WASTE AUDIT AND CONSULTANCY SERVICES
Level 21, 133 Castlereagh Street
Sydney, NSW 2000
Telephone (02) 9199 4521
www.wasteaudit.com.au

Darling Square
North East Plot
Waste Management Plan

This report contains confidential information. It has been compiled by Waste Audit and Consultancy Services (Aust) Pty Ltd on behalf of Lend Lease.

This Waste Management Plan is not a substitute for legal advice on the relevant environmental legislation, which applies to Lend Lease, its contractors or other bodies. Accordingly, Waste Audit and Consultancy Services (Aust) Pty Ltd will not be liable for any loss or damage that may arise out of this project, other than loss or damage caused as a direct result of Waste Audit and Consultancy Services (Aust) Pty Ltd's negligence.

The contents of this report should be treated at all times as confidential, unless permission from Lend Lease is received.

Table of Contents

1. Introduction

This report supports an application made under section 96 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to modify Development Consent, SSD 6626 relating to the development of the North East Plot of Darling Square which is part of the Sydney International Convention, Exhibition and Entertainment Precinct (SICEEP).

Development Consent SSD 6626 was granted on 16 April 2015 by the delegate of the Minister for Planning for the following components of development:

- Site preparation works including demolition of existing Sydney Entertainment Centre;
- Staged construction of 8 storey, 19 storey and 41 storey buildings, including a 5 storey podium, to be used for:
  - 2,050m^2 retail floor space at ground floor level;
  - 445 above ground car parking spaces and storage; and
  - 581 residential apartments
- Various public domain improvements including:
  - Provision of footpath treatment to the northern and eastern frontages and associated landscaping along the northern boundary; and
  - Interim surface treatments to the southern and western frontages.

This section 96 application (the Modification Application) constitutes the first modification to the consent. This Modification Application follows the approval and current assessment of a number of SSDAs within the SICEEP site as set out in **Table 1**.

Table 1 – Status of initial SICEEP SSD DAs

DA No	Description of Application	Status
12_5752	SICEEP Core Facilities – Exhibition Centre, Convention Centre, The Theatre, Event Deck and Tumbalong Park	Approved: 22 August 2013
MOD 1	S96(1A) - various	Approved: 20 February 2014
MOD 2	S96(1A) – various	Approved: 18 July 2014
MOD 3	S96(1A) – various	Approved: 1 July 2015
13-5878	Darling Square Concept Proposal	Approved: 5 December 2013
MOD 1	S96(1A) – various	Approved: 26 November 2015
MOD 2	S96(1A) – various	Approved: 4 October 2016
6010	Western Plot (Student Accommodation – Building W2)	Approved: 7 May 2014
MOD 1	S96(2) – various	Approved: 1 April 2016
6013	North-West Plot (Public car park/ commercial office building)	Approved: 7 May 2014
MOD 1	S96(2) – various	Approved: 20 July 2015
MOD 2	S96(1A) – various	Approved: 26 November 2015
MOD 3	*S96(1A) – various*	*Under Assessment*
6011	South-West Plot (Mixed Use Residential Development)	Approved: 21 May 2014
MOD 1	S96(1A) – various	Approved: 27 July 2015
6116	ICC Hotel	Approved: 15 June 2014
MOD 1	S96(1A) – various	Approved: 8 July 2015
6626	North-East Plot (Mixed Use Residential Development)	Approved: 16 April 2015
MOD 1	***S96(1A) – various***	***Subject of this application***
6831	ICC Hotel fit-out, façade lighting system and subdivision	Approved: 16 October 2015
7133	Western Plot (Student Accommodation – Building W1)	Approved: 1 April 2016
7021	*North Plot (Community and Retail Building and Public Open Space)*	*Under Assessment*
6633	*South East Plot (Mixed Use Residential Development)*	*Under Assessment*

2. Overview of Proposed Modifications

This Modification Application seeks approval for the following amendments:

- Internal amendments to the podium levels, including the provision of new public amenities and additional service parking spaces;
- Minor internal revisions to some residential apartments; and
- Minor external amendments at the upper and lower levels, including refined interfaces with the public domain.

A range of other minor amendments resulting from design development, including amendments made in light of the continual design of surrounding buildings and public domain elements, are illustrated on the amended Architectural Drawings. These changes are to be expected in any project, especially given the nature and scale of the approved North East Plot development.

Waste Audit & Consultancy Services confirms that the proposed amendments to the Ground Floor plan will not adversely impact the operational waste management of the North East Plot. These amendments are in line with applicable guidelines relating to waste storage and management including the City of Sydney's *Policy for Waste Minimisation in New Developments 2005*.

The service bays that have been added to the Ground Floor and the increase in back of house (BOH) areas are to service the requirements of the North Plot retail operations (SSDA 10), and the addition of amenities are to service the North Plot and North East Plot retail patrons.

3. Site Description

The SICEEP Site is located within Darling Harbour. Darling Harbour is a 60 hectare waterfront precinct on the south-western edge of the Sydney Central Business District that provides a mix of functions including recreational, tourist, entertainment and business.

With an area of approximately 20 hectares, the SICEEP Site is generally bound by the Light Rail Line to the west, Harbourside shopping centre and Cockle Bay to the north, Darling Quarter, the Chinese Garden and Harbour Street to the east, and Hay Street to the south (refer to **Figure 1**).

The Darling Square Site is:

- Located in the south of the SICEEP Site, within the northern portion of the suburb of Haymarket;
- Bounded by the Powerhouse Museum to the west, the Pier Street overpass and Little Pier Street to the north, Harbour Street to the east, and Hay Street to the south; and
- Irregular in shape and occupies an area of approximately 37,701m2.

Figure 1 – Aerial Photograph of the SICEEP Site

The Modification Application Site relates to the North East Plot and surrounds as detailed within the drawings submitted in support of Modification Application. **Figure 2** illustrates the North East Plot in the approved Concept Proposal.

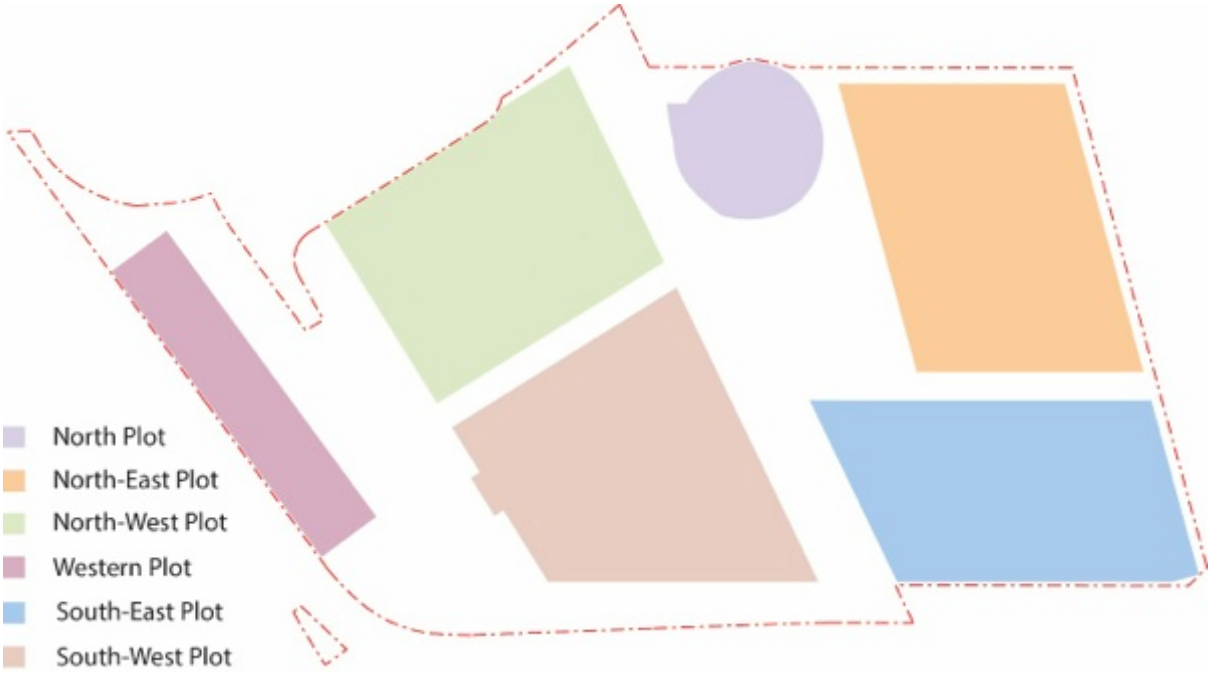


Figure 2 – Concept Proposal Development Plots

4. Waste Generation & Systems

This Waste Management Plan (WMP) details estimated waste and recycling generation, and recommended systems, for the residential and retail components of the North East Plot of Darling Square, and has been developed in accordance with the City of Sydney's *Policy for Waste Minimisation in New Developments 2005*.

It has been confirmed that the residential waste will be collected by City of Sydney Council. For the purposes of this report it has been assumed that the Council will offer general waste collections twice per week and mixed recycling collections once per week.

Waste from retailers will be kept separate from residential waste and a commercial waste contractor will be engaged to collect and dispose of all retail waste and recycling streams.

The North East plot is comprised of three residential towers and each tower will utilise a split chute, which will be accessible from each level and will terminate at dock level on the ground floor within the waste room allocated to each tower. The split chute provides for the disposal of general waste and mixed recycling from each residential level.

The City of Sydney's guidelines have been used to estimate waste/recycling generation from the residential towers, and bin numbers have been proposed to meet the capacity requirements of the guidelines. Tables 1-7 show residential waste/recycling generation estimates and recommended systems and Tables 9 and 10 show retail waste/recycling generation and recommended systems.

5. Waste & Recycling Generation

5.1 Waste & Recycling Streams

Based on the estimated waste profile, the following materials streams are expected to be generated:

1. General Waste
2. Cardboard/Paper Recycling
3. Commingled (Container) Recycling
4. Food Organics Recycling
5. Used Cooking Oil
6. E-Waste Recycling
7. Battery Recycling
8. Mobile Phone Recycling
9. Toner Cartridge Recycling
10. Fluorescent Light Tube Recycling

Streams 1-10 will be generated by retail tenancies and the base building in varying quantities depending on the tenancy type; streams 1-3 only will be generated by residential tenants (with cardboard and paper recycling combined with commingled container recycling collected as a single stream by the City of Sydney.

5.2 Waste & Recycling Generation - Residential

Residential waste estimates are based on the following apartment yield and waste/recycling generation rates:

Table 1 - Residential Apartment Mix

Residential Tower	Apartments
NE1	163
NE2	50
NE3	364
TOTAL	**577**

Table 2 - Residential Waste Generation Rates

	Kg/Apt/Week		Total/Week	
	General Waste	Recycling	General Waste	Recycling
City of Sydney Guidelines	6.4	2.1	80	40

The following tables summarise the expected weekly quantities of waste and recyclables that will be generated by the development's residential dwellings. Estimated bin footprints include a 20% allowance for space between bins and circulation.

Table 3 - Residential Tower NE1 (163 apartments)

Material Stream	Generation/Apt/Week		Total/Week	
	kg	L	kg	L
General Waste	6.4	80	1,043	13,040
Paper/Cardboard Recycling	0.7	25	114	4,075
Commingled Recycling	1.4	15	228	2,445
TOTAL	**8.5**	**120**	**1,386**	**19,560**

Table 3A- NE1 Residential Waste Systems

Material Stream	Bin Type	No.	Weekly Clearance Frequency	Capacity Litres/ Week	Est. Litres/ Week	Footprint/ Bin (m^2)	Total Footprint
General Waste	1500 litre MGB compacted 2:1	3	2	18,000	13,040	2.40	7.2
Mixed Recycling	660 litre MGB	10	1	6,600	6,520	1.40	14.0
TOTAL		**13**		**24,600**	**19,560**		**21.2 m^2**
TOTAL AVAILABLE FLOORSPACE							**30.1 m^2**

Table 4 - Residential Tower NE2 (50 apartments)

Material Stream	Generation/Apt/Week		Total/Week	
	kg	L	kg	L
General Waste	6.4	80	320	4,000
Paper/Cardboard Recycling	0.7	25	35	1,250
Commingled Recycling	1.4	15	70	750
TOTAL	**8.5**	**120**	**425**	**6,000**

Table 4A – NE2 (North) Residential Waste Systems

Material Stream	Bin Type	No.	Weekly Clearance Frequency	Capacity Litres/ Week	Est. Litres/ Week	Footprint/ Bin (m^2)	Total Footprint (m^2)
General Waste	1100 litre MGB	2	2	4,400	2,000	2.05	4.1
Mixed Recycling	660 litre MGB	2	1	1,320	1,000	1.40	2.8
TOTAL		**4**		**5,720**	**3,000**		**6.9 m^2**
TOTAL AVAILABLE FLOORSPACE							**12.0 m^2**

Table 4B – NE2 (South) Residential Waste Systems

Material Stream	Bin Type	No.	Weekly Clearance Frequency	Capacity Litres/ Week	Est. Litres/ Week	Footprint/ Bin (m^2)	Total Footprint (m^2)
General Waste	1100 litre MGB	2	2	4,400	2,000	2.05	4.1
Mixed Recycling	660 litre MGB	2	1	1,320	1,000	1.40	2.8
TOTAL		**4**		**5,720**	**3,000**		**6.9 m^2**
TOTAL AVAILABLE FLOORSPACE							**12.0 m^2**

Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016

Table 5 - Residential Tower NE3 (364 apartments)

Material Stream	Generation/Apt/Week		Total/Week	
	kg	L	kg	L
General Waste	6.4	80	2,330	29,120
Paper/Cardboard Recycling	0.7	25	255	9,100
Commingled Recycling	1.4	15	510	5,460
TOTAL	**8.5**	**120**	**3,094**	**43,680**

Table 5A - NE3 Residential Waste Systems

Material Stream	Bin Type	No.	Weekly Clearance Frequency	Capacity Litres/ Week	Est. Litres/ Week	Footprint/ Bin (m^2)	Total Footprint (m^2)
General Waste	1500 litre MGB compacted 2:1	6	2	36,000	29,120	2.40	14.4
Mixed Recycling	660 litre MGB	23	1	15,180	14,560	1.40	32.1
TOTAL		**4**		**51,180**	**43,920**		**46.5 m^2**
TOTAL AVAILABLE FLOORSPACE							**46.5 m^2**

5.3 Waste & Recycling Generation – Retail

The following table summarises expected weekly quantities of waste and recyclables that will be generated by the development's retail tenancies:

Table 6 - Retail Waste & Recycling Generation

Material Stream	kg/week	L/week
General Waste	653	9,324
Paper/Cardboard Recycling	449	4,488
Commingled Recycling	110	1,374
Organics Recycling	468	974
Cooking Oil Recycling	50	55
Total	**1,730**	**16,215**

Table 7 - Retail Waste and Recycling Systems

Material Stream	Bin Type	No.	Weekly Pickups	Capacity Litres/ Week	Est. Litres/ Week	Footprint/ Bin (m^2)	Total Footprint
General Waste	660	4	5	13,200	9,324	1.40	5.6
Paper/Cardboard Recycling	Baler	1	3	6 bales	4,488	4.00	6.0
Commingled Recycling	240	3	3	2,160	1,374	0.51	1.5
Organics Recycling	120	3	3	1,080	974	0.33	1.0
Oil Recycling	Caddy	1	As req.	1,000	55	1.50	1.5
TOTAL		**12**		**17,440**	**16,215**		**15.6 m^2**
TOTAL AVAILABLE FLOORSPACE							**20.0 m^2**

Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016

6. Waste & Recycling Storage Areas

6.1 General Requirements

The residential and retail waste and recycling storage areas will have the following features:

- Wash bay facilities – there is a central wash facility located within the ground floor car park (shown on the Ground Level plan - Appendix 11.1)
- Ventilation: The bin storage rooms will be mechanically exhausted as required by AS 1668.2
- Vermin Prevention:
  - The bin storage rooms will feature tightly fitted doors
  - Opening will be vermin proof
  - Building management is to ensure that as part of the cleaning contract, that the waste area and equipment is cleaned on a regular basis and that the bin lids are kept closed
  - Cleaners are to ensure that bin lids are closed when unattended

Noise is not likely to be an issue due to the location of the waste storage rooms on ground floor.

Occupational Health and Safety issues such as slippery floors in waste rooms and the weight of the waste and recycling receptacles will need to be monitored. Cleaners will monitor the bin storage area and clean up all spills immediately.

The materials and finishes for the waste/recycling storage areas are as follows:

Floor Structural concrete slab with smooth epoxy topping finish with coved wall and floor junctions. Graded drains to approved sewer connections subject to final design.

Walls Masonry walls

Ceiling Structural concrete slab over

Lighting Base building lighting

Water Supply Hose cocks and hose connections supplying warm water

6.2 Residential Waste and Recycling Storage Areas

There will be a total of four waste rooms (one servicing each individual residential tower – NE2 is split into two cores). The split chute system will terminate in each waste room, depositing waste and recycling into the bins as detailed in Section 5.2 above.

A dedicated storage room has been provided for residents to store bulky, ad-hoc items such as furniture and e-waste etc. This room is located on the ground floor adjacent to the bin-wash room.

These materials will be stored for a fixed time to give other residents the opportunity to re-use the items or if left unclaimed, appropriate collection organisations will be contacted to remove and recycle/reuse the items as required. Alternatively, City of Sydney Council offers a bulky goods collection every Wednesday, which building management would have to book as required.

In keeping with best practice sustainability programs, all storage areas and waste and recycling bins will be clearly differentiated through appropriate signage and colour coding to Australia Standards to reflect the materials contained.

Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016

6.3 Residential Waste & Recycling

The retail waste and recycling storage room will be located adjacent to the loading zone on ground floor and will house the bins detailed in Table 7 above. Access to this room will be restricted to retailers and cleaners – retailers will not have access to residential waste rooms, thus ensuring residential waste remains separate.

The waste storage area will be well signed with colour coded areas and/or signed walls that correspond to the waste and recycling systems so that tenants can easily recognise systems are located under the corresponding signage.

The waste and recycling areas are level with no raised platforms or steps. This allows tenants, cleaners and contractors to easily manoeuver waste bins throughout these areas.

Retail Management will work with tenants directly to ensure they are equipped with appropriate BOH systems to effectively manage their waste and maximize the diversion of recyclables from the general waste stream.

The cleaning contractor will be responsible for cleaning all the waste handling areas and ensuring they stay litter free.

6.4 Colour-Coding

In order to encourage cleaners, retailers and tenants to use the waste and recycling systems the bin storage rooms should be set up in a user-friendly fashion. For example, bins for all waste and recycling streams should be easily accessible without having to wheel / manoeuvre bins.

It is highly recommended that the bin storage room be colour-coded to ensure bins are stored in the correct area and to reinforce the colour-coding systems used throughout the building. This can be done by painting borders on the floor indicating where bins should be stored. The colour of the paint should be consistent with the waste stream e.g. yellow paint for comingled recycling, red paint for general waste. The waste room walls can also be painted.

Containers located within the development for waste and recycling should be consistent. The following table outlines the colour coding that has been developed by Standards Australia.

Table 8 - Standards Australia Waste/Recycling Container Colour Coding

Material Stream	Bin Body Colour	Lid Colour
Paper Recycling	Blue	Blue
Cardboard Recycling	Green	Blue
Food Organics	Burgundy	Burgundy
Commingled Recycling	Green	Yellow
General Waste	Green	Red

Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016

6.5 Signage

All waste and recycling streams should be differentiated with clear signage on all bins and on walls within the waste storage room. Each chute access point should be clearly signed too. Below are examples of appropriate signage incorporating textual information, pictures and colour coding to communicate the message.

Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016

7. Collection and Management Practices

7.1 Residential Collection

Residential waste and recycling collection services will be provided by City of Sydney Council. Collections will take place twice per week for general waste and once per week for recycling utilising the Council's standard rear-lift service (refer to Appendix 11.5 for truck specifications).

Prior to each collection, cleaning staff will transfer all bins from each individual waste storage room to the central residential waste storage room adjacent the loading zone within the ground floor car park. The Council truck will service the bins from the loading zone and it will be the responsibility of cleaning staff to return the bins to their respective waste rooms after collection.

Access from the waste rooms to the central residential waste storage room is level and free of kerbs ensuring all bins can be easily handled.

Due to the use of compacted 1500L MGBs in the NE1 and NE3 waste rooms, a power- assisted tug will be implemented for use by cleaning staff to assist in transferring the larger bins to the central residential bin storage room.

Table 9 - Residential Waste and Recycling Systems

Stream	Total Bins	Collection Frequency	Comments
Mixed Recycling	37 x 660L MGBs (total)	1 x weekly	Paper, cardboard, mixed plastics, aluminium/steel cans etc. segregated by residents and disposed into chute. 660L MGBs monitored and managed by cleaners and then transferred to loading zone for collection by Council truck on scheduled days.
General Waste	9 x 1500L, 4 x 1100L MGBs	2 x weekly	General waste disposed into chute by residents. MGBs monitored and managed by cleaners and then transferred to loading zone for collection by Council truck on scheduled days.
Bulky items	Storage cage	As required	Residents contact building management to arrange access to storage cage as required. Building management to schedule ad-hoc collection by Council as required.

7.2 Residential Management Practices

Chute access will be provided for residents on each floor. The split chute system allows general waste and recycling to be deposited in the one chute – residents must select which stream they are depositing and the diverter at the base of the chute will direct the material into the appropriate bin in the waste storage room (refer to Appendices 11.3 and 11.4 for chute information).

Residents will be briefed on the proper use of the split chute system and any contamination of the recycling stream will be monitored and reported by cleaners/building management as it is imperative that the recycling stream remains free of contamination to ensure compliance with City of Sydney collection protocols. Residents will be encouraged to maximise the separation of general waste and mixed recyclables within their apartments to aid the proper disposal of all materials.

7.3 Retail Collection

Retail waste and recycling collection services will be provided by a commercial waste contractor (TBA). Utilising a commercial waste contractor affords the retail manager greater flexibility regarding collection schedules and the appropriate collection frequencies will be determined in consultation with the waste contractor once appointed.

Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016

Recommended collection frequencies have been detailed in Table 7 above based on the estimated waste profile; however once operational, collection schedules may need to be adjusted accordingly depending on actual waste generation.

The waste contractor will be engaged to retrieve the bins from the retail waste room and load them from the central loading zone within the ground floor car park, then return the bins to the retail waste room for use. The only exception is the oil caddy which will be emptied via a hose connected from the tanker truck directly to the oil unit within the waste room.

Unlike the residential waste systems, utilising a commercial contractor enables greater segregation of recyclables into their unique streams – therefore a separate truck will be used to collect each of the different streams detailed in Table 9.

Retail management will liaise with the appointed waste contractor to advise on the most suitable collection times for all streams to ensure traffic congestion is limited in the loading area.

Table 10 - Retail Waste and Recycling Systems

Material Stream	Total Bins	Collection Frequency	Comments
Paper/Cardboard Recycling	Baler (see Appendix 11.8 for example)	2 x weekly	Tenants separate materials and deposit directly into baler. Cleaning staff to monitor baler and remove bales as required. Waste contractor to transfer bales from waste storage room to loading zone for collection.
Food Organics	5 x 120L MGBs	6 x weekly	Tenants separate materials in BOH/kitchen areas and deposit into MGBs. Alternatively, high organics generators may prefer to use a 120L bin in BOH area and take to the waste room when full. Waste contractor to transfer bins from storage room to loading zone for collection and then return empty bins to storage room.
Commingled Recycling	6 x 240L MGBs	3 x weekly	Tenants separate commingled materials in BOH area and deposit directly into 240L MGBs. Waste contractor to transfer bins from storage room to loading zone for collection and then return empty bins to storage room.
Oil Recycling	Oil Caddy (see Appendix 11.9 for example)	As required	Tenants use small transportable oil caddy to transfer oil to recycling unit in waste room from where it will be serviced by a specialist oil recycling contractor.
General Waste	2 x 660L MGBs	3 x weekly	Tenants separate general waste in BOH areas and then deposit directly into 660L MGBs. Waste contractor to transfer bins from storage room to loading zone for collection and then return empty bins to storage room.

7.4 Retail Management Practices

Retailers will separate general waste and recyclables from within their tenancies and transfer them to the waste room periodically throughout each day or as required to be disposed into the relevant bin in the waste room. It will be the responsibility of the individual retailer to maintain separation of recyclables from general waste from the point of generation to disposal in the systems provided.

The waste and recycling facilities located in the retail waste storage room are easily accessible by tenants and contractors, and the waste and recycling area and loading zone are level, with no raised platforms or steps. This allows tenants, cleaners and contractors to easily manoeuver waste bins throughout these areas.

Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016

Retail Management will work with tenants directly to ensure they are equipped with appropriate BOH systems to effectively manage their waste and maximize the diversion of recyclables from the general waste stream.

The cleaning contractor will be responsible for cleaning all the waste handling areas and ensuring they stay litter free.

Waste from common areas will be collected in dedicated bins and relocated to the main collection points by the cleaning contractor.

8. Public Domain Waste and Recycling

As per the SICEEP Sustainability Plan, general waste and recycling facilities will be provided in public realm areas throughout the precinct. The final number of bins will be determined in consultation with Sydney Harbour Foreshore Authority (SHFA) operations manager.

It is recommended that bin hubs provide for general waste and comingled recycling streams. It is important that general waste and recycling bins are always located together in order to make recycling as accessible as general waste disposal. Recycling bins should never be located on their own in isolation from a general waste bin as patrons are likely to contaminate the recycling bin with general waste if there is no other option to dispose their general waste.

The implementation of organics recycling bins is not recommended in public places due to the high levels of contamination commonly observed in such systems.

All public domain waste and recycling bins will be clearly signed and appropriately colour-coded to ensure the streams are readily identifiable, and will be managed and collected by SHFA as part of their existing waste and recycling operations.

9. Tenant Education

The ongoing waste program should include regular updates to residents and tenants regarding current recycling performance as well as tenant education and awareness programs.

It is recommended that the resident/tenant education and awareness program be conducted by building management to ensure that tenants are aware of their responsibilities in relation to segregation of recyclables, and to ensure they are following the building protocols.

The program should be tailored to the requirements of the building and will detail the waste and recycling systems in place, what materials are appropriate for each stream, the procedures involved in effective waste and recycling management, recommendations on how to minimise waste generation and instruction on how to operate the machinery safely.

Included in the information provided to tenants should be information directed at ongoing waste minimisation rather than just waste diversion. Building management should actively engage tenants at the beginning of their lease period to encourage initiatives that seek to increase the use of recyclable materials in their packaging and also minimise the amount of packaging used in their products and by their suppliers.

Guidelines to tenants regarding packaging could include the following information:

- Re-usable
- Recyclable
- Made from recycled materials
- Utilise renewable raw resources
- Supplier take-back programs
- Packaging minimisation

Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016

10. North Plot Waste Generation

The North Plot consists of a six-storey building (also known as The Darling Exchange) containing the following uses:

- Retail tenancies/market hall (market stalls, food and beverage premises and restaurant/bar operations);
- Community uses (library including IQ Hub, and child care); and
- Fitout and operation of the ground level and mezzanine market hall, child care facility, and the food and beverage offering (restaurant/bar) within The Darling Exchange.

10.1 Waste Streams

Based on the estimated waste profile, the following waste streams are expected:

1. General Waste
2. Cardboard/Paper Recycling
3. Commingled (Container) Recycling
4. Food Organics Recycling
5. Used Cooking Oil
6. E-Waste Recycling
7. Battery Recycling
8. Mobile Phone Recycling
9. Toner Cartridge Recycling
10. Fluorescent Light Tube Recycling

10.2 Waste Generation Estimates

The following tables detail the estimated retail waste generation quantity and profile based on the indicative retail mix, using WACS' retail waste model derived from extensive current and historical data from Lend Lease's national retail portfolio. All tenancies listed below will operate 7 days per week, except for the Child Care centre, which will operate 5 days per week.

General waste will be collected daily, 7 days per week, and recyclables (cardboard, commingled recycling, and organics) will be collected 5 days per week. Streams 5-8 listed above would be collected on an as-needed basis.

It is estimated that the North Plot will generate a total of **7,005 litres = 881 kilograms** of waste and recyclables per day (see Table 11 below).

Table 11 – The Darling Exchange – Waste and Recycling Generation Rates per Tenancy

Tenancy	Level	GFA (m^2)	Litres/Day				
			General	Cardboard	Commingled	Organics	Total
Market Hall	G	450 m^2	540	360	135	135	1170
Restaurant	M	500 m^2	750	400	200	200	1550
Library	1-2	1790 m^2	358	143	36	0	537
Child Care	3-4	1264 m^2	632	253	126	126	1138
Restaurant	5	842 m^2	1263	674	337	337	2610
TOTAL		**4,846 m^2**	**3,543**	**1,830**	**834**	**798**	**7,005**

Table 12 – The Darling Exchange: Waste and Recycling Generation Rates per Stream

Material Stream	Estimated Daily Generation	
	L	kg
General Waste	3,543	248
Recycling	3,462	633
TOTAL	**7,005**	**881**

Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016

The site will also have 15-20 market stalls operating 3 times per week, two kiosk-style retail pods operating 7 days per week that will generate food and beverage waste, and a number of public domain bins for general waste and recycling.

Daily waste and recycling generation rates for the retail pods are shown in Table 13. The retail pods will be self-contained and will be required to manage their own waste and recycling, and will form part of SHFA's ongoing daily waste management service.

Table 13 – The Retail Pods: Waste and Recycling Generation Rates per Stream

Material Stream	Estimated Daily Generation	
	L	kg
General Waste	48	3
Cardboard Recycling	32	3
Commingled Recycling	12	1
Organics Recycling	12	6
TOTAL	**104**	**13**

Daily waste and recycling generation rates for the 15-20 market stalls are shown in Table 14. Market Stall holders will be required to manage their own waste and recycling and will form part of SHFA's ongoing waste management service.

Table 14 – The Temporary Markets: Waste and Recycling Generation Rates per Stream

Material Stream	Estimated Daily Generation	
	L	kg
General Waste	96	7
Cardboard Recycling	64	6
Commingled Recycling	24	2
Organics Recycling	24	12
TOTAL	**208**	**27**

Public domain bins will be emptied daily as part of ongoing SHFA service. Estimated daily waste and recycling generation rates are shown in Table 15.

Table 15 – Public Domain Bins: Waste and Recycling Generation Rates per Stream

Material Stream	Estimated Daily Generation	
	L	kg
General Waste	200	19
Commingled Recycling	96	2
TOTAL	**296**	**21**

Table 16 on the following page summarises all general waste and recycling expected to be generated on a daily basis by North Plot tenancies and the public domain. The remaining waste and recycling streams will be generated occasionally and in relatively small volumes and will not require management and collection on a daily basis.

Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016

Table 16 – Summary: Waste and Recycling Generation Rates per Tenancy and Stream

Tenancy	Days Operation	Litres/Day				
		General Waste	Cardboard Recycling	Commingled Recycling	Organics Recycling	Total
Market Hall	7	540	360	135	135	1170
Restaurant	7	750	400	200	200	1550
Library	7	358	143	36	0	537
Child Care	5	632	253	126	126	1138
Restaurant	7	1263	674	337	337	2610
Retail Pods	7	48	32	12	12	104
Market Stalls	3	96	64	24	24	576
Public Bins	7	200	0	96	0	296
TOTAL		**3,887**	**1,926**	**966**	**834**	**7,981**

Table 17 shows the indicative floor space required for waste and recycling storage per tenancy and area. Collection bins will be spread across the floor plate for each tenancy (i.e. no central storage per floor/tenancy. Final selection of receptacles will be done in conjunction with Lend Lease.

Table 17 – Tenancy Storage Requirements

Tenancy	General Waste	Commingled Recycling	Organics Recycling	TOTAL Footprint (m^2)
Market Hall	1.02	1.02	0.33	**2.37**
Restaurant	0.51	1.02	1.86	**1.86**
Library	0.51	1.02	0.00	**1.53**
Child Care	0.51	1.02	1.86	**1.86**
Restaurant	1.02	1.02	0.33	**2.37**

10.3 Waste/Recycling Bin Requirements and Footprints

The number, type, and total footprint of bins required has been estimated based on collection of general waste 7 x /week for and cardboard, commingled, and organics recycling 5 x /week. Bin footprints include a 20% allowance for space between bins and circulation.

Table 18 – Bin Requirements per Stream

Material Stream	Bin Type	No.	Total Capacity Litres	Required Capacity Litres	Footprint per Bin (m^2)	Total Footprint (m^2)
General Waste	240 litre	9	2,160	3,887	0.51	8.7
General Waste	1100 litre	2	2,200		2.05	
Cardboard Recycling	1100 litre	4	4,400	3,851	2.05	8.2
Commingled Recycling	240 litre	8	1,920	1,932	0.51	4.1
Organics Recycling	120 litre	12	1,440	1,668	0.33	3.9
TOTAL		**35**				**24.9 m^2**

A further 10-15 m^2 will be required for the following:

- Bin wash area
- Oil recycling unit (for waste cooking oil from restaurants)
- Storage of bulky waste/other recyclable materials (see Section 8)

Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016

We note that the current Ground Level plans show a dedicated waste and recycling storage room for the North Plot of approximately **50 square metres size**. As detailed above, this should be adequate for storage of the expected volumes of materials generated.

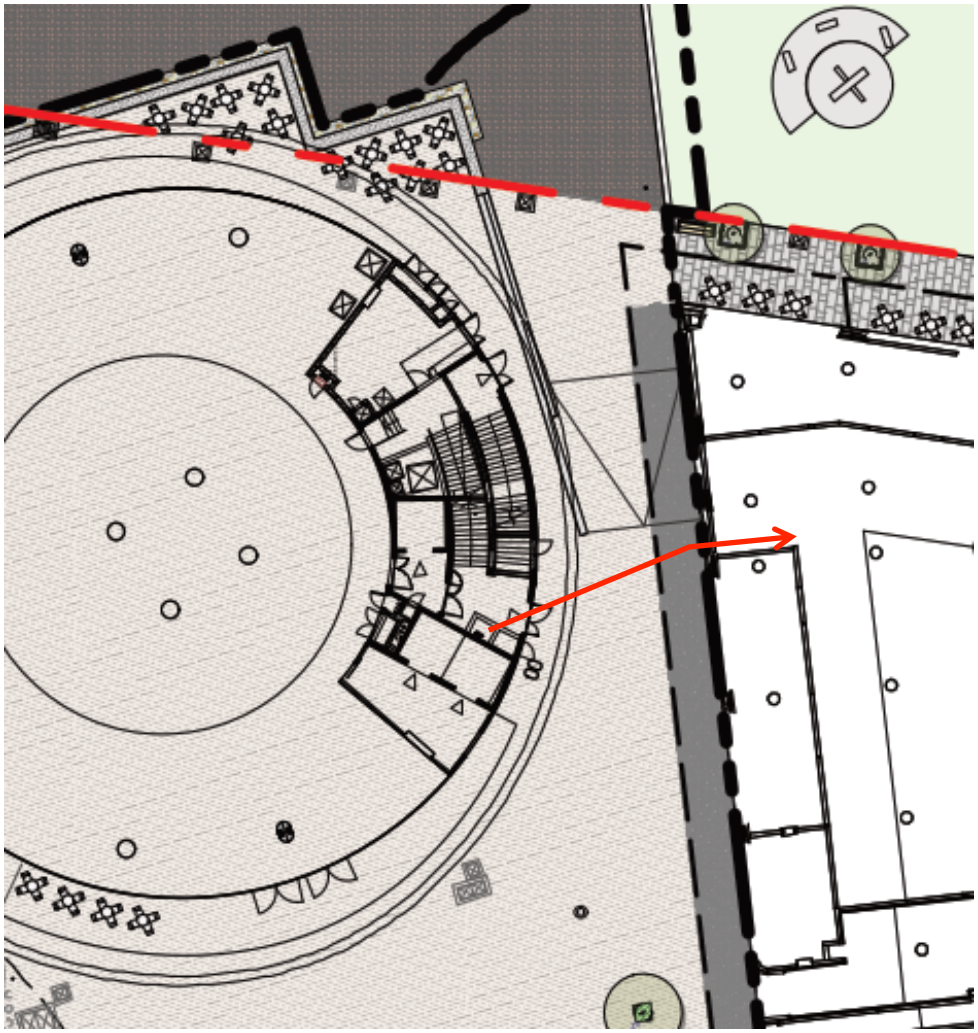
10.4 Tenancy Waste Storage – North Plot

We do not recommend the use of any MGBs larger than 240 litres for transport of waste and recyclables from The Darling Exchange to the NE Plot storage room. For organics recycling we recommend 120 litre bins as larger bins are likely to become too heavy to move safely (~100 kg).

Tenancies will require their own internal bins for separation of materials – each tenancy will be responsible for managing their own waste and recycling and will have contract cleaners who will transport the materials to the NE Plot storage room.

10.5 Waste Movement & Storage – North Plot

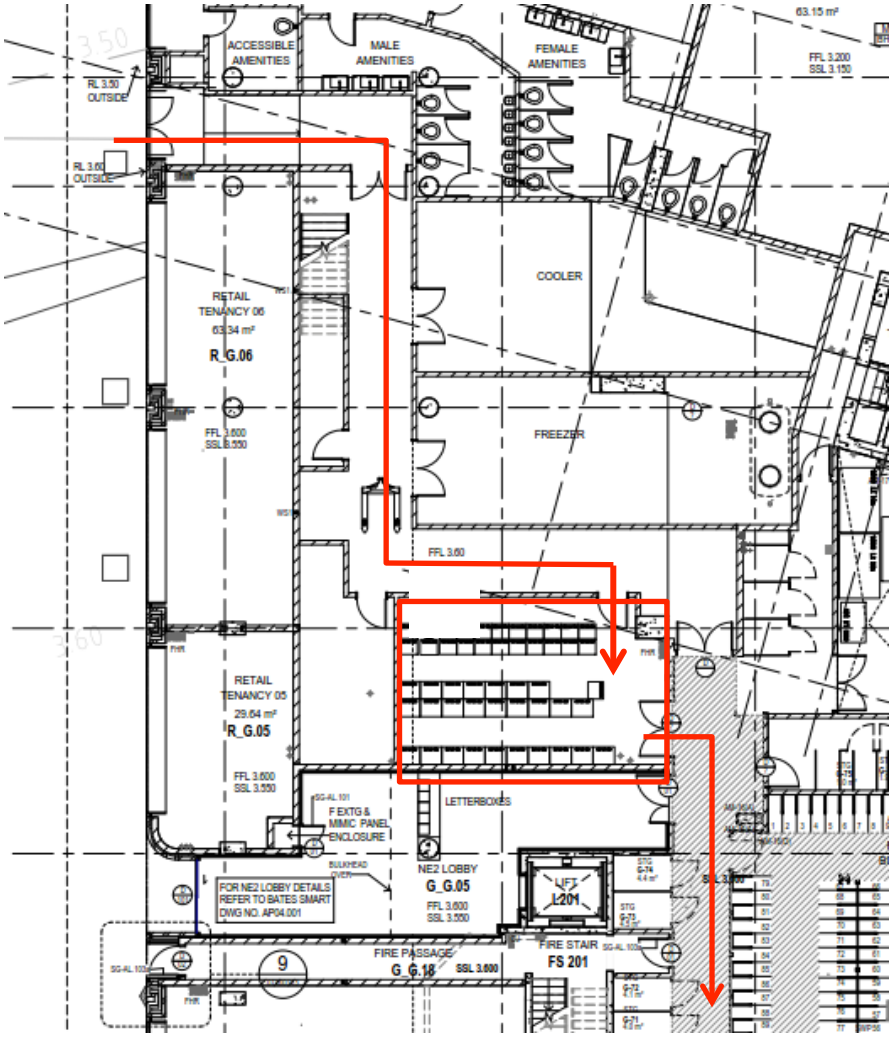
Figure 3 – Indicative Waste/Recycling Transport From North Plot



The indicative pathway for transport of waste/recyclables within the North East Plot is shown on the following page.

Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016

Figure 4 – Waste/Recycling Transport From North Plot Within NE Plot



11. Green Star Compliance

Table 19 - Multi-unit Residential Design v1 Mat-1 Recycling Waste Storage Compliance Criteria

Credit Criteria Summary	Comments
One point is awarded where any three of the four initiatives below are implemented. Two points are awarded where all four of the initiatives are implemented.	
1) Dedicated storage area for the separation, collection and recycling of waste is provided and it: - can be easily accessed by all building occupants - has suitable access for recycling contractors - is sufficiently sized to accommodate the storage equipment for the following recyclables: o cardboard o glass o plastics – mixed containers o plastics – soft plastics o plastics – polystyrene o metals; and o batteries	***Complies*** A dedicated storage area has been provided for each residential building (refer to appendix 12.2). Due to the implementation of a split chute system providing for the disposal of general waste and mixed recyclables from each residential level, there will be no need for residents to access the waste storage rooms on ground floor. However should the need arise that a resident does require access to the storage room, access is convenient. Similarly, City of Sydney waste contractors will not require access to the storage rooms as the bins will be moved to a central loading zone prior to collection (refer to section 8.1.1). However should the need arise, access for contractors is convenient. The waste rooms are sufficienttly sized to house the requisite number of bins for general waste and mixed recycling as per City of Sydney guidelines (refer to section 6). The provision of facilities for soft plastics and polystyrene recycling have not been provided as City of Sydney council do not offer a recycling service for these streams. Facilities have been provided for metal and battery recycling within the bulky items storage cage. Due to the ad-hoc nature of these items, specialty collections will arranged by building management as required.

Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016

2) Convenience of recycling/waste chutes - Disposal of recycling is at least as convenient as disposal of general waste, for example where waste chutes are provided for general waste, chutes are also provided for recycling - Recycling and general waste chutes are provided on each floor in close proximity to each other.	***Complies*** The chute system provides for general waste disposal and mixed recyclable disposal through the same chute by means of a diverter at the base of the chute which directs the material to the appropriate bin according to the selection made by the resident from their disposal point on their floor (refer to appendix 12.7 and 12.8).
3) Compost facilities - Facilities are provided for on-site disposal and re-use of compost and green waste	***Complies*** Compost facilities provided on podium level for disposal of green waste by grounds maintenance staff – compost will be re-used on landscaping by grounds maintenance staff.
4) Facilities for over-sized household items: - Space is provided in common areas for the collection of over-sized household items to facilitate re-use within the building and it must be: o Large enough to contain a 2m3 cage o Clearly labelled for items for re-use o Separated from the general waste and recycling area: and o Its existence and location must be communicated to tenants	***Complies*** An oversived items storage cage has been provided in a central location adjacent to the loading zone within the ground floor carpark. The area allocated for the storage cage is approximately 46m^3 and is separate from the general waste and recycling area The location and disposal protocols of the storage cage will be communicated to tenants and managed by building management.

12. Conclusion

The storage areas, management systems, and collection practices detailed in Sections 1-10 will provide residents, retail operators, contractors, patrons, and other site users with practical and efficient systems for managing operational waste and recycling, and enable the development to attain compliance with the Green Star credit *Multi-Unit Residential Design v1 Mat-1 Recycling Waste Storage*.

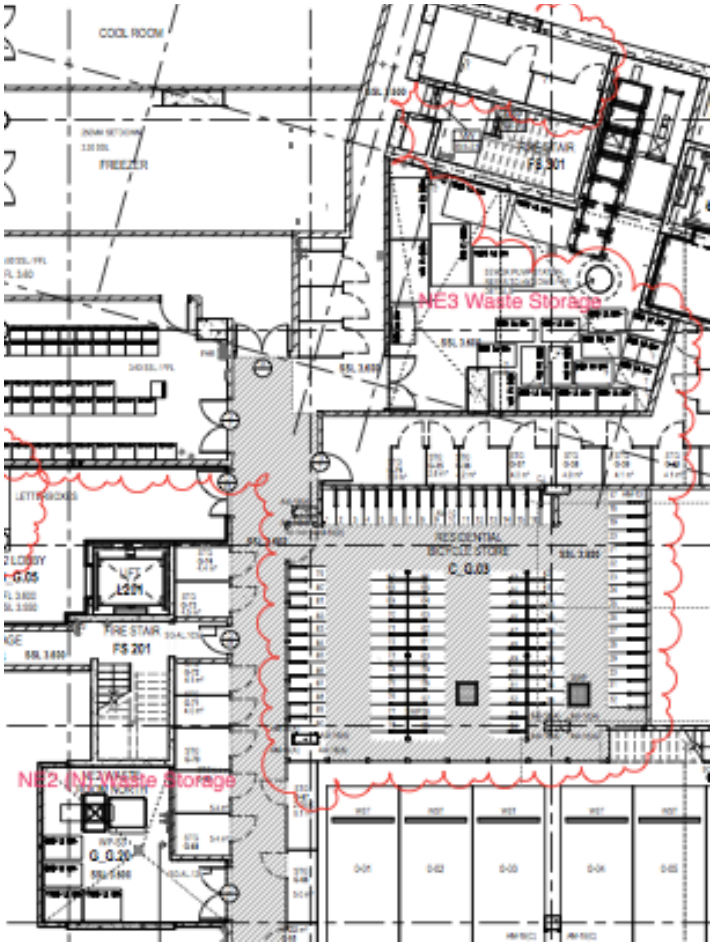
Waste Audit & Consultancy Services confirms that the proposed amendments to the Ground Floor plan will not adversely impact the operational waste management of the North East Plot. These amendments are in line with applicable guidelines relating to waste storage and management including the City of Sydney's *Policy for Waste Minimisation in New Developments 2005*.

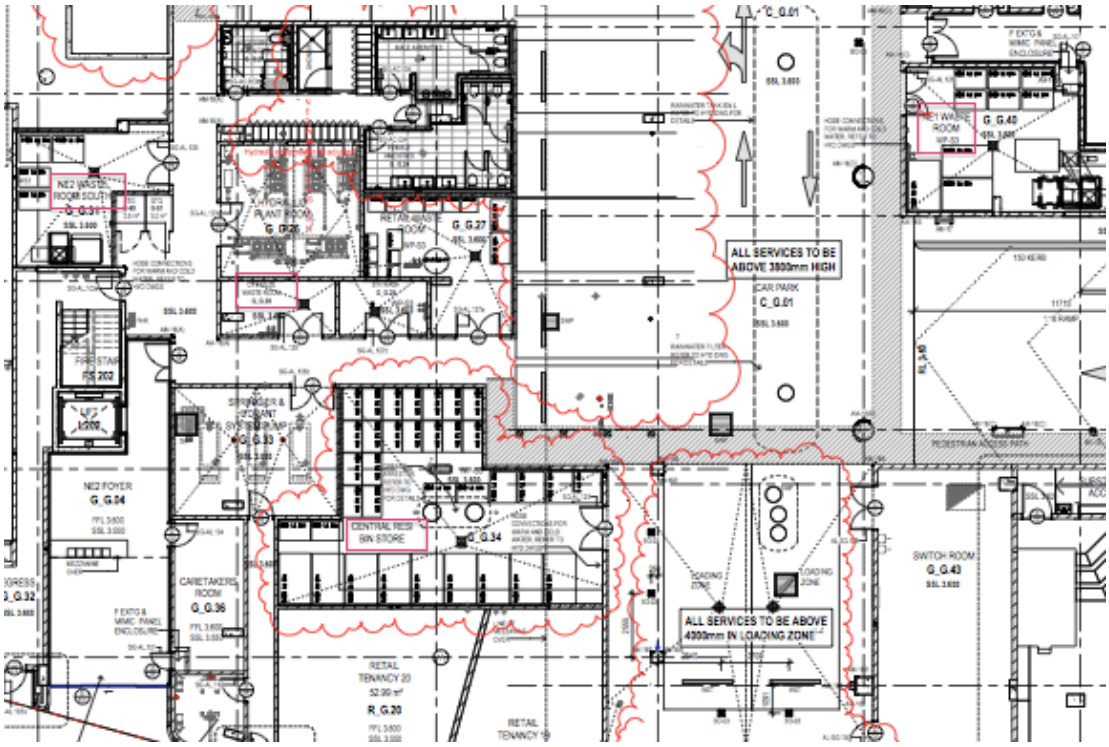
These provisions also meet the requirements of the North Plot with regard to management of operational waste and recycling.

Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016

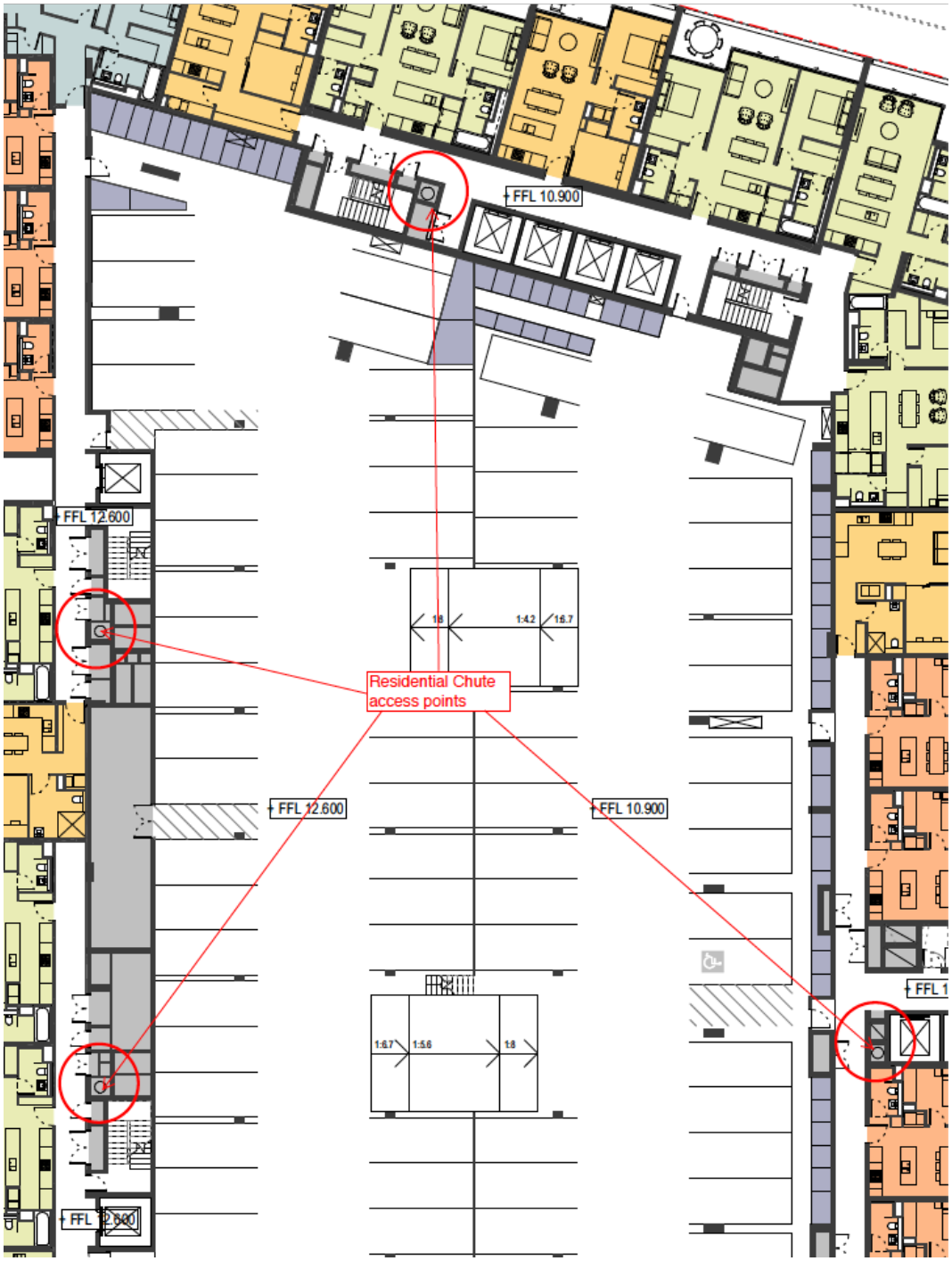
13. Appendices

13.1 Ground Floor Waste Storage and Loading

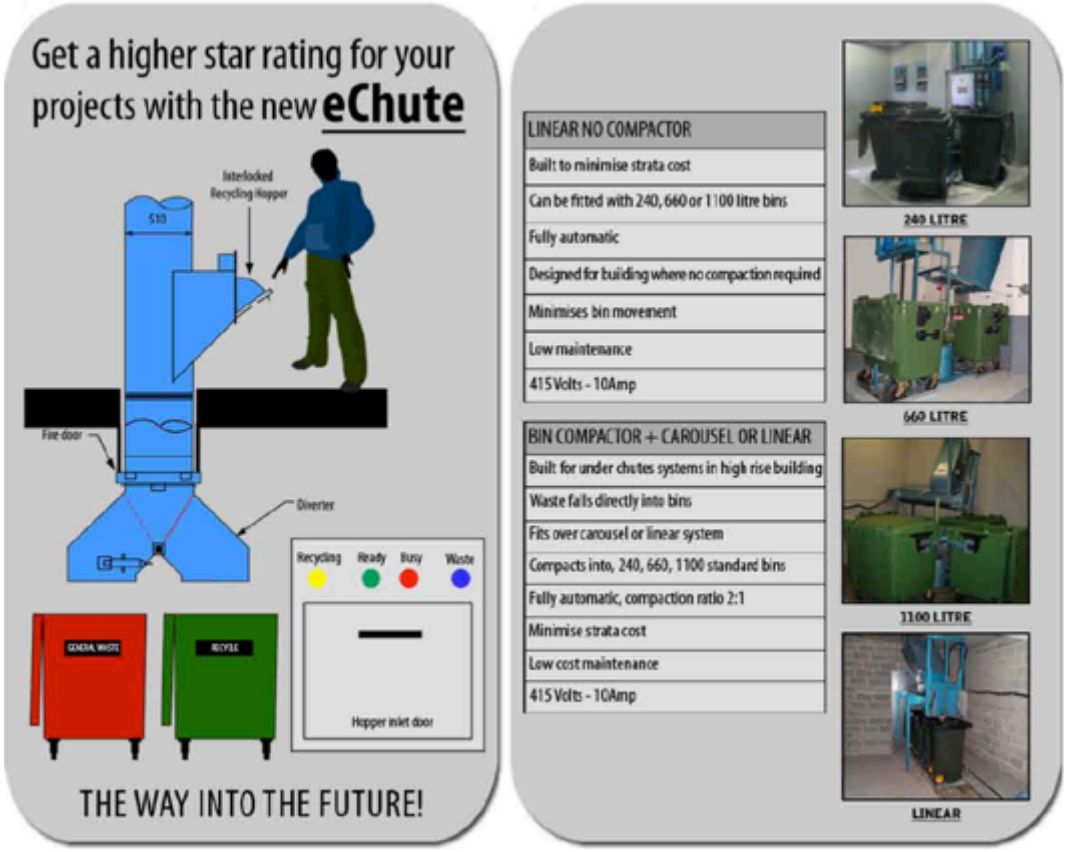




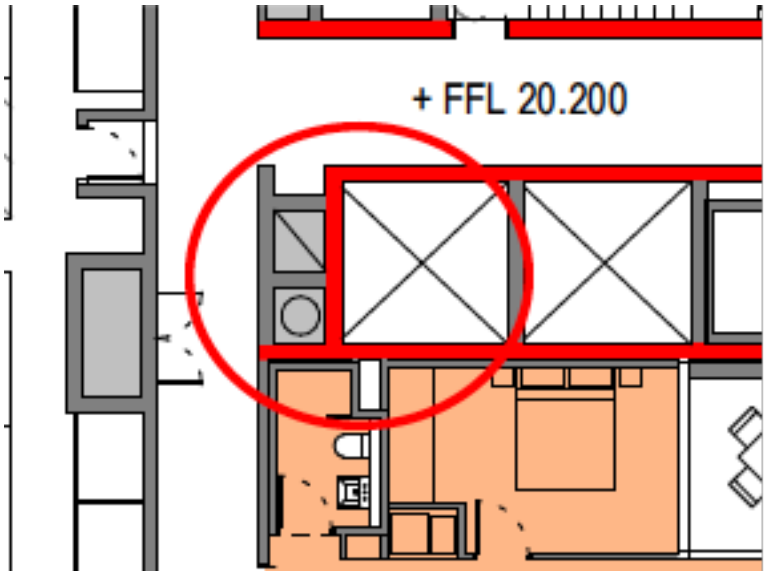
13.2 Typical Residential Floor Chute Access Points



13.3 Indicative Design for Split Chute System

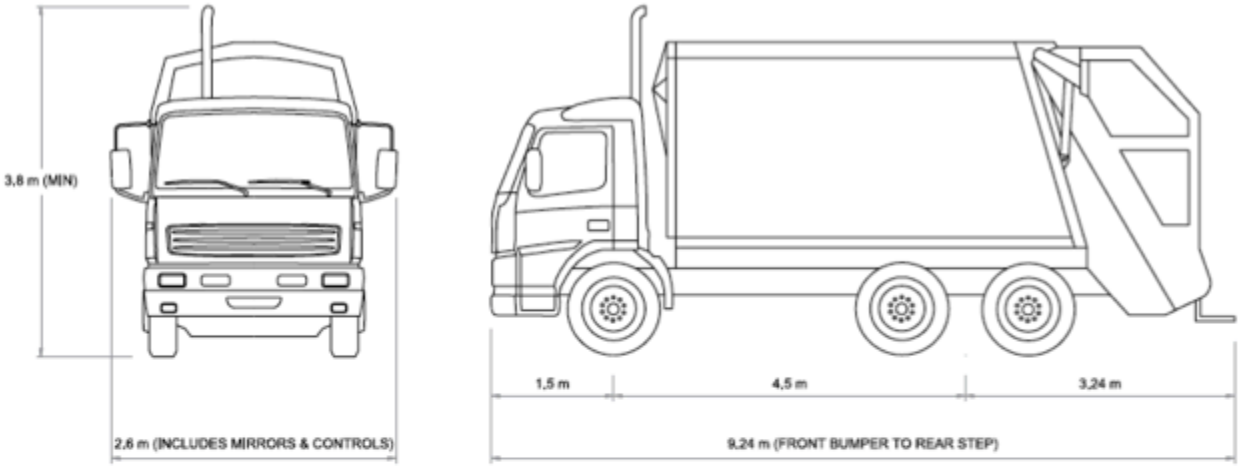


13.4 Typical Chute Outlet in Ground Level Waste Storage Room



Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016

13.5 City of Sydney Truck Specifications



Rear loading collection vehicle for MGBs	
Length overall	9.54 m
Width overall	2.6 m
Operational height	4 m
Travel height	3.8 m
Weight (payload)	26 tonnes

13.6 Multi-Sort Waste/Recycling Hub

Examples of waste/recycling hubs recommended for retail/kitchen areas:

Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016

13.7 Cleaner's Trolley with Separate Bags for Different Streams

13.8 Cardboard Baler for Retail Use

ELEPHANTS FOOT recycling solutions

EF 100VX

The EF100VX is a low height baler making it easy to transport and install with no on site assembly required. It is a low noise baler with a fast cycle time and front loading ropes. EF100VX baler produces bales of cardboard up to 90kg. It can be used to bale a range of materials including plastic film, shredded paper and cardboard.

13.9 Used Oil Collection Equipment

Copyright Waste Audit & Consultancy Services (Aust) Pty Ltd 2016