer streets;
- Traffic reduction due to fewer collections; and
- Standardised so that they can be emptied with existing equipment.

Smart waste recycling, cardboard or other labelled compactor bins could also be deployed to complement a recycling spokes solution within the laneways to further divert different waste streams such as paper, glass/bottles, and general waste from landfill (**Figure 5-6**) however WMC collections would need the ability to collect such diverted waste streams.

Wide-ranging benefits of smart compactor bins include the ability to:

- Raise public and business awareness of best waste practice and encourage recycling;
- Improve street sanitation;
- Decrease collections and associated traffic;
- Collect and analyse area-specific data on waste volumes for better planning; and
- Increase WiFi coverage with their function as a free public WiFi hotspots.

Figure 5-6: Public Place Smart Bins

A SWOT analysis of the smart bins option is shown in **Appendix B Table B-14**. Capital costs and technical specifications for a variety of solar bins is provided in **Appendix B Table B-15**.

The implementation of a such technology will generate servicing efficiencies, reduce heavy vehicle movements, and potentially reduce service costs.

WMC has already purchased and installed five CleanCube solar bins within the LGA, with collection frequency modelling studies and data reported by Smart City Solutions. WMC could use the deployment of smart bins as a steppingstone to a broader smart cities waste framework which incorporates smart community waste hubs.

Use this opportunity to embed IoT technology, and the power of smart sensors within Civil Operations to develop flexible, responsive waste collection and reporting. In hand with this, WMC should investigate opportunities to expand IoT data capabilities throughout the organisation in line with a smart cities approach.

5.4.3.3 Smart Tree Hubs

Poor amenity within laneways and a perceived lack of public waste bins emerged as issues in the LBWMS. Smart tree hubs offer WMC a way to extend the use of smart compactor bins into a holistic placemaking solution which incorporates both improved public waste services and increased amenity.

Smart tree hubs integrate smart compactor bins, shade, seats, and tables, charging stations, solar power, sensors, lighting, public WiFi, greenery, and smart fountains designed to serve a community need rather than creating a one-size-fits-all solution. Such ‘placemaking’ infrastructure is being rolled out in NSW councils with Georges River Council, for example, successfully launching their first smart tree hub in February 2020.

Hubs deliver data to councils via IoT to assist with decision-making, safety, and maintenance management. Sensors are embedded in the hubs to measure use, microclimate, and utilities. Smart waste bins deliver greater capacity, reduced odour, and improved collections.

https://streetfurniture.com/world-first-smart-chillout-hubs-designed-and-built-in-australia/

Figure 5-7: ChillOUT Hub with Smart Bin

Approximate costs for smart tree hubs are outlined in **Appendix B Table B-16.**

The integration of smart tree hubs with smart compactor bins would address a perceived issue in lack of public bins in laneways, overflowing public bins and amenity issues. It would demonstrate Council's commitment to improving and beautifying urban spaces and valuing clean, litter-free environments. It also enables WMC to monitor urban spaces and embed practical IoT technologies into its operations.

5.4.3.4 Smart Community Waste and Recycling Hubs

Poor amenity, lack of space, poorly maintained bins, high number of individual bins and high frequency of waste collections and vehicles have been identified in the LBWMS as key waste-related laneway issues. WMC could consider utilising smart compactor waste hubs as a multi-pronged solution to remove general waste, recycling and/or specialist bins such as paper/cardboard bins from the kerbside and free up space along major sections of a laneway under one technology solution.

CoM is a strong example of a council employing smart community waste hubs to improve waste management and amenity in busy, narrow, high pedestrian, business laneways in Melbourne's CBD (https://youtu.be/KeM0qRwPDvQ)

Following successful trialling of a manual recycling hub and spoke model (**Section 5.4.3.4**) in the Degraves Street project between 2013 and 2017, CoM has leveraged an IoT community hub model

with the aim of reducing the number of kerbside bins and improve amenity in the CBD. CoM Lord Mayor, Sally Capp noted:

> *The hubs will allow us to remove 110 commercial bins from city laneways. By increasing waste and recycling options for businesses, we can cut 7000 waste collection truck trips from the city each year.*
>
> *We know there are around 1000 individual bins stored on public property across the central city. Bins in laneways take up space and can cause odour, visual pollution and attract vermin.*
>
> *By creating more resource recovery hubs we can reduce noise, smell, congestion and mess.*
> *(Waste Management Review, 2020).*

Under a smart community smart waste hubs solution, compactor hubs replace poorly maintained individual bins right through the laneway and constrain waste collection to one or two collectors at a single point. This frees up space throughout the laneway and reduces infrastructure and servicing to one point.

The difference between recycling spokes and smart community waste hubs lies is largely in the use of smart cards by registered businesses and associated data management opportunities, increased capacity, and the opportunity to outsource hub management and collections if desired.

A smart waste hub within a CoM laneway is shown in **Figure 5-8.**

Figure 5-8: CoM Smart Waste Hub in Use
https://youtu.be/KeM0qRwPDvQ

Implementation and Costing Methodology

Each registered business (or potentially residential user) utilises a smart card to deposit waste to a general waste and/or recycling hub. Waste volumes are automatically recorded to each user which offers WMC a new level of waste reporting and planning at the laneway level.

CoM businesses in selected laneway locations were offered the opportunity to engage in the community smart waste hub trial under agreement that a nominal base flat fee would be charged during the trial period and revised fee structure and contracts offered post trial. Following the CoM trial all participants elected to continue the service. Waste collection charges, reflective of the market, were streamlined into a new flat fee for either small, medium, or large waste users and maximum allowable waste volumes under each category were calculated to simplify management.

Utilising a built-in GPS system, the compactor manager has full remote control over its users, reporting, servicing, and compactor tracking via a database management system. As individual usage and waste volume data is automatically tracked this provides very flexible, adaptive billing and contract management. As all user data and waste volumes are automatically recorded, using this approach would enable WMC to review charges on a regular basis and adjust accordingly.

Smart cards can be utilised at any hub under management, at any time of the day. When rollout of new hubs occurs, this reduces the necessity to offer a “perfect” location as users can choose to deposit waste to a newly installed hub for example, in preference to an existing hub where this is more conveniently located. Waste compaction capabilities and automatic notifications on hub fullness keep managers abreast of the response required and provides flexibility during busy periods reducing the necessity for determining “perfect” hub size.

Hub Infrastructure

Small, smart compactor hubs occupy a small footprint and large waste capacity. Smaller mobile hubs can be removed and replaced as part of the collection process. Mobile hubs are taken and then returned, usually a round trip of three hours. Stationary hubs will have waste collected in situ, the front end of the hub remaining while the back end is removed for collection.

10 cubic metre smart compactor hubs suitable for multiple laneway businesses can utilise single-axle hook-lift collection vehicles of approximately eight to nine metres in length. Such compactor bins comfortably occupy the equivalent of a single car space in a carpark (5.5m long x 3.2m wide). **Figure 5-9** shows the collection of a portable smart compactor waste hub.

Figure 5-9: Single Axle Hook Lift Smart Compactor Hub Removal
maxresdefault.jpg (1280×720) (ytimg.com)

Smart community waste and recycling hubs are robustly designed for outdoor locations, are visually attractive, can be uniquely branded by WMC and can occupy a small footprint (compare **Figure 5-10** and **Figure 5-11**). Mobile hubs can be installed onto laneway paving. Mobile hubs mean that should a more favourable location become available, the hub can be relocated.

Figure 5-10: Multiple Urban Waste Bins
MULTIPRESS ECO Gestaltungsmöglichkeiten Camo Design Pöttinger Entsorgungstechnik - YouTube

Figure 5-11: Innovative Branding; Hub Replaces Multiple Bins
MULTIPRESS ECO Gestaltungsmöglichkeiten Camo Design Pöttinger Entsorgungstechnik - YouTube

The clean look, odour control and contracted hub maintenance suggest this infrastructure is more akin to street furniture and can be well integrated into a broader placemaking approach. Smaller hubs equate to more potentially suitable locations and the gains in collection control and single contractor versus multiple contractors, strongly outweigh any issues in even daily collection from one or two smaller hubs.

Community Waste and Recycling Hub Locations

Council-owned parking facilities or parks, pedestrian only laneways, or wider vehicular laneways offer suitable sites for these hubs (**Figure 5-12**). WMC should also consider longer term options for leasing outdoor spaces.

Selection of trial hub locations should prioritise the following:

- Laneway business waste output;
- Diversion of different waste types via a combination multiple hubs (cardboard /recycling) of varying sizes;
- Hub size and whether the hub itself or the contents are collected; and
- Opportunities to maximise amenity in consideration of pedestrian access, cyclists, general traffic movement and characteristics of neighbouring properties.

It is recommended that WMC incorporate the field experience of the hub supplier in hand with swept path or traffic analysis to decide suitable hub locations. Ideally, such location would facilitate collection vehicle movement in a one-way direction to collect waste and continue in forward gear.

A SWOT analysis of smart community waste and recycling hubs is shown in **Appendix B Table B-17.** Cost Cost considerations are outlined in **Appendix B Table B-18**

Figure 5-12: In-situ hub example

MULTIPRESS ECO Gestaltungsmöglichkeiten Camo Design Pöttinger Entsorgungstechnik - YouTube

Engaging multiple businesses within a selected laneway/s under a smart waste hub trial has the potential to:

- Dramatically increase visual, auditory and odour amenity;
- Reduce waste collection frequency via compaction;
- Reduce waste collection times by eliminating individual bin collections;
- Increased waste diversion by offering general waste, recycling or paper/cardboard hubs;
- Reduce number of collection vehicles in laneways - single v/s multiple waste collection contractors; and
- Increase flexibility and response to changing patterns in waste volumes to match business waste collection requirements via IoT automatic sensor triggers and notifications.

This recommendation offers a central location for laneways waste disposal, reduces the number of heavy vehicle movements across the serviced area and improves local amenity by eliminating the need for kerbside presentation of waste bins. Determining sensible hub locations will be key to engaging users and WMC will need to be confident that the provider can offer contractual rapid response options in the event of breakdowns.

Prior to trial implementation a considerable level of stakeholder engagement is required. Community buy-in is essential for a successful trial outcome and ongoing monitoring and evaluation of community perceptions to waste and recycling are essential in any community waste project.

5.5 Laneways Waste Management Trial

It is recommended that the Laneways Business Recycling and Smart Waste Management recommendations are planned, trialled, and evaluated by WMC. Thus, community engagement can be established, and local conditions, issues and particularities can be explored and resolved as the trial moves forward.

Undertaking a trial enables WMC to transition to a full rollout of chosen recommendations in the CWS whilst managing the complexities and implementing the lessons learned to ensure an efficient and cost-effective system is delivered in accordance with the objectives of the *Double Bay Place Plan 2019 – 2023* (WMC, 2019a).

5.6 Grants and Revenue Streams

The NSW government *Waste Less, Recycle More* initiative has been a primary source of waste-related funding for a wide variety of projects for councils and business recycling, organics collections, market development, managing problem wastes, new waste infrastructure and research and development.

Whilst funding programs under this initiative run until 2021, funding is currently directed to finalising existing projects across all programs and there are currently few grant options available to WMC until a new grants program is established.

However, at a smaller scale, the Bin Trim program (EPA, 2019b), which is primarily related to businesses, offers waste-related equipment rebates of up to $50,000 on equipment. There is the potential for WMC to receive a rebate as a "*Collector*". Bin Trim has been run consecutively over several years and it is recommended that WMC explore opportunities through this program.

Some funding allocation may be available under the main programs closer to the release of the *NSW 20 Year Waste Strategy Discussion Paper* towards the beginning of 2021.

It is recommended that WMC monitor available NSW EPA and NSW Environmental Trust grants throughout 2021. Potential grants which have relevance to the WMC and the CWS and which may reopen are highlighted in **Table 5-6.**

Table 5-6: Grants

Program	Description
Circulate	Supports recovery of commercial and industrial waste - Waste products of one process become the resources of another process. Projects look to reduce waste disposal costs by reuse of materials such as business food waste reprocessed into fertiliser or compost
Product Improvement Program	Grants for infrastructure aimed primarily at comingled bins
Organics Infrastructure (Large and Small) Program Stream 2 Business Infrastructure	Supports new and enhanced infrastructure and on-site processing for organic waste and food donation projects and can apply to council.

Program	Description
Organics Processing Infrastructure	Program which funds the establishment or upgrading of organics processing facilities.
Organics Collections Business	Can also include education including surveys, educational material

https://www.epa.nsw.gov.au/working-together/grants

It should be noted that prior to a grant approval, procurement, installation, and operations cannot have been undertaken. However, planning activities and a pilot project would work favourably towards WMC being able to show intent and trialling success of a proposed project.

6 Conclusion

The complexity associated with the conflict between business back-of-house versus that of another's front-of-house operations, is evident not only physically with the established building layout and infrastructure, but also socially, where businesses have little regard for the impact on a neighbouring business. The difficulty is further exemplified by narrow laneways and kerbs, insufficient bin storage, waste collection times, frequency and traffic and illegal dumping.

In devising the recommendations identified in **Section 5**, it was recognised that one single solution may not solve all the issues and constraints identified within the laneways, whereas in fact, it is more likely that a combination of these recommendations are utilised to produce the most effective and efficient system for WMC. To put it simply, one size does not fit all, and a holistic approach is needed to address waste management within the Double Bay Commercial Centre.

The recommendations cover a broad range of aspects related to waste management and this is necessary to implement a holistic approach. In addition, recommendations have been identified across a range of budgets from cheaper through to more expensive. This allows WMC to assess and identify what combination of recommendations are not only technically suitable but also financially suitable. Furthermore, the financial suitability can also be influenced using government grant funding which may facilitate the implementation of the more costly but more beneficial recommendations without the capital outlay.

WMC should now carefully consider the practicality of implementing the recommendations and how they interact with WMC, with businesses and the broader community. Therefore, the critical piece to the puzzle, no matter what recommendations are implemented, is community engagement, resource recovery education and ensuring businesses within the Double Bay Commercial Centre come along on the journey. Without their support, the implementation of this Study will be difficult and may result in significant community back-lash.

A strong, well informed, and comprehensive community engagement and education campaign will obtain the support of the community and assist in delivering the recommendations within the CWS, while facilitating the broader achievement of the objectives in the *Public Domain Strategy* by reducing the number of bins in the laneways, improving the overall amenity, and cultivating better activated laneway environments in the Double Bay Commercial Centre.

7 Implementation

Priority waste management actions for laneways and a generalised action plan for implementing the recommendations are outlined in the following sections.

7.1 Action Plan

The following table provides an indication of the priority for each of the recommendations in terms of implementation, who is responsible, and the resources required.

Table 7-1: CWS Action Plan

Recommendation	Priority	Council Department Responsible	CWS Sections	Action
Planning				
Business Data Management	H	• Chief Information Officer • Civil Operations • Placemaking • Civil Operations • Strategic Planning • Chief Financial Officer • Business Chamber • IoT data consultant •	• 5.1.1 • 5.4.3	Review of the currency, accuracy, and essential information on businesses within the Double Bay Commercial Centre laneways to enable adequate waste planning inclusive of business type and floor area. Investigate how IoT data, smart cards and smart waste infrastructure can be leveraged across WMC.
Planning controls	H	• Business Assurance and Risk • Development Control • Strategic Planning • Placemaking • Civil Operations • Compliance • Capital Projects • Engineering Services • Consultant/s	• 5.4.2 • 5.1.2	Review SWMMP and DCP to update and reflect proposed operations. Review traffic, surrounding land use and community considerations.

Recommendation	Priority	Council Department Responsible		CWS Sections	Action
Waste and Sustainability Education					
Integrated Community and Behavioural Change Program	H	• Customer Service • Community Development • Marketing	• Civil Operations • Open Space and Trees • Behavioural change consultant	• 4 • 5.1 • 5.2.2	Reduce the number of bins requiring collection through reducing waste generated. Investigate and target waste reduction education initiatives with all businesses within the Double Bay Commercial Centre. Increase awareness of waste and sustainability issues. Combine with the release and implementation of the Sustainable Events Policy.
Sustainable Events Policy	H	• Customer Service • Community Development • Marketing	• Civil Operations • Open Space and Trees	• 5.1	Increase community understanding of sustainability in action - empower event organisers and attendees towards best practice waste management. Combine with the implementation of the Integrated Community and Behavioural Change Program.
Service Management					
Wheel-Out Services	L	• Marketing coordinator • Customer Service	• Business Assurance & Risk • Placemaking • Civil Operations • Contractors	• 5.3.1	Consider the addition of Wheel-Out services to Council's waste collection service to provide a greater level of service and demonstrate to the community WMC's commitment to Double Bay Commercial Centre community.

Recommendation	Priority	Council Department Responsible		CWS Sections	Action
Food Donation	H	• Community Development • Marketing • Customer Service	• Placemaking • Compliance • Civil Operations • Selected Food Waste Company	• 2 • 4.3 • 5.3.2	Strive towards meeting the State waste diversion targets by diverting greater quantities of business waste from landfill, reducing substantial amounts of food organics from existing red bins and saving businesses money.
Business Waste Avoidance Programs	L	• Community Development • Marketing	• Customer Service • Civil Operations	• 2 • 4.3 • 5.3.4	Strive towards meeting the State waste diversion targets and higher objectives of the waste management hierarchy by avoiding, reducing, and reusing potential business waste and reducing waste to landfill
Hard Infrastructure					
Laneway Infrastructure Paving / Bollards	M	• Director Technical Services & team • Director Planning & Development	• Marketing Coordinator • Customer Service • Information Officer • Waste and IoT Consultant	• 1.1 • 4 • 5.4	Laneway trial of paving, bollards and smart community waste hubs and recycling spokes in tandem with other selected placemaking solutions such a street furniture. Improve the physical layout of laneways via paving and bollards to increase usable laneway spaces which can be allocated to community waste infrastructure, pedestrian access, business leasing of alfresco areas with regulated parking, service access and traffic movements.

Recommendation	Priority	Council Department Responsible	CWS Sections	Action
				Regulate the frequency and service points for waste collections to significantly enhance outdoor public spaces within the laneways.
Recycling Infrastructure – Recycling Spokes	M	• Director Technical Services & team • Director Planning & Development • Marketing Coordinator • Customer Service • Information Officer • Waste and IoT Consultant	• 2.1 • 3.3 • 4 • 5.4	Strive towards meeting the State waste diversion targets by diverting greater quantities of waste from landfill to recycling spokes for collection by contractors or further processing at WMC recycling station. Trial - Introduce community recycling spokes to replace comingled bins within selected laneway/s
Recycling Infrastructure – Recycling Station	L	• Director Technical Services & team • Director Planning & Development • Marketing Coordinator • Customer Service • Information Officer • Waste Consultant	• 3.3 • 5.4 • 5.1.2	Explore the viability of establishing a recycling station in the vicinity of the laneways to accept recyclables from laneway recycling spokes with the aim of further refining, and separating waste and potentially reusing organics locally. Requires strong collaboration between WMC departments
Smart Waste Infrastructure				
Smart Sensors – WMC Commercial	H	• Civil Operations • Compliance • Marketing Coordinator • Placemaking	• 5.4.3 • 5.1.1	WMC look to trial smart sensors in existing WMC commercially contracted waste bins in selected laneway/s. Build on the opportunity to automatically manage collection frequency and understand waste characteristics of businesses. Investigate

Recommendation	Priority	Council Department Responsible		CWS Sections	Action
Collection bins / recycling spokes		• Information Officer	• Smart Waste Consultant		how best to integrate IoT data into existing systems and the potential use of such data between WMC departments
Smart Compactor Public Bins	H	• Civil Operations • Compliance • Information Officer	• Marketing • Placemaking • Smart Waste Consultant	• 4.2.2 • 5.4.3	WMC to investigate optimal locations and number of bins required to improve the perceived lack of public place bins. Replace existing public place bins with smart compactor waste and recycling bins. Raise public awareness of best waste practice and encourage recycling. Look to improve street sanitation and decrease littering. Collect and analyse area-specific data on automatically generated waste volumes and adapt collections in response to smart data. Embed data monitoring and waste collection responses into Civil Operations to underpin rollout of smart community waste and recycling hubs. Investigate leveraging IoT data and reporting across WMC in meaningful ways.
Smart Tree Hubs	L	• Capital Projects • Civil Operations • Engineering	• Information Officer • Open Space & Trees • Placemaking	• 5.4.1 • 5.4.3	Investigate potential for trialling a smart tree hub in a selected laneway once laneway infrastructure has been upgraded (paving etc.). Use this opportunity to monitor smart tree data for bin and associated usages such wireless and charging use by the public – investigate how this data can be leveraged across WMC departments
Smart Community Waste & Recycling Hubs	M	• Director Technical Services & team • Director Planning & Development	• Marketing Coordinator • Customer Service • Information Officer	• 3.3 • 5.4.1 • 5.4.3 • 5.1.1 • 5.6	Following wholistic planning across departments, integrated community education program implementation to determine optimal locations, trial a smart community waste hub and smart recycling hub in selected laneways. Monitor and evaluate the trial with the aim of retaining maximum trial businesses as WMC looks to roll out further smart hubs within the laneways.

Recommendation	Priority	Council Department Responsible	CWS Sections	Action
		• Smart waste consultant / Smart hub company		

Priority: H = High, M = Medium, L = Low

Appendix A: Mapping

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337,300 337,400 337,500 337,600 337,700

6,250,200 6,250,100 6,250,000 6,249,900

Guilfoyle Street
Guilfoyle Avenue
South Avenue
Cooper Street
Henrietta Lane
Brooklyn Lane
Bay Street
Cross Street
Knox Lane
Knox Street
Short Street
Goldman Lane
Goldman Lane
Gum Tree Lane
Transvaal Avenue
Jamberoo Lane
Cross Lane
New South Head Road
New South Head Road
Kiaora Lane
Kiaora Road
Bellevue Road
Leura Road
Carlotta Road
Court Road
Anderson Street
Manning Road
Patterson Street

Data source: Roads, Lots: NSW Spatial Services, 2019.

LEGEND

Fashion

Surveyed - Weekly Total Waste (l)

- 0-500
- Not Surveyed
- Survey Area

LOCALITY

0 10 20 30 km

DOUBLE BAY BUSINESSES FASHION

Woollahra Commercial Waste Study

N 0 20 40 60 m

Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator, Datum: GDA 1994
Scale @ A3: 1:1,500

Prepared:	F Walker	Date:	11/12/2019
Project:	TW19074	Revision:	A
Reviewed:	K Maguire		

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Figure 01

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Cross Lane
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Kiaora Road
Bellevue Road
Leura Road
Carlotta Road
Manning Road
Patterson Street
Anderson Street
Court Road

Data source: Roads, Lots: NSW Spatial Services, 2019.

LEGEND

Food and Drink

Surveyed - Weekly Total Waste (l)

- 3500-10000
- Not Surveyed
- Survey Area

LOCALITY

0 10 20 30 km

DOUBLE BAY BUSINESSES FOOD AND DRINK

Woollahra Commercial Waste Study

N

0 20 40 60 m

Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator, Datum: GDA 1994
Scale @ A3: 1:1,500

Prepared:	F Walker	Date:	11/12/2019
Project:	TW19074	Revision:	A
Reviewed:	K Maguire		

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Figure 02

Document Path: \\server\Talis\SECTIONS\Waste\PROJECTS\TW2019\TW19074 - Woollahra Commercial Waste Study\GIS\Maps\TW19074_02_FoodDrink_RevA2.mxd

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New South Head Road
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Gum Tree Lane
Manning Road
Patterson Street
Anderson Street
Court Road
Kiaora Road
Bellevue Road
Leura Road
Carlotta Road

Data source: Roads, Lots: NSW Spatial Services, 2019.

LEGEND

Restaurant / Cafe

Surveyed - Weekly Total Waste (l)

- 0-500
- 500-1500
- 1500-3500
- 3500-10000
- 10000-35000
- Not Surveyed
- Survey Area

LOCALITY

0 10 20 30 km

DOUBLE BAY BUSINESSES RESTAURANTS/CAFES

Woollahra Commercial Waste Study

N 0 20 40 60 m

Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator, Datum: GDA 1994
Scale @ A3: 1:1,500

Prepared:	F Walker	Date:	11/12/2019
Project:	TW19074	Revision:	A
Reviewed:	K Maguire		

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Figure 03

Document Path: \\server\Talis\SECTIONS\Waste\PROJECTS\TW2019\TW19074 - Woollahra Commercial Waste Study\GIS\Maps\TW19074_03_Restaurant_RevA2.mxd

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Kiaora Lane
Kiaora Road
Bellevue Road
Leura Road
Carlotta Road
Court Road
Anderson Street
Patterson Street
Manning Road

LEGEND

Retail

Surveyed - Weekly Total Waste (l)

- 0-500
- 500-1500
- Not Surveyed
- Survey Area

LOCALITY

0 10 20 30 km

DOUBLE BAY BUSINESSES RETAIL

Woollahra Commercial Waste Study

N 0 20 40 60 m

Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator, Datum: GDA 1994
Scale @ A3: 1:1,500

Prepared:	F Walker	Date:	11/12/2019
Project:	TW19074	Revision:	A
Reviewed:	K Maguire		

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Figure 04

Data source: Roads, Lots: NSW Spatial Services, 2019.

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LEGEND

Commerce

Surveyed - Weekly Total Waste (l)

- 0-500
- 500-1500
- 1500-3500
- Not Surveyed
- Survey Area

DOUBLE BAY BUSINESSES COMMERCE

Woollahra Commercial Waste Study

N
0 20 40 60 m

Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator, Datum: GDA 1994
Scale @ A3: 1:1,500

Prepared:	F Walker	Date:	11/12/2019
Project:	TW19074	Revision:	A
Reviewed:	K Maguire		

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Figure 05

Document Path: \\server\Talis\SECTIONS\Waste\PROJECTS\TW2019\TW19074 - Woollahra Commercial Waste Study\GIS\Maps\TW19074_05_Commerce_RevA2.mxd

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Leura Road
Manning Road
Patterson Street
Anderson Street
Court Road
Carlotta Road

Data source: Roads, Lots: NSW Spatial Services, 2019.

LEGEND

Services

Surveyed - Weekly Total Waste (l)

- 1500-3500
- 3500-10000
- Not Surveyed
- Survey Area
- Lot

LOCALITY

0 10 20 30 km

DOUBLE BAY BUSINESSES SERVICES

Woollahra Commercial Waste Study

N 0 20 40 60 m

Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator, Datum: GDA 1994
Scale @ A3: 1:1,500

Prepared:	F Walker	Date:	11/12/2019
Project:	TW19074	Revision:	A
Reviewed:	K Maguire		

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Figure 06

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Bellevue Road
Leura Road
Carlotta Road
Manning Road
Patterson Street
Anderson Street
Court Road

Data source: Roads, Lots: NSW Spatial Services, 2019.

LEGEND

Arts / Civic

- Not Surveyed

LOCALITY

0 10 20 30 km

DOUBLE BAY BUSINESSES ARTS AND CULTURE CIVIC

Woollahra Commercial Waste Study

N

0 20 40 60 m

Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator, Datum: GDA 1994
Scale @ A3: 1:1,500

Prepared:	F Walker	Date:	11/12/2019
Project:	TW19074	Revision:	A
Reviewed:	K Maguire		

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Figure 07

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Kiaora Lane
Kiaora Road
Bellevue Road
Leura Road
Manning Road
Patterson Street
Anderson Street
Court Road
Carlotta Road

Data source: Roads, Lots: NSW Spatial Services, 2019.

LEGEND

Health / Beauty

Surveyed - Weekly Total Waste (l)

- 0-500
- 500-1500
- Not Surveyed
- Survey Area

LOCALITY

0 10 20 30 km

DOUBLE BAY BUSINESSES HEALTH AND BEAUTY

Woollahra Commercial Waste Study

N 0 20 40 60 m

Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator, Datum: GDA 1994
Scale @ A3: 1:1,500

Prepared:	F Walker	Date:	11/12/2019
Project:	TW19074	Revision:	A
Reviewed:	K Maguire		

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Figure 08

Document Path: \\server\Talis\SECTIONS\Waste\PROJECTS\TW2019\TW19074 - Woollahra Commercial Waste Study\GIS\Maps\TW19074_08_HealthBeauty_RevA2.mxd

Appendix B: SWOT Analysis and Costs

Table B-1: Education SWOT Analysis

SWOT Analysis			
Strengths	**Weaknesses**	**Opportunities**	**Threats**
- Leverage the growing community culture of recycling and waste minimisation - Open, transparent and targeted investigation into current community buy-in to waste initiatives - Provide opportunities to put community views into practice	- Difficult to achieve full community engagement - Time taken to change community perceptions - Labour intensive	- Less confusion by business community about recycling streams and ability to apply in practice within their own business - Clearer waste-related information on waste WMC initiatives - Less comingled recycling and organics contamination within the commercial waste stream	- Lack of community support - Misinformation led by special interest groups to confuse - Lack of clarity on resources needed - Underestimating budget allocation

Table B-2: Behavioural Change Cost Estimates

Aspect	Costs	Detail
Collective Impact Framework		
Initial Investment	$15,000 p.a.	Councils using C41 have leveraged volunteer value in-kind of over $25,000 for waste education activities (a five-fold increase in this value is estimated if considering time spent beyond planning meetings).
Integrated Community and Behavioural Change		
Education/Communication Coordinators x 2	$65,000	Full-time x 6 months
Business Engagement/Media	$30,000	Promotional materials
Education Resources	$10,000-$20,000	Paraphernalia/brochures/signage
Consultation / Monitoring / Evaluation	$20,000	Staff time, assistance from behaviour change experts

Table B-3: Wheel-Out Service SWOT Analysis

Wheel-Out Service			
Strengths	**Weaknesses**	**Opportunities**	**Threats**
- Improved visual amenity - Reduced odour - Improved pedestrian access	- Increased waste collection times - Time/costs required by WMC to set up registration and billing - Service vehicles potentially obstructing laneways for longer periods of time compared to standard kerbside collections	- Expand WMC suite of waste collection services - Build on community rapport	- Breaches of agreement by contractor - Property damage

Table B-4: Costs Wheel-Out Wheel-Back Service

Bin Size	Distance	Details	Cost
bins 240L and under	< 50m	visibility of the collection truck can be maintained.	Approx. $7.50 per collection.

Table B-5: Food Donation SWOT Analysis

Food Donation			
Strengths	**Weaknesses**	**Opportunities**	**Threats**
- Diverts high proportions of organics from the kerbside - Increases red bin capacity - Potential for high organics businesses to reduce collections - Reduces odour at the kerbside - Negligible costs - Established food donation organisations very	- Some potential to increase vehicular traffic in laneways	- Increases community connectedness - Values food as a commodity - WMC supports the community at all levels - Excellent platform to encourage inhouse business waste diversion	- Some food not suitable for donation

Food Donation			
effective in training and advertising - Community satisfaction			

Table B-6: Business Recyclables Collection Service SWOT Analysis

Strengths	Weaknesses	Opportunities	Threats
- Demonstrates strong understanding of laneways waste issues, solutions, and education - Low capital cost - Best practice waste separation - Increases business confidence in waste management - Reduces collection vehicles and congestion - Improves amenity - Litter reduction and improvement of laneway amenity	- Time-related costs - Labour costs	- Educate business on waste separation - Improved diversion of waste from landfill in line with waste legislation and best practice - Litter reduction as free service - Improve amenity and space within laneways	- Business acceptance and buy-in - Industry back-lash regarding removal of collection services within laneways

Table B-7: Business Recyclables Collection Service Costs

Details
Recycling collections could be undertaken in conjunction with a social enterprise such as *Green Connect* or *Flagstaff* as a method of offsetting costs. This would enable WMC to set up infrastructure, systems and training initially and then bring suitable organisations on board. Capital costs would be minimal. WMC would need to evaluate waste trolley types and the value or otherwise of supplying suitable recycling containers to businesses. It is recommended that WMC consider training and deploying a waste team with a minimum of two staff to collect recyclables. This team would also manage the recycling spokes (if opted) and recycling stations. A robust education package is imperative in successfully rolling out this option. Key elements required and associated costs are discussed in **Appendix B Table B-2**

Table B-8: Laneways Infrastructure Paving / Bollards SWOT

SWOT Analysis			
Strengths	**Weaknesses**	**Opportunities**	**Threats**
- Improves amenity and increases valuable public spaces - Community appreciation of placemaking in action - Public appreciation of community waste concept - Facilities pedestrian access areas - Reduces existing OHS issues - Reduces laneway traffic	- Must accompany a rethink on laneway infrastructure waste infrastructure and new waste technologies - Requires rigorous transport planning and evaluation - Requires strong community engagement - Infrastructure costs - Time taken to redesign each laneway	- Increased community pride in laneways - Increased opportunities for placemaking - Trial offers businesses in other laneways an understanding of how dramatically laneways can be improved as public spaces	- Business back-end service disruption if not well planned

Table B-9: Recycling Spokes SWOT Analysis

SWOT Analysis			
Spokes			
Strengths	**Weaknesses**	**Opportunities**	**Threats**
- Low infrastructure costs and maintenance - Best practice waste separation - Removes comingled recycling bins from laneways - Proactive waste management support - Reduces collection vehicles, litter and congestion - Improves amenity - Small footprint	- Time taken for collections	- Improved diversion of waste from landfill in line with waste legislation and best practice - Litter reduction if free service - Improved amenity and space within laneways	- Contamination - Littering under user-pays model - Industry back-lash regarding removal of collection services within laneways

Table B-10: Recycling Spokes Costs

Details
Under the CoM model, all businesses within the precinct would register with council to receive a comprehensive recycling solution inclusive of free 24 x 7 recycling spokes and free inhouse recyclables collections. Thus, the recycling spokes are very manageable in terms of collections. It would be difficult to track the tonnage or type of material deposited per business at spokes however, the core goal of removing recycling bins from the kerb would be possible and a clear idea of recyclables generated at the laneway scale would be achievable. WMC could also evaluate other options including gated enclosures with smart card access to registered businesses. This would give WMC the opportunity to recoup a small cost on a user-pays basis. Businesses would self-regulate use dependent on internal storage at the business end, volumes of recyclables generated and degree of motivation to visit the spoke. Consideration of negative impacts such as increased littering would be important under a user-pays scenario however, this may be ameliorated by charging a nominal amount for use. The number of spokes, size of enclosures, materials used, and types of openings will determine costs for each spoke. Pricing should be undertaken in line with WMC's procurement policy which will facilitate a competitive process and provide accurate market rates. Viability should incorporate collection and labour costs. WMC could also consider outsourcing such waste collections. This would effectively streamline collections to one or two contractors in a particular zone.

Table B-11: Recycling Stations SWOT Analysis

Recycling Stations			
General			
Strengths	**Weaknesses**	**Opportunities**	**Threats**
- Removes recycling bins, boxed recyclables and stacked cardboard from laneways - Recycling best practice - Strongly supports business - Reduces vermin and littering - Scalable in terms of equipment and level of sorting	- Determining a suitable location - Multiple stations may be required due to distance - Necessity to purchase and manage a range of equipment - Difficulty to update technology where equipment is owned by WMC - Cost	- Excellent waste diversion as managed by WMC waste team - Build rapport with business community - Increased understanding of waste issues facing businesses - Entry into future recyclables markets	- Noise, amenity issues surrounding site, unsuitable location
Food Organics			

Recycling Stations			
Strengths	**Weaknesses**	**Opportunities**	**Threats**
- Odourless output - Significantly reduces volume of general waste - High feedstock availability - Small footprint of front-end units - Low purchase/rental cost for simpler technologies - Well-tested technologies - Supports identified business needs - Addresses ongoing waste problem that currently has no business solution - Technology rapidly improving - WMC process management results in low contamination	- Low contamination tolerance which could result in breakdowns - Labour intensive - Costly if utilising high-end equipment	- Supports existing desire by food/takeaway businesses to divert this waste type - Educate business on waste separation - Improved diversion of waste from landfill in line with waste legislation and best practice - Ameliorate costs by "fertiliser" or compost product reuse in local area	- Resultant inhouse products must meet standards

Table B-12: Recycling Stations Cost Recovery

Details
It is recommended that WMC investigate cost recovery options for small-scale processing of products within their recycling hub. As discussed in **0**, WMC could also explore the opportunity to utilise processed organics from its recycling hubs as "organic fertiliser" or compost within local parks and gardens to reduce costs and potentially in the longer term sell these products. WMC could collaborate with large commercial operations within the Commercial Centre to facilitate collection economies of scale. Niche companies such as Flagstaff, with access to recyclables markets, may provide free collection of cardboard bales or other recyclable waste streams which may result in a cost neutral service for WMC. To minimise the number of waste collectors at recycling hubs, WMC should look towards a company which can collect multiple recyclable product streams.

Details
CoM implemented the Degraves Street business recycling model as a free ongoing service operated by council. However, WMC could explore variations to this prototype such as provision of free recycling for a set number of years or offset business rates.

Table B-13: Smart Sensors Specifications and Costs

Supplier/ Product	Size	Cost per unit	Details
Smartsensor Technologies Waste Sensors	- 240L - 120L	*1-99 units* $345 *100-249 units* $325 *250-500 units* $299 *500+ units* $249	- Can be used in existing / new public place bins that have enclosed/semi enclosed lids - Bin fullness-level sensor and software platform using your existing waste network Fill-level and temperature information directly to any web enabled device including smartphones - Solar /mains conversion - 1 x Ultrasonic and Optical Laser x 2 - 2 x 3.6 V Primary lithium-thionyl chloride (Li-SOCl2) High power C-size cell Expected 48 months with Hourly Heartbeats Up to 5 Metres Resolution of ~1.6-mm NB-IoT, Cat-1, LoRa, Sigfox512 Grams From -40˚C to +65˚C IP66 Rated 1 to 4 x M5 Security HEX Screws - Dashboard - dashboard.smartsensor.com.au, iOS APP, Android APP, API Predictive Collection, Reporting, Collection History, Routing, ASSETRACK
	- 660L, 1100L, 3m3		- As above plus: - Sensor mounted to the lid using the provided bracket - Shortly available option for sideways installation in large open skip bins

Table B-14: Smart Compactor Bins SWOT Analysis

Smart Bins			
Strengths	**Weaknesses**	**Opportunities**	**Threats**
- Increased waste storage capacity - Fewer collections and ability to adjust to fluctuations in waste volumes - Improved OHS - operatives not required to manually handle bins - Reduction of odour & vermin - Potential service cost reductions due to collections being undertaken when needed	- Power or parts failure requires suitable trained personnel to resolve issue - Potential increase in time required to service the bins - Training for users to reduce OHS risks - Initial capital investment may be considered excessive - Waste collection - Cost	- Demonstrates WMC commitment to new technologies and improved waste management	- Vandalism

Table B-15: Smart Compactor Bins Specifications and Costs

Supplier/ Product	Size	Cost per unit	Details
Smart City Solutions CleanCubes (CleanCaps sensor)			
	- 240L - 120L	$7,000	- Compaction Force: up to 500kgf - Power consumption: 15Wh/day - System Voltage: 12Volts DC - Battery: spill-proof, sealed lead
SmartSensor Technologies			
BigBelly H5 Station	240L	*1-20 units* $6,990 *20-50 units* $6,790 *50-100* $6,690 *100+ units* $6,590	- Compaction Force: 570 KGS - System Voltage: 12 Volts DC - Cycle Time: 41 seconds - Motor Size: 1/6HP DC motor - 5 yr in field warranty (air, water, rust) - Drive System: Gear motor with chain drive - Fully automated, IC processor-controlled system - 3-color LED status lamps indicate compacted trash level, machine status and error codes

Supplier/ Product	Size	Cost per unit	Details
Clean Platform	n.a.	$24.95 p/m	- Unlimited Users - Reporting & Analytics Suite Include platform updates iOS & Android App - 60-month agreement

Table B-16: Smart Tree Hubs Costs

Smart Tree Technology	Costs $ (AUD)
Solar Smart Tree (2 x Onyx solar panels)	38,000
Smart Tree (240v plus smart monitoring)	30,000
Powered Tree (240v)	27,000
Non-Powered Tree	15,000

Table B-17: Smart Community Waste and Recycling Hubs SWOT Analysis

Smart Community Waste and Recycling Hubs			
Strengths	**Weaknesses**	**Opportunities**	**Threats**
- Successful Australian trials and implementation - Smart access 24 x 7 - Increased waste diversion using different hub types Single waste contractor - Contracted hub maintenance / cleaning - Collection efficiency - maximises capacity prior to collection - Range of sizes - portable models can be relocated - Reduced traffic - single point of collection - Visually attractive - Real-time monitoring - security,	- Hub location must be within easy access of trial businesses - Risk to property or the public - Complaints / footpath obstruction where poor location specified - Traffic movement during collection where poor location specified - Potential illegal dumping if trial costs prohibitive to certain business within the trial area	- Community approach to waste management - Outsource hub management /collections to one contractor - Waste collection by single contractor - Real-time understanding of general waste output for a service area - Methodology applicable broadly across Centre post trial - Access by registered users to multiple hubs in different locations	- Location of hub too far from businesses - Hub malfunction and necessity for effective contracted response plan

Smart Community Waste and Recycling Hubs			
performance, fill level, volumetric reporting, and billing			

Table B-18: Smart Community Waste and Recycling Hubs Costs and Specifications

Aspects	Detail
Pottinger Eco Smart Compactor	
Sizes	- Portable: 10m3, 12m3, 14m3 Stationary 10m3 + (hull same bin size varies)
Capacity	- 14m3 capacity is 7 tonnes
Costs	$ 95,000 plus GST (all models)
Compaction ratio	5:1; 25t pressure
Power	16 Amp 3 phase 415 volt

Table B-19: Slab Dimensions (Example Pottinger MP ECO14)

Depth / Width / Height	Min Height Clearance	Min Space Requirement	Min Truck Loading Area	Sound Level
5.82/1.95/2.44m	4m	6.0/2.2m	10/2.6m	56dB

Appendix C: Technical Review – Recycling Station Organics

Details	Closed Loop CLO100	BioBin 4.5m3	Ecoguardians GC 1200
Organics			
Technology	Aerobic	Aerobic	In-vessel composting
Process	Onsite - organic output may need blending to improve quality	Onsite- effectively a storage unit. Starts to breakdown material but compost output requires further treatment offsite	Onsite
Suitability	Sensitivity to contamination could be a major issue. Would only be suitable for businesses & would need monitoring/management	May be suitable as low management is required. Need to balance C:N ratio. An intermediary processing step so cost benefit would need to stack up	May be suitable as low management is required and simple technology
Overview	Small container unit (agitator, airflow and heat exchange) with live microbes to breakdown food waste in a short period. Soil Conditioner By product produced.	Forced Aeration Receptacle Waste is loaded in and left to reduce in size before being collected and transported to composting facility	Continual process system designed to be fed with wastes as frequently as possible – ideally daily. Food and organic waste placed into the hopper on the top of the machine with an equal quantity of “woody” material.
Success	Currently used at Uni's, Restaurants, Mine sites etc.	Used at Adelaide University and several other facilities	Yes
Capacity	200kg/day	New organics capacity = 3000kg	1200 kg/day (2000 kg/day for GC2000 model)
Flexibility of capacity	Add waste throughout the day - doesn’t seem like it requires a 'steady flow'. Can use as you go.	Doesn’t seem to require a 'standard flow' - needs to be exchanged when its full.	Flexible
Scalability	Can add more units	Bins available in different sizes and more can be purchased as necessary	Additional vessels can be added to system to scale up.
Required Waste Inputs	All food waste including some liquids (excluding Large bones, seafood shells and bulk oil)	Food Waste, green waste, manure and VET waste, and anything compostable and organic.	Cooked / Uncooked Meat & Fish Cooked / Uncooked Fruit & Vegetables Garden Waste / Green Wastes Animal Waste (including some types of bedding).

Details	Closed Loop CLO100	BioBin 4.5m3	Ecoguardians GC 1200
			Food and organic waste with equal quantity of 'woody' material
Processing Time	26 hours	Processing until bin is full.	2 weeks
Waste Volume Reduction	80-90%	Depends on material but should reduce by approx. 50%	better when used in conjunction with Dehydra food waste dewaterer
Odour Considerations	Odour is created however supplier claims the odour is "quite pleasant". Can run odour through an exhaust pipe.	System comes with a filter fan and biofilter.	Minimal, in vessel system Bio-filter optional extra
Required Footprint	Overall footprint (mm): 2584 (w) x 1250 (d) x 1580 (h)	3.2m x 3m	Length 3.3m, Width 1.8m, Height 2m (Length 4.2, Width 2.1 Wide for GC2000 model)
Mobile /Fixed System	Mobile	Mobile - location can change depending on needs	Mobile
Supporting Technology	Bin Tip can be included if OHS is an issue.	Bin tipper could be included. Additional space may be required for additional feedstocks such as green waste etc.	Power screen for refining product Bio-filter, air injection Conveyor loading / discharge
By-Product Harvesting Frequency	Weekly - with 1/3 of material left in to continue the biological and pasteurisation process	3-4 times per annum	About once a week
By-Product Quality	Basic soil conditioner. Depends on level of contamination.	Waste is delivered to a compost facility and turned into high grade composted product.	Simple compost product
By-Product Management	May provide little benefit to soil, while generating odour.	Minimal By product is managed by a Third Party (composter)	Medium - could use power screen for refining end product
Contamination Tolerance	Minimum	Minimum	Minimum

Details	Closed Loop CLO100	BioBin 4.5m3	Ecoguardians GC 1200
Technology Complexity	Medium Simple dehydrator but multiple moving parts and processes.	Low Basically a skip bin that you fill with food waste, and maybe a little shredded green waste to keep at the right C:N ratio	Simple
Training	Minimal	Minimal While some knowledge of the composting process is required it is much lower as the by-product is managed by the 3rd party.	Minimal, easy to use
Ongoing Process Management	Medium By-product will have to require consistent management	Low Skip bin with a fan. Make sure the C:N mix is reasonable and arrange pick up when full.	Usual hygiene practices, such as brushing the floor around the Rocket® and wiping the machine clean
Continued Management Requirements	Yes- Microbes and material required to stay activated in system to maintain composting ability	Can be left alone for extended periods	Ideally needs to be fed daily
Maintenance	Minimal - check box filter and condensate collector once a week however product is produced internationally so repairs may pose an issue.	Minimal Check filters and fullness of bin. Third Party composters will perform servicing and maintenance on bin each time it is collected.	Requires minimal maintenance
Operating Cost		System runs for approximately half of each day, i.e. 12 hours and consumes approx. 8 kWh in each 24-hour period. At $0.30 AUD per kWh that is around $2.40 AUD per day	
Purchase Cost	$73,000 + GST	Delivery charge (estimate approx. $3k) - Add. options - $3k hydraulic lid, $15k bin lifter.	Capital $292,000 or lease $5,300 p/m (Capital $432,000 or Lease $8,500 p/m for GC2000 model)
Lease	yes	yes	
Power requirements	AC 3 phase, 20-amp, 5 pin dedicated outlet	240V 10 Amp connection is required	1ph 240v 16amp x 2 sockets

Details	Closed Loop CLO100	BioBin 4.5m3	Ecoguardians GC 1200
Reviews	Wandering Cooks (innovative Brisbane business providing short-term access to commercial kitchens) - 140kg of food waste processed per week, 6.3 tonnes of CO2 saved per year. 100% of food waste composted on-site.	Diverted approx. 70% waste to landfill." - "Out of all our waste saving initiatives, the BiobiN® has made the greatest impact on our waste disposal – it has reduced our waste collection by 14 bulk bins removals per week." R.Phillips, Chief Engineer, Noosa Sheraton, Queensland	Currently in operation throughout the UK and abroad including exclusive hotels, ACS Cobham International Schools, Pepsico— Walkers Crisps Skelmersdale and British Petroleum East Caucus Pipeline Expansion

Appendix D: Bibliography

City of Hobart (2019): *Single-use plastics by-law information*. Retrieved from: https://www.hobartcity.com.au/Business/Food-and-beverage-businesses/Single-Use-Plastics-By-Law-Information#section-1

City of Melbourne (2019): *Degraves Street Recycling Facility*. Retrieved from: https://www.melbourne.vic.gov.au/business/waste-recycling/Pages/degraves-street-recycling-facility.aspx

City of Sydney (2016): *Environmental action 2016–2021 – Strategy and action plan*

City of Sydney (2018): *Guidelines for waste management in new developments*. Retrieved from: https://www.cityofsydney.nsw.gov.au/__data/assets/pdf_file/0009/307269/Guidelines-for-Waste-Management-in-New-Developments.pdf

City of Sydney *Local Approvals Policy for managing waste in public places.* Retrieved from: https://www.cityofsydney.nsw.gov.au/__data/assets/pdf_file/0007/194380/Waste-Policy-local-approvals-policy-for-managing-waste-in-public-places.pdf

Commonwealth of Australia (2019): *Closing the loop on waste.* Retrieved from: https://www.infrastructure.gov.au/cities/smart-cities/collaboration-platform/Closing-The-Loop-on-Waste.aspx

McKenzie-Mohr, D. (2000). Promoting Sustainable Behavior: An Introduction to Community- Based Social Marketing. Journal of Social Issues , 56(3), 543–554

NSW EPA (2015a): *Disposal-based audit Commercial and industrial waste stream in the regulated areas of New South Wales: Main report.* Retrieved from: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/warrlocal/150209-disposal-audit.pdf

NSW EPA (2015b): *Pilot generator site-based audit: Commercial and industrial waste stream in the metropolitan levy areas of New South Wales*. Retrieved from: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/warrlocal/150186-site-audit-overview.pdf

NSW EPA (2018a): *Bondi unwrapped: metro and beach hotspots*. Retrieved from: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/grants/waste-and-recycling/18p1165-waverly-bondi-unwrapped-casestudy.pdf

NSW EPA (2018b): *Too Good To Waste Discussion paper on a circular economy approach for NSW*. October 2018. Retrieved from: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/recycling/18p1061-too-good-to-waste-circular-economy-discussion-paper.pdf

NSW EPA (2019a): *Circular Economy Policy; Office QLD Chief Entrepreneur (2018). Towards a zero waste, circular economy; W.A. Waste Authority WARR Strategy 2030*

NSW EPA (2019b): *Bin Trim*. Retrieved from: https://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/business-government-recycling/bin-trim

NSW State Government (2019): *Organics Infrastructure – Stream 2 Business Organics Recycling grant project summaries.* Retrieved from: https://www.environment.nsw.gov.au/funding-and-support/nsw-environmental-trust/grants-available/organics-infrastructure/stream-2-business-organics-recycling/grants-awarded-and-project-summaries#city

NSW, State Environmental Planning Policy No 65— *Design Quality of Residential Flat Development, 2017*

Sacke N. (2020): *Maximising the value of IoT data.* IoTNOW, August 7, 2020. Retrieved from: Maximising the value of IoT data - IoT Now - How to run an IoT enabled business (iot-now.com)

Southern Sydney Regional Organisation of Councils (SSROC) (2017a): *Regional waste avoidance and resource recovery strategy*. Retrieved from: https://ssroc.nsw.gov.au/wp-content/uploads/2018/02/SSROC-Community-facing-Strategy_v12-PRINT.pdf

Southern Sydney Regional Organisation of Councils (SSROC) (2017b): *SSROC submission on the NSW EPA Waste and Resource Recovery Infrastructure Strategy Consultation Draft.* Retrieved form: https://ssroc.nsw.gov.au.s223791.gridserver.com/wp-content/uploads/2018/01/EPA-171117-SSROC-Waste-Infrastructure-Submission-v041.pdf

Southern Sydney Regional Organisation of Councils (SSROC) (2018a): *SSROC submission on the Too Good to Waste – Discussion Paper on a Circular Economy for NSW*. Retrieved from: https://ssroc.nsw.gov.au/wp-content/uploads/2018/12/20181206-SSROC-Submission-on-Circular-Economy-Policy-attachment.pdf

Southern Sydney Regional Organisation of Councils (SSROC) (2018b): *Update of the 2009 National Waste Policy*. Retrieved from: https://ssroc.nsw.gov.au/wp-content/uploads/2019/02/20181005-National-Waste-Policy-SSROC-with-LGNSW-submission-v03.pdf

Waste Management Review (2018): Eco Guardians: AORA Victoria 2018 awards winners announced. Retrieved from: https://wastemanagementreview.com.au/tag/eco-guardians/

Waste Management Review (2019a): *Melbourne opens recycling hub EOI's.* August 2019. Retrieved from: https://wastemanagementreview.com.au/melbourne-opens-recycling-hub-eois/

Waste Management Review (2020): *Melbourne to establish two new waste and resource recovery hubs.* June 5, 2020. Retrieved from: https://wastemanagementreview.com.au/melbourne-to-establish-two-new-waste-and-resource-recovery-hubs/

Woollahra Municipal Council (2015): *Woollahra Council DCP: Chapter E5: Waste management*. Retrieved from: https://www.woollahra.nsw.gov.au/__data/assets/pdf_file/0019/150544/Chapter_E5_Waste_Management.pdf

Woollahra Municipal Council (2015): *Woollahra Council DCP: Chapter D5: Double Bay Centre.* Retrieved from: https://www.woollahra.nsw.gov.au/__data/assets/pdf_file/0004/150538/Chapter_D5_Double_Bay_Centre.pdf

Woollahra Municipal Council DA Guide. Attachment 1: Site waste minimisation and management- Waste Avoidance and Resource Recovery Strategy 2030; Retrieved from:

https://www.woollahra.nsw.gov.au/__data/assets/pdf_file/0019/152407/DA_Guide_-_Attachment_1_-_Site_Waste_Minimisation_and_Management_Plan.pdf

Woollahra Municipal Council (2016a): *Double Bay Centre: Public domain strategy.* Retrieved from: https://www.woollahra.nsw.gov.au/__data/assets/pdf_file/0007/168397/Double_Bay_Centre_-_Public_Domain_Strategy_-_ASPECT_Report_2016.PDF

Woollahra Municipal Council (2016): *Risk management framework 2016 to 2021.* Retrieved from: https://www.woollahra.nsw.gov.au/__data/assets/pdf_file/0013/207220/Risk_Management_Framework.pdf

Woollahra Municipal Council (2018): *Delivery program 2018 – 2021* & *Operational plan 2019 – 2020: Adopted 24 June 2019.* Retrieved from: https://www.woollahra.nsw.gov.au/__data/assets/pdf_file/0016/203524/Delivery_Program_2018-21_and_Operational_Plan_2019-20.pdf

Woollahra Municipal Council (2019a): *Double Bay place plan 2019 to 2023.* Retrieved from: https://www.woollahra.nsw.gov.au/__data/assets/pdf_file/0003/151446/Double_Bay_Place_Plan_2019_to_2023_Adopted.pdf

Woollahra Municipal Council (2019b) *Council news* 5 February 2019. Retrieved from: https://www.councilnews.com.au/2019/02/4157337-steyne-park

Woollahra Municipal Council (2020): *Woollahra Local Strategic Planning Statement (LSPS) March 2020.* Retrieved from Woollahra+LSPS+2020+-+Web+version+-+March+2020_S-980+(4).pdf (shared-drupal-s3fs.s3-ap-southeast-2.amazonaws.com)

WSROC (2019): *Western Sydney cafes choose to reuse.* 25 November 2019. Retrieved from: https://wsroc.com.au/media-a-resources/releases/western-sydney-cafes-choose-to-reuse