

University of Newcastle – STEMM Building: Waste Management Plan

A submission to Urbis Pty Ltd

19th November 2019



Mike Ritchie & Associates Pty Ltd trading as MRA Consulting Group (MRA)
ABN 13 143 273 812

Suite 408 Henry Lawson Building
19 Roseby Street, Drummoyne NSW 2047
AUSTRALIA

P +61 2 8541 6169

E info@mraconsulting.com.au

mraconsulting.com.au

Document

Author	Anupama Nair, Maya Deacock
Checker	James Cosgrove
Approver	James Cosgrove

Document history

Title	Version no.	Status	Date
University of Newcastle – STEMM Building: Waste Management Plan	1	Final	19/11/19

Disclaimer

This report has been prepared by Mike Ritchie and Associates Pty Ltd (trading as MRA Consulting Group (MRA)) for Urbis Pty Ltd. MRA (ABN 13 143 273 812) cannot accept any responsibility for any use of or reliance on the contents of this document by any third party.

Glossary

Terminology	Description
AS	Australian Standard
C&D	Construction and Demolition
C&I	Commercial and Industrial
CoN	City of Newcastle
DA	Development Application
DC	Development Consent
DCP	Development Control Plan
DECC	Department of Environment and Climate Change
ENM	Excavated Natural Material
EPA	Environment Protection Authority
LGA	Local Government Area
MGB	Mobile Garbage Bin
MSW	Municipal Solid Waste (also referred to as domestic or residential waste)
NDCP	Newcastle Development Control Plan 2012
NLEP	Newcastle Local Environmental Plan 2012
VENM	Virgin Excavated Natural Material
WMP	Waste Management Plan
WNDCP	Waste Not Development Control Policy
WSP	Waste Service Provider
WSRA	Waste Storage and Recycling Area

Contents

Glossary.....	iii
Contents.....	iv
List of Tables.....	vi
List of Figures.....	vi
1 Introduction.....	1
2 Background.....	3
2.1 Description of Proposed Development.....	3
2.2 Location.....	3
2.3 Zoning and Use	4
2.4 Assumptions	4
3 Construction and Demolition Waste Management.....	5
3.1 Demolition.....	5
3.2 Construction	5
3.3 Best Practice	9
3.4 Waste Contractors and Facilities	10
3.5 Waste Management Procedure	11
3.6 Waste minimisation, reuse and recycling:	11
3.7 Waste Storage and handling	11
4 Ongoing Waste Management	13
4.1 Overview	13
4.2 Café Waste Management.....	14
4.2.1 Waste Generation.....	14
4.2.2 Temporary Waste Storage.....	14
4.3 Education Spaces	14
4.3.1 Waste Generation.....	14
4.3.2 Temporary Waste Storage.....	15
4.4 Waste Storage Requirements.....	16
4.5 Waste Storage and Recycling Areas.....	17
4.6 Additional Waste Streams.....	17
4.6.1 Chemical Waste	17
4.6.2 Hazardous Waste	18
4.6.3 Soft Plastics.....	18
4.6.4 Food Waste.....	18
4.6.5 Food Donation	20

4.6.6 Container Deposit Scheme (CDS) eligible materials	20
4.6.7 E-Waste	20
5 Equipment and Waste Management Systems	21
6.1 Waste Management Equipment.....	21
6.2 Collection Method and Loading Areas	21
6.3 Waste Disposal and Recycling Method	23
6.3.1 Café	23
6.5.1 Education Spaces	24
6.6 Management System and Responsibilities	25
6.7 Waste Storage and Recycling Area Specifications	25
6.8 Signage and Education	26
6.9 Prevention of Pollution, Illegal Dumping and Litter Reduction	26
Appendix A Site Plans	28
Appendix B Standard Signage	30
Appendix C Waste Compactor Example	31
Appendix D Organics Equipment.....	32

List of Tables

Table 1: Building waste material by percentage and conversion factor for volume and weight.....	5
Table 2: Construction waste generation estimates.....	6
Table 3: Waste service contractors and facilities	10
Table 4: MGB capacity and footprint.....	13
Table 5: Front lift bin capacity and footprint	13
Table 6: Cafe waste generation	14
Table 7: Total estimated site waste generation per week.....	15
Table 8: Temporary Waste Storage points.....	15
Table 9: Site bin requirements	16
Table 10: Organics processing unit costings	19
Table 11: Organics Collection Services	19
Table 12: Examples of Waste Compactor Equipment	21
Table 13: Collection point and loading area specifications.....	21

List of Figures

Figure 1: Location of proposed STEMM building and surrounding areas.....	3
Figure 2: Example of C&D source separation bins.....	9
Figure 3: Café waste flow.....	23
Figure 4: Education space waste flow.....	24
Figure 5: Site C&D waste management area	28
Figure 6: Site waste storage and recycling area, and waste loading area	29
Figure 7: Examples of standard signage for bin uses.....	30
Figure 8: Example and layout of safety signage	30
Figure 9: Example of equipment for on-site organics processing	32

1 Introduction

MRA Consulting Group was engaged by Urbis Pty Ltd (Urbis) to prepare a Waste Management Plan (WMP) for the proposed development of a Science, Technology, Engineering, Mathematics and Medicine (STEMM) building at the University of Newcastle, Callaghan Campus, situated in The City of Newcastle (CoN) Local Government Area (LGA). The STEMM building will include 4 levels of teaching spaces, laboratories, seminar and meeting rooms, and a ground floor café space. The new building will be able to accommodate 2,310 people when fully developed and occupied.

The purpose of this WMP is to address the generation and flow of construction and demolition waste that will be produced as a result of the demolition and construction phases of the proposed development. This WMP will also address the management of ongoing waste generated and incorporate waste minimisation strategies for use onsite.

This WMP addresses the requirements of the Consent Authority (Department of Planning), and fulfil the Secretary's Environmental Assessment Requirements (SEARs) related to waste management:

Identify, quantify and classify the likely waste streams to be generated during construction and operation and describe the measures to be implemented to manage, reuse, recycle and safely dispose of this waste. Identify appropriate servicing arrangements (including but not limited to, waste management, loading zones, mechanical plant) for the site.

The WMP conforms to the following reference documents:

- *Newcastle Development Control Plan (NDCP) 2012; and*
- *Newcastle Local Environmental Plan (NLEP) 2012.*

Section 7.08 Waste Management of the NDCP outlines the following objectives:

1. Minimise resource requirements and construction waste through reuse and recycling and the efficient selection and use of resources.
2. Minimise demolition waste by promoting adaptability in building design and focussing upon end of life deconstruction.
3. Encourage building designs, construction and demolition techniques in general which minimise waste generation.
4. Maximise reuse and recycling of household waste and industrial/commercial waste.
5. Ensure waste management systems are compatible with collection services.
6. Minimise risks associated with waste management at all stages of development.

This WMP addresses waste management across the site and complies with relevant waste management requirements outlined in the Newcastle Development Control Plan (NDCP) 2013 and other statutory requirements. Since the university is already in operation, this waste management plan also summarises how the proposed works will incorporate and change the existing system for the management of new ongoing waste.

Consideration has also been given to the following supplementary documents in the preparation of this WMP:

- *Better Practice Guide for Resource Recovery in Residential Developments (NSW EPA, 2019);*
- *Interior Design Guidelines (University of Newcastle); and*
- *Environmental Sustainability Plan 2019-2025 (ESP, University of Newcastle) (2019).*

This WMP will also adhere to the University of Newcastle's existing Environmental Sustainability Policy (ESP) 2019-2025, with the following priority actions:

- Develop and implement a University-wide waste education campaign, including bin labelling and placement;
- Achieve best-practice baseline waste data and accurately measure via monthly contractor reports; and
- Deliver best practice contractor management, including cleaner training, to achieve high levels of general waste separation and recycling targets.

The ESP measures success by a 70% recycling rate for general solid waste generated across the University by 2021.

2 Background

2.1 Description of Proposed Development

The proposed development is located within Lot 11 of DP 804087 as described in the Newcastle Local Environmental Plan (2012). The proposed development consists of one four-storey building featuring:

- Ground floor café space;
- Meeting and seminar spaces;
- Design and research laboratories;
- Collaborative working spaces and informal learning areas;
- Loading dock; and
- Ancillary structures.

2.2 Location

The proposed site is in the south-western area of the Callaghan campus, off McMullin Lane which runs along the site's eastern boundary (see Figure 1). To the north, east and west of the proposed site are academic and research facilities for the mathematics and science faculty. The Great Hall is located directly to the west. Callaghan campus is the University of Newcastle's main campus and is located 12 kilometres north west of Newcastle CBD.

Vehicle access to the site will occur via Ring Road and McMullin Lane, with the loading dock accessed from the east of the building on McMullin Lane.

Figure 1: Location of proposed STEMM building and surrounding areas



Source: Nearmap, 2019.

2.3 Zoning and Use

The site is zoned as SP2 – Infrastructure in the Newcastle Local Environmental Plan (2012). Nearby zones include RE1 – Public Recreation, R2 – Low Density Residential, and R3 – Medium Density Residential.

Currently the site is occupied by the McMullin Building and McMullin Theatre, and the Drama Building, which are to be demolished as part of the proposed development. The land use of the site will not change as a result of the proposed development. The new development will allow for multiple disciplines to make use positive learning environments and provide a platform for collaboration between the disciplines.

2.4 Assumptions

The following assumptions have been made:

- Drawings and information that have been used in waste management planning for this WMP are the final reference/indicative design set from the project architect, Lyons Architecture (9th May 2019);
- Waste generation volumes have been modelled based on suggested rates for tertiary education establishments and food and beverage retail occupations as stated in the NSW EPA *Better Practice Guide for Resource Recovery in Residential Developments (2019)*. The amount of waste generated in practice is affected by the level of activity and application of waste management methods;
- Waste management methods include those that are outlined in this WMP and the specific commercial practices of workers (including contractors). The quantitative information presented in the report is therefore indicative only;
- Waste management equipment and infrastructure recommendations have been made according to estimated waste generation rates and waste guideline suggestions;
- This WMP is a living document and therefore, waste management equipment and systems described in this report are subject to change based on future operations and available technology.

3 Construction and Demolition Waste Management

Demolition and construction activities at the site will generate a range of construction and demolition (C&D) wastes. Throughout the development process, all materials will be reused and recycled where possible, minimising the disposal (landfilling) of materials other than those that are contaminated or unsuitable for reuse or recycling processes. In keeping with legislation, guides and Newcastle DCP objectives priority will be given to reusing and recycling where possible and minimising the disposal (landfilling) of materials other than those that are contaminated or unsuitable for reuse or processing.

Waste storage during construction operations will involve some stockpiling of reusable material, as well as placement of skip bins for the separation of construction materials for recycling. A skip bin for residual waste or contaminated material will also be made available at the site for disposal where necessary. Skip bins may require alternative placement across construction operations to facilitate the safe and efficient storage of materials and will be retained within property boundaries to avoid illegal dumping.

A waste storage area (Appendix A, Figure 5) shall be designated by the demolition and construction contractor and shall be sufficient to store the various waste streams expected during operations. Waste storage areas will be kept clear to maintain vehicular access and shall also be kept tidy to encourage separation of waste materials and for WHS reasons.

Waste management principles, management measures and facilities in use on the site shall be included as part of the site induction for all personnel working on the site.

3.1 Demolition

Demolition of the site has been addressed in a separate REF.

3.2 Construction

Construction works would include the following:

- Excavation of one lower-ground level;
- Minor roadworks for a car drop-off point;
- Construction of a four-storey building with ground floor food and beverage space; and
- Landscaping.

Table 1 outlines indicative volume to weight conversion factors for common construction materials.

Table 1: Building waste material by percentage and conversion factor for volume and weight

Building waste material	Tonnes per m ³	Waste as % of the total material ordered
Brick	1	5-10%
Concrete	2.4	3-5%
Tiles	0.75	2-5%
Timber	0.5	5-7%
Plasterboard	-	5-20%
Metal	2.4	-

Source: Parramatta Waste Management Plan Application Template, 2017.

Table 2 outlines the expected construction waste quantities to be generated at the site, in addition to the appropriate management methods for each material type.

The information below presents multiple options for materials reuse, recycling and disposal where applicable (e.g. return to manufacturer, recycled at construction and demolition (C&D) processor, or disposed to landfill if contaminated).

Table 2: Construction waste generation estimates

Type of waste generated	Quantity	Reuse	Recycling	Disposal	Methods for reuse, recycling and disposal
Excavation material	9,000m ³	✓	-	-	On site: testing (if necessary) for contamination and stockpiling of material for reuse as fill material. C&D processor: reuse/recycling of VENM and ENM Landfill if contaminated.
Concrete	180m ³	✓	✓	-	On site: to be separated wherever possible to enhance resource recovery. C&D processor: crushing and recycling for recovered products (aggregates).
Asphalt and Road Base	<5m ³	✓	✓	-	On site: asphalt will be batched to reduce the likelihood of excess materials. C&D processor: recycling of asphalt for reuse. Road base to be reused in other civil works.
Bricks/pavers	35m ³	✓	✓	-	On site: cleaned and separated wherever possible for reuse or to enhance resource recovery. C&D processor: recovery for reuse where possible, crushing and recycling for recovered aggregate products.

Type of waste generated		Quantity	Reuse	Recycling	Disposal	Methods for reuse, recycling and disposal
Tiles	Roof	N/A	✓	✓	-	On site: cleaned and separated wherever possible for reuse or to enhance resource recovery.
	Interior	<1m ³	✓	✓	-	C&D processor: recovery for reuse where possible, crushing and recycling for recovered aggregate products.
Timber (engineered/treated)		<5m ³	-	✓	-	On site: to be separated wherever possible to enhance resource recovery. Reuse: surplus and offcut material returned to manufacturer for reuse. C&D processor: recovery and recycling for recovered product (e.g. mulch) or organics processing.
Metals (ferrous and non-ferrous)		<10m ³	-	✓	-	Onsite: to be separated wherever possible to enhance resource recovery. C&D processor: metals recovery and recycling.
Plasterboard		<5m ³	✓	✓	-	On site: to be separated wherever possible to enhance resource recovery. Reuse: surplus and offcut material returned to manufacturer for reuse.
Glass		<1m ³	✓	✓	-	On site: to be separated wherever possible to enhance resource recovery.

Type of waste generated	Quantity	Reuse	Recycling	Disposal	Methods for reuse, recycling and disposal
					Reuse: surplus and offcut material returned to manufacturer for reuse where possible. Glass recycler: recovery and recycling.
Fixtures and fittings	<2m ³	✓	✓	-	On site: reuse wherever possible or return to manufacturer. Reuse: surplus and offcut material returned to manufacturer for reuse where possible. C&D processor: recovery and recycling.
Floor coverings	<9m ³	✓	✓	-	On site: to be separated wherever possible to enhance resource recovery. Reuse: surplus and offcut material returned to manufacturer for reuse where possible. C&D processor: recovery and recycling.
Packaging (used pallets, pallet wrap)	25m ³	✓	✓	-	On site: to be separated wherever possible to enhance resource recovery. C&D processor: recycling of timbers and plastic.
Garden organics (Vegetation)	<5m ³	✓	✓	-	Minimal garden organic waste from landscaping. Organics processor: storage on-site (from minor excavations) processing for recovered product (e.g. mulch or other blended

Type of waste generated	Quantity	Reuse	Recycling	Disposal	Methods for reuse, recycling and disposal
					recovered fines) or organics treatment.
Containers (cans, plastic, glass)	<2m ³	-	✓	-	Commercial contractor: recycling.
Paper/cardboard	10m ³	-	✓	-	Commercial contractor: segregation of paper, cardboard or other streams.
Residual waste (general refuse)	20m ³	-	-	✓	Separate recyclables where possible and disposal at principal licensed waste facility.
Hazardous/special waste (e.g. spills and contaminated wastes)	Unknown	-	-	✓	Management by a licensed asbestos and site hygienist should hazardous or special waste be found at the site.

3.3 Best Practice

Onsite Source Separation

The most efficient way of maximising reuse and recycling is to separate wastes as early as possible. Providing multiple bins (of varying sizes, depending on expected volumes of waste generation) will allow contractors to separately dispose of waste as it is generated, rather than having to sort mixed waste loads. Smaller bins should be provided for general waste, to encourage separation of useable waste. An array of bins can be provided, such as in Figure 2 below.

Figure 2: Example of C&D source separation bins



Source: Envirowaste, 2019.

Bin sizes should be based on expected quantities of each waste type, which can be confirmed with the site construction contractor.

Bin Collections

The owner and transporter of waste is legally responsible for its disposal in a suitably licensed facility. Some examples of such facilities can be found below in Table 3.

3.4 Waste Contractors and Facilities

To ensure best practice waste management, appropriate contractors and facilities have been proposed based on their location and service offerings (Table 3).

Table 3: Waste service contractors and facilities

Role	Details
Recommended Waste Collection Contractor	The following are local skip bin operators for consideration in the management of excavation and construction waste for the site: • Newcastle Skip Bins; • Alltown Skips; and • Newcastle Skip Hire. Or another supplier as elected by the building contractor.
Principal Off-Site Recycler	The following are local C&D processing facilities for consideration in the management of C&D waste generated at the site: • Benedict Mayfield West, • Bingo Industries Tomago, • Boral Recycling Kooragang. Or another appropriate facility as elected by the waste management contractor.
Principal Licensed Landfill Site	Summerhill Landfill, or other appropriate facility as elected by the waste management contractor.

3.5 Waste Management Procedure

The construction contractor and waste service provider will manage waste generated during construction in accordance with this WMP. Responsibility for the WMP, waste documentation and processes during the excavation and construction phases will be with the site manager or builder.

This WMP will be retained on-site during the excavation and construction phases of the development, along with other waste management documentation (e.g. contracts with waste service providers).

A logbook that records waste management and collection will be maintained on site, with entries including:

- Time and date of collections;
- Description of waste and quantity;
- Waste/processing facility that will receive the waste; and
- Vehicle registration and company name.

Waste management documentation, the logbook and associated dockets and receipts must be made available for inspection by an authorised Council Officer at any time during site works.

3.6 Waste minimisation, reuse and recycling:

The following strategies will help minimise the waste generated on-site and help with recycling and reuse where possible:

- The waste strategy will be included in project induction and all contractors and personnel will be informed about the site waste management principles and facilities
- Ensure that suppliers deliver materials of expected quality to reduce any need for rework stemming from product quality
- Prefabricated material will be used where practice and reasonable
- Reuse equipment and material whenever possible
- Reuse green waste depending on species for landscaping purposes on and off site when feasible. Mulch or compost all other green waste on or offsite
- Provide source separation bins in site offices and facilities
- Clear signage on bins, waste collection points and facilities
- Feedback from waste management service provider
- On-going checks by site supervisors
- Providing commingled recycling bins for food containers and educating staff to separate food waste and food packaging waste from waste to avoid contamination of C&D waste
- Recycle timber, formwork, and waste concrete
- Recycle general waste generated on site offices and facilities such as paper, cardboard and aluminium cans

3.7 Waste Storage and handling

- All demolition and excavation waste will be removed by licensed contractors and sent to approved waste and resource recovery facilities.
- The handling, storage and transport of hazardous materials and waste will be in accordance with relevant codes and guidelines hazardous materials management procedures.
- During construction skip bins and wheelie of varying capacities will be placed strategically on site for use by subcontractors and site staff.
- A food scrap bin will be provided for putrescible waste products

- Waste oils and chemicals will be stored in a secured bunded area. An emergency response spill kit will be located adjacent to the bunded area.
- All storage containers and locations for the various waste streams will be clearly labelled to ensure that waste mixing and contamination is avoided as much as possible
- Records will be retained detailing the quantity, classification and disposal of waste

4 Ongoing Waste Management

4.1 Overview

Ongoing waste management requirements for the site will result from the daily operation of a café and multiple individual and group study spaces, laboratories and conference or seminar rooms that will be used by university staff, students, and guests.

Waste generation for the operational phase of the development will be addressed in applying waste generation rates outlined in Section 4.2.1 for the Café and Section 4.3.1 for Educational Spaces. Equipment requirements are addressed in Section 4.4 for the site. Waste storage and recycling areas were determined with reference to waste generation rates and have been addressed separately in Section 4.5.

The University of Newcastle has set a target of 70% diversion rate for general solid waste generated across the university by 2021. This goal is attainable through the introduction of additional source separation of waste streams, as outlined in Section 4.6.

All waste storage and management areas at the site are to be located within the building or in the site loading area, to minimise potential impacts on active street frontages and site users.

The following space calculations are based off the bin dimensions sourced from NSW EPA's *Better Practice Guide for Resource Recovery in Residential Developments* (2019) (MGBs: Table 4, Front lift bins: Table 5).

Table 4: MGB capacity and footprint

Bin Capacity (L)	Height (mm)	Depth (mm)	Width (mm)	Footprint (Approx. m ²)
120L	940	560	485	0.27
240L	1,080	735	580	0.43
660L	1,250	850	1,370	1.16
1,100L	1,470	1,245	1,370	1.71

Source: *Better practice guide for resource recovery in residential developments* (2019).

Table 5: Front lift bin capacity and footprint

Bin Capacity (L)	Height (mm)	Depth (mm)	Width (mm)	Footprint (Approx. m ²)
1.5m ³	900	900	1,800	1.65
3m ³	1,200	1,325	1,800	2.40
4.5m ³	1,500	1,600	1,800	2.90
6m ³	1,650	1,900	2,000	3.80

Source: *Better practice guide for resource recovery in residential developments* (2019).

A 2014 waste audit¹ across the University's campuses at Callaghan, Central Coast, and Newcastle CBD, found a waste composition (total waste sorted was 2,857kg) of 46% organic material, 16% paper/cardboard, 15% recyclable containers and 23% other material. The Callaghan campus made up 82% of all waste generated from UoN sites.

While increased total waste generation is expected, the generation rate and composition of ongoing waste is not expected to be significantly different post-works. Consequently, waste management associated with the new works will need to integrate into the already established system.

¹ University of Newcastle Website. <https://www.newcastle.edu.au/about-uon/our-university/sustainability/resource-management/sidebar/waste/energy>

This section outlines the existing waste management strategies for ongoing waste management at the site and how these and new strategies may be implemented to adequately handle changes occurring as a result of the proposed expansion.

4.2 Café Waste Management

4.2.1 Waste Generation

The *Better Practice Guide* (2019) outlines the following waste generation rates:

- General Waste: 100L per 100m² floor space per day; and
- Recycling: 120L per 100m² floor space per day.

The *Better Practice Guide* does not provide a figure for paper and cardboard generation; however, it is expected to compose up to 50% of recycling waste generated at the café. The *Guide* also does not specify an expected figure for food organic waste – a rate of 35% food waste in general waste was identified in the 2010 National Waste Report and will be applied in this instance.

The café onsite is proposed to occupy a floor space of approximately 280m². Therefore, the following waste will be generated as a result of typical café activity (operating 7 days per week):

Table 6: Cafe waste generation

Waste Stream	Per Day (L)	Per Week (L)
General Waste	182	1,274
Food Waste	98	686
Co-mingled Recycling	168	1,176
Paper and Cardboard Recycling	168	1,176

4.2.2 Temporary Waste Storage

Bins are to be retained at the back of house area of the café for the storage of minimum one-days' waste. To increase source separation, several types of bins should be provided. At minimum, general waste, food waste, commingled recycling, and paper and cardboard recycling bins are to be provided. Management may also like to provide additional bins for soft plastics to assist with the University's 70% diversion target.

Café staff or cleaners are to transfer the waste from the temporary storage bins to the site waste room on the lower ground level, at minimum once per day.

4.3 Education Spaces

4.3.1 Waste Generation

The NDCP does not specify waste generation rates for occupation types, so the following generation rates are taken from the NSW EPA *Better Practice Guide for Resource Recovery in Residential Dwellings* (2019), Appendix F (Estimated Commercial Waste and Recycling Generation Rates).

The NDCP requires that all waste produced on site is separated into at least four streams:

- Paper/Cardboard;
- Recyclables;
- General Waste; and

- Industrial Process Type Wastes.

The *Better Practice Guidelines* do not provide estimated generation rates of paper and cardboard, but typical university and café activities are expected to generate paper and cardboard waste as a substantial proportion of total recyclable material. Providing a paper and cardboard recycling bin may improve resource recovery efficiencies and assist in the diversion of waste from landfill. Additionally, paper and cardboard services are generally cheaper than general waste or commingled recycling and therefore, may reduce the waste management costs of the site. It is recommended that there is at least one dedicated bin for paper and cardboard.

The below information is based on full occupation and usage of the building. It is expected that waste volumes will be reduced during lower usage periods such as semester breaks.

The *Better Practice Guide* (2019) outlines the following waste generation rates:

- General Waste: 10L per student (full time equivalent)
- Co-mingled Recycling: 10L per student (full time equivalent)

Paper and Cardboard recycling can be expected to make up roughly 50% of the above recycling waste generated.

The STEMM building is expected to accommodate up to 2,310 people once completed. This will result in the following weekly waste generation, assuming a typical 5-day week (Table 7):

Table 7: Total estimated site waste generation per week

Waste Stream	Per Week (L)
General Waste	23,100
Co-mingled Recycling	11,550
Paper and Cardboard Recycling	11,550

Seminar and Meeting Spaces

It is difficult to predict waste generated in areas with varied usage such as meetings and seminar rooms. Functions and events onsite are expected to generate more waste than usual. Extra bins and bin lifts may need to be scheduled by management to accommodate temporary increases in general waste and recycling volumes.

4.3.2 Temporary Waste Storage

Temporary waste storage points are to comply with the University's *Interior Design Guidelines*, which are summarised below:

Table 8: Temporary Waste Storage points

Interior Waste Management	Comment
Desk Tidies	• Responsibility of emptying desk tidies falls on the user, not cleaners • Sit on top of desks rather than underneath
Waste Stations	• Source separation bins will be provided in high-use areas (such as kitchens, print rooms, and at natural entrance/exit flow patterns for staff)

	• Colour coded to the Australian Standard waste colours: red for general waste, yellow for commingled recycling, and blue for paper and cardboard. • Option to increase to a 4-bin system to capture food waste
Recycling Stations	• Offered as an addition to the waste stations, the recycling station will include bins for batteries, mobile phones, and printer cartridges • To be supplied near print rooms

Bins will be provided on each level, with at minimum separate bins provided for general waste, commingled recycling, and paper and cardboard wastes. Management may also like to provide additional bins for food waste and soft plastics to assist with the University's 70% diversion target.

Waste and recycling cupboards will be available at any kitchen areas, including tea rooms on each level and the staff and student microwave bank on the ground floor. These waste storage bins are to have a minimum capacity for one-days' waste generated. Cleaners are to transfer the waste from the temporary storage bins to the site waste room on the lower ground level, at minimum once per day.

4.4 Waste Storage Requirements

Combined, the entire site generates 25,060L of general waste, 12,726L of co-mingled recycling, and 12,726L of paper and cardboard recycling per week. The waste room has an allocated area of approximately 45m².

For these volumes of waste, the following bins would be required, collected three times a week:

Table 9: Site bin requirements

Bin size	General Waste	Commingled Recycling	Paper and Cardboard Recycling
1,100L	8	4	4
3m ³	3	2	2
4.5m ³	2	2	2
6m ³	2	1	1

Due to the requirement of bin transfer between the waste room and loading dock, 1,100L mobile bins are recommended for use at the site. A standalone MGB compactor can be utilised to achieve a 2:1 compaction rate for general waste (refer to Appendix C for an example of a general waste compactor), therefore reducing the number of bins to be retained at the site.

Bulky Waste

Sufficient space has been provisioned for storage of bulky waste items as part of the waste management system for the development. A bulky waste storage area has been provided within the lower-ground level waste room to facilitate appropriate management of these wastes. Management and access of the bulky storage room will be the responsibility of building management and/or the site waste caretaker. Bulk waste for the University of Newcastle is currently being collected by Suez.

The room provisions for the storage of bulky items (such as furniture, pallets, and other large wastes unsuitable for the general waste bins). Educational materials for sorting may be displayed to promote resource recovery, waste minimisation and appropriate disposal.

4.5 Waste Storage and Recycling Areas

The lower-ground level waste storage and recycling area (WSRA) is approximately 47m² and is located adjacent to the site loading dock (see Figure 6, Appendix A).

The following equipment will be retained in the site WSRA:

Equipment	Quantity	Footprint (m ²) (includes space to manoeuvre)	Total minimum area with handling space
General Waste Bin (1,100L)	4	7m ²	30.5m ²
Commingled Recycling Bin (1,100L)	4	7m ²	
Paper and Cardboard Bin (1,100L)	4	7m ²	
General Waste Compactor	1	1.5m ²	
Bulky Waste Cage	1	4m ³	
Hazardous Wastes Storage Area	1	4m ²	

The 1,100L bin size has been selected as the most appropriate application for the proposed development due to space availability, manoeuvring requirements and waste generation rates. These bins have a greater capacity than 660L bins typically used for commercial buildings, allowing for less frequent bin maintenance. The manoeuvring of 1,100L bins can be assisted by the use of bin tugs for transfer between the WSRA and the loading dock.

A private waste contractor will service this development, and the following collection schedule is recommended:

- General Waste collection three times per week; and
- Commingled Recycling collection three times per week; and
- Paper and Cardboard recycling three times per week

Building management can observe bin fullness levels upon full occupancy and adjust the number of collections and services accordingly.

4.6 Additional Waste Streams

4.6.1 Chemical Waste

Chemical waste may be generated as a result of typical teaching and research laboratory activities. The following strategies will help management mitigate any risks associated with the handling and disposal of chemical wastes.

Purchasing strategy

Laboratory technicians and procurement officers should ensure the purchasing policy of laboratory groups are optimised to reduce unnecessary chemical waste. Ordering larger containers of chemicals are typically considered economical, however once the container has been opened and a small amount taken out, the

remaining chemical may degrade due to exposure to the atmosphere. Purchasing of smaller quantities in smaller vessels typically means less of the chemical is wasted.

Sharing of excess and unexpired chemicals

Chemical swaps may be conducted between lab groups and institutions.

Chemical waste storage

Chemicals are to be treated and disposed of in accordance to information available on the corresponding Safety Data Sheet. Chemicals will be managed according to the University's Chemical Management Procedure.

Chemical waste is to be stored in a separate, locked cupboard within the WSRA. Bunding of the chemical waste storage area is required to mitigate any spill or leak risk and prevent run-off into the drainage system. Toxfree is a suitably licensed chemical waste contractor and services the University once a month.

4.6.2 Hazardous Waste

Medical, Biological, and Radioactive wastes are to be handled in accordance with the University's Waste Management Guidelines and Work Health and Safety Policy. Under no circumstances should these wastes be disposed of in General Waste bins. Cleanaway currently manage medical waste for the University of Newcastle.

4.6.3 Soft Plastics

Soft plastics cannot be placed in kerbside recycling bins; however, they can still be diverted from landfill. REDcycle is a recycling program working in conjunction with Coles and Woolworths Supermarkets, that collects soft plastics to be processed by Replas into recycled plastic products. Soft plastic waste can be collected on-site and taken to the nearby Woolworths (24-26 Blue Gum Rd, Jesmond; or 3 Angophora Dr, Warabrook).

Management can also engage a waste service such as Cleanaway to collect soft plastic waste. This may be suitable if the building commonly receives deliveries packaged with pallet wrap or other soft plastic.

4.6.4 Food Waste

Food waste can make up to 70% of a typical general waste bin by weight. Diverting food waste from landfill not only reduces and mitigates the effect of rotting food releasing damaging greenhouse gases but can also result in cost savings to management by way of reduced general waste bin lifts.

Organics Processing

Commercial food organics waste generation from the café could be collected and treated on-site at small scale should management decide to do so. Organics treatment can be used to produce conditioners, compost or vermiculture castings for application on or off-site. Equipment options include different size and capacity composters, dehydrators, worm farms and macerators (see Appendix D for example equipment). For organics treated to acceptable standards, discharge of effluent or any output to sewer as commercial trade wastewater may be permitted. Both these options would necessitate the use of a 3rd bin for organics.

Table 9 below outlines some food processing equipment that UoN can consider for the management of this waste stream.

Table 10: Organics processing unit costings

Name	Processing Capacity	Capital Cost (Excl GST)	Once-off setup costs (Excl GST)	Annual Ongoing Costs (Excl GST)	Comment
Enrich360 – E220M	200kg/day	Unit and Installation: \$76,941.50	Delivery and Installation: \$1,150.00 Bins and Signage: \$990.00	Maintenance and Collection of output: \$4,810.00 Labour: \$2,500 Electricity: \$1,153.55	The outputs of this machine are stored onsite until collection by a licensed organic composting facility. Contract term is 60 months.
Closed Loop – CLO10s	20kg/day	\$30,000.00	-	\$3,600.00	The Closed Loop CLOEY systems are small units (0.72m ² footprint) that reduces food waste by up to 90% in 24 hours.

Organics Collection

Alternatively, the tenant could make arrangements for the separate collection of its organics by its waste management contractor.

MRA has identified the following services which provide organics waste collections (see Table 11):

Table 11: Organics Collection Services

Name of WSP	Comments	Bins Required	Bin Hire Cost (Excl GST)	Cost per Lift (Excl GST)
Veolia	Food and Garden waste 240L or 660L bins available for organic waste Service twice per week Contamination allowed: less than 2%	14 x 660L	Hire: \$1.00 per week per bin	660L bin: \$64.00
Organic Recycling Group	Food waste only ORG can provide either 240L or 660L MGBs for collection 3 times per week. Contamination levels must remain below 5% otherwise the collection will be rejected, and alternative service provided at extra cost. Minimum contract of 36 months.	5 x 660L	Per Month: 660L: \$5.00 per bin	660L bin: \$54.83

BioPak	Food waste only 240L or 660L bins available 12-month contract Maximum weights apply to bins: ○ 240L bins: max 80kg per bin ○ 660L bins: max 200kg per bin Extra charge of \$0.40 per kg excess weight		Per Month: 660L: \$4.33 per bin	660L bin: \$59.41 (\$0.40 extra charge per kg)
---------------	---	--	---------------------------------------	---

The above services displayed are indicative of cost and is by no means an exhaustive list of services available

4.6.5 Food Donation

Café management may like to explore the potential for donation of excess consumable food to charities such as OzHarvest or FoodBank NSW.

4.6.6 Container Deposit Scheme (CDS) eligible materials

Recyclable containers eligible for the NSW EPA's "Return and Earn" container deposit scheme can be collected separately to commingled recycling. Reverse Vending Machines (RVMs) accept these containers and issue refunds through retail vouchers (to spend or swap for cash), online into a PayPal account, or donated to a selected charity. Management may like to install a Reverse Vending Machine for staff, students, and visitors to utilise. Collected CDS materials are collected from the RVM by Cleanaway trucks.

4.6.7 E-Waste

This can be either an on-call service or scheduled collection depending on the need. On call collections generally take 1-2 weeks until collection. The bins supplied are standard blue 660L bins with an education sticker and phone number. Collection is completed via a Pantech and the bins are swapped at time of collection.

5 Equipment and Waste Management Systems

5.1 Waste Management Equipment

For 1,100L MGBs, compaction of general waste will be required to reduce the number of required bins for the site.

Compaction units can be utilised to reduce the number of bins retained onsite. Sizes of compactors and compaction ratios can vary. Sizes can range from individual 240L bin presses, to larger hopper fed compactors.

It is important to follow manufacturers advice on compaction ratios, as over-compaction can result in damage to bins, jamming of waste inside the bins, and can make bins heavy and difficult to move. Table 12 below outlines some examples of waste compaction equipment.

Table 12: Examples of Waste Compactor Equipment

Manufacturer	Model Name	Compaction Ratio	Height	Width	Length	Footprint
Waste Initiatives	APS1100 Roto Compactor	Up to 10:1	2m	1.45m	1.73m	2.2m ²
Elephants Foot	Single Bin Compactor	2:1 up to 5:1	2.85m	1.5m	1.1m	1.65m ²
Waste Initiatives	WastePac 1100L Bin Press	Up to 3:1	2.2m	1.2m	1.2m	1.5m ²

5.2 Collection Method and Loading Areas

Waste will be collected from the site by a suitably licensed private waste contractor. Chemical waste will be collected by ToxFree, medical waste by Cleanaway, and bulk waste by SUEZ. The collection point for the WSP and areas for handling and loading are as follows:

- Collection and loading will occur at the loading dock which accessible via McMullin Lane;
- The loading dock will be located on the lower ground level, with appropriate space for a waste truck to reverse to the WSRA;
- Clear, safe, accessible and convenient space for handling of MGBs and equipment and loading of collection vehicles; and
- Identifiable areas where students, staff, visitors and site staff can recognise and avoid any risk associated with moving vehicles, and bin moving and handling.

Table 13 outlines relevant specifications.

Table 13: Collection point and loading area specifications

Component	Requirement	Specification
Collection point	Allow safe waste collection and loading operations	- Adequate clearance and manoeuvring space; - Sufficient clearance for the safe handling of materials and equipment; and - Sectioned loading bay does not impede upon traffic and pedestrian safety.

Vehicle manoeuvring and loading space	Truck space for adequate lift clearance, manoeuvring and operation for a contractor collection vehicle	- Adequate loading bay dimensions do not impede rear lift clearance; - Operational clearance for truck reversing into the loading bay, and exiting in a forward direction; and - The provision of space clear of vehicle parking spaces.
Operating times	Appropriate collection times to limit noise and traffic disturbance	- Collection times will be arranged to ensure minimal disturbance to students, staff, pedestrians and visitors.

The lower-ground level waste management and storage area will also be utilised for the storage of full bins prior to collection and empty bins that can be rotated when bins become full. Trucks will access the lower-ground level through the ground floor ramp, where the waste caretaker will position the MGB for collection. There is minimum distance between the waste storage area and the loading dock as they are located adjacent.

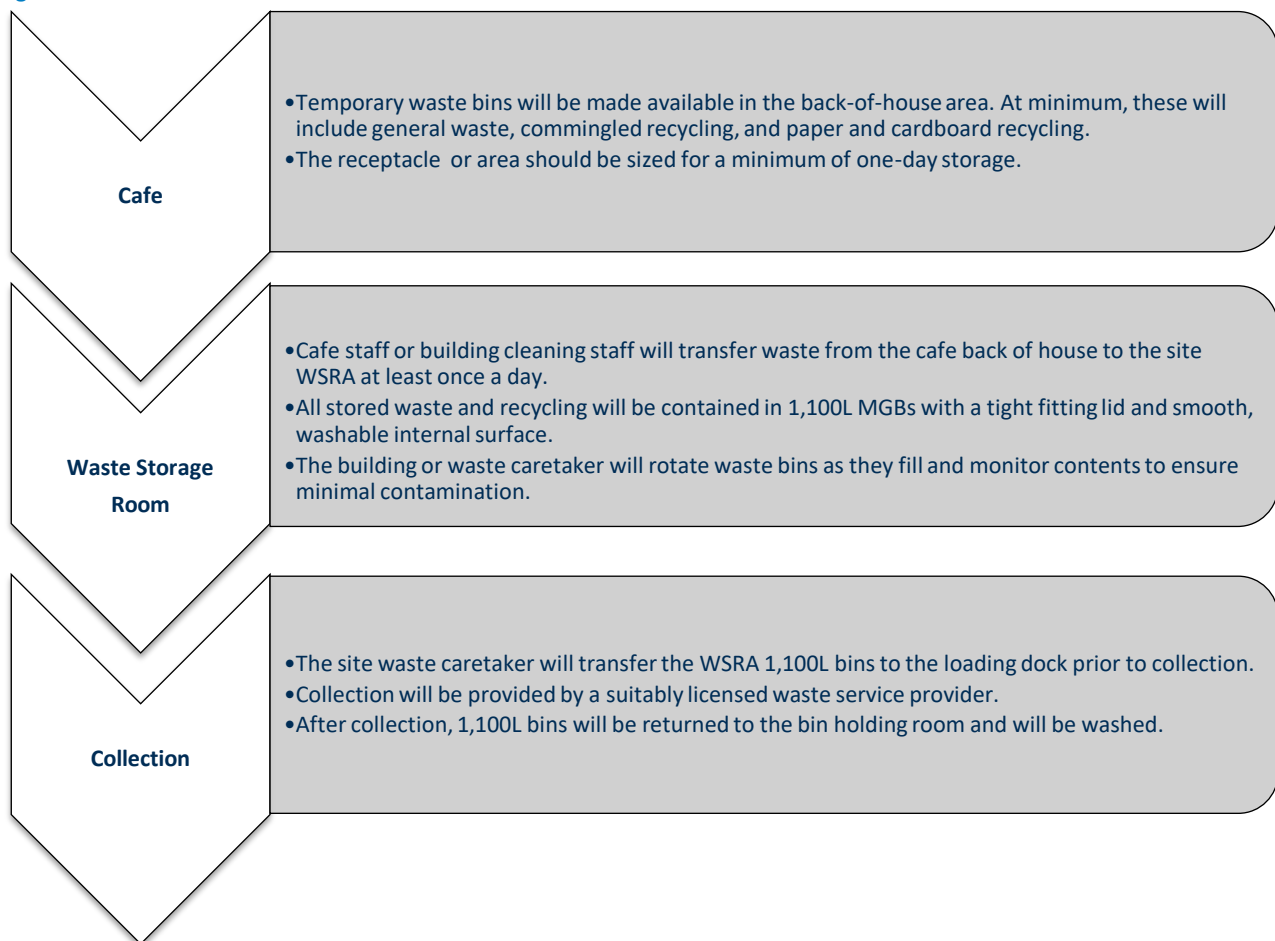
Collection of site waste bins by the contracted WSP will be facilitated through building management or the site waste caretaker who will provide access to the ground floor waste management and storage area via the loading dock.

5.3 Waste Disposal and Recycling Method

5.3.1 Café

Waste generated as a result of café activities onsite will be temporarily stored in the back-of-house bins. Waste is then transferred to the lower-ground WSRA where it will remain until scheduled collection from the contracted waste service provider. Figure 3 below outlines the flow of waste from Café to collection.

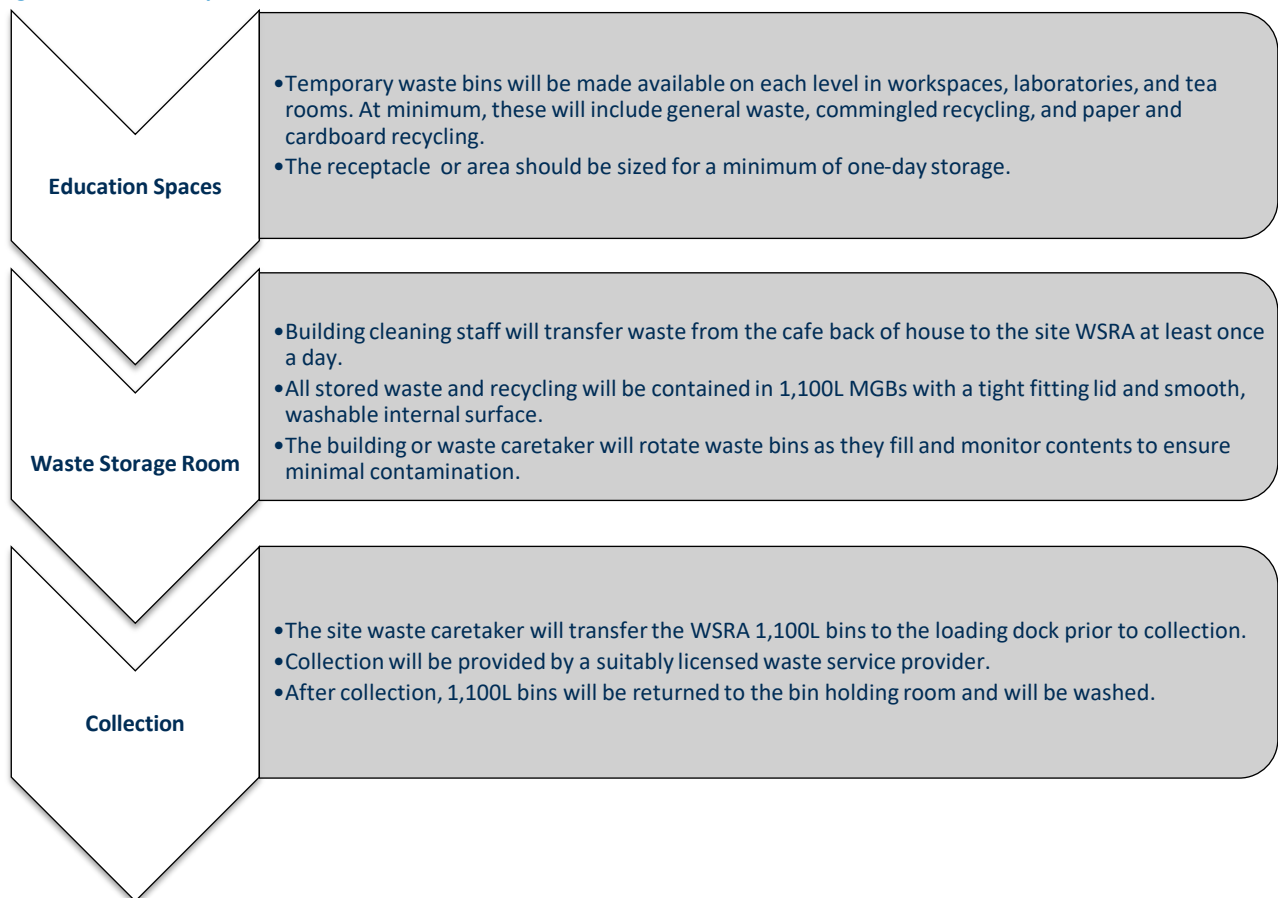
Figure 3: Café waste flow



5.5.1 Education Spaces

Waste generated as a result of education activities onsite will be temporarily stored on each level in source-separation bins. Bins will be provided on each level in circulation areas, workspaces, laboratories, and in kitchen and bathroom facilities. Waste is then transferred to the lower-ground WSRA by site cleaning staff where it will remain until scheduled collection from the contracted waste service provider. Figure 4 below outlines the flow of waste from each level to collection.

Figure 4: Education space waste flow



5.6 Management System and Responsibilities

Building management and the site waste caretaker will be responsible for the management of waste at the site. Should there be any issues that impact on the operational efficiency, safety and suitability of waste management, the waste caretaker will inform management. Operation of the waste management system is the responsibility of building management and the waste caretaker. Responsibilities include:

- Using this WMP to inform waste management operations, design and infrastructure;
- Providing educational materials and information on sorting methods for recycled waste, awareness of waste management procedures for waste minimisation and resource recovery;
- Maintaining a valid and current contract with a licensed waste service provider for waste and recycling collection and disposal;
- Making information available to students, visitors and site staff about waste management procedures;
- Collection of waste from ground floor ancillary services in a mobile waste management/janitor trolley, for direct disposal into designated bins retained in ground floor bin storage area;
- Manoeuvring bins to specified onsite collection point prior to and following scheduled collection of waste bins;
- Organising, maintaining and cleaning waste management areas as part of a regular maintenance schedule;
- Maintenance of equipment and infrastructure for waste where possible (within the means of staff);
- Organising the relevant waste contractor for additional maintenance or waste management for the site (including bulky waste);
- Ensuring bin allocation and waste/recycling collection frequency is adequate. Requesting additional infrastructure or services where necessary; and
- Monitoring any vermin and pest issues and arranging appropriate controls (traps or fumigating) and maintenance of doors or other points of potential entry.

5.7 Waste Storage and Recycling Area Specifications

The WSRA will provide centralised storage that has adequate capacity to receive and store the maximum likely generation of waste and recycling between collection times. Each WSRA will be constructed to improve amenity, minimise odour, protect surrounding areas and promote user safety. WSRA specifications include:

- Signage for safety and waste bin identification;
- Safety precautions, staff training and signage for plant;
- Noise attenuation for waste management and WSRA that limits effects to university students, staff, and visitors, from compactor, bin transfer and collection vehicle noise;
- Floors constructed of concrete or other approved solid, impervious material that is easily cleaned;
- Grading and draining to an approved drainage fitting located in the room;
- A smooth, even floor surface covered with vertical wall and plinth faces;
- Doorway ramp (if not level);
- Light colour finish for all room surfaces;
- Adequate supply of water with hose cock as close as practicable to the doorway;
- Close-fitting and self-closing door, large enough to facilitate access of 240L bins, 660L bins and bulky waste items;
- Suitable construction including limited entry paths to prevent vermin;
- Ventilation through permanent unobstructed ventilation (5% of floor area) or mechanical exhaust ventilation system (5L/s per m² of floor area); and
- Security and lighting.

5.8 Signage and Education

Signage that promotes resource recovery, waste minimisation, safety and amenity follows the Australian Standard for safety signs for the occupational environment (Standards Australia 1994, Figure 2 and 3).

Signage is designed to consider language and accessibility (i.e. to be understood as clearly as possible by those with different abilities of vision, knowledge of the English language, intellectual ability and with other conditions). Signage is to be prominently posted in each WSRA and relevant waste service area indicating:

- Detail on acceptable recyclables;
- Recyclables are to be decanted loose (not bagged);
- No standing and danger warnings apply to the area surrounding the WSRA;
- Contact details for arranging the disposal of bulky items; and
- The area is to be kept tidy.

Standard signage requirements and guidance for application apply (see Figure 8, Appendix B).

5.9 Prevention of Pollution, Illegal Dumping and Litter Reduction

To minimise dispersion of litter and prevent pollution (to water and land via contamination of runoff, dust and hazardous materials), site management will also be responsible for:

- Maintenance of communal areas and the WSRA;
- Securing the waste storage area from vandalism and the escape of litter;
- Identification and appropriate disposal of goods with hazardous material content (paints, e-waste, fluorescent tubes);
- Acting to prevent dumping and unauthorised use of waste areas; and
- Requiring contractors to clean up any spillage that may occur during waste servicing or other work.

6 References

- Australian Building Codes Board (2016) National Construction Code (NCC).
- Blue Environment (2016) Australian National Waste Report.
- Department of Environment and Climate Change (2008) NSW Model Waste Not DCP Chapter.
- Department of Environment, Climate Change & Water (2010) House deconstruction fact sheet: Bricks and concrete removal.
- Department of the Environment (2016) Working together to reduce food waste in Australia, Australian Government.
- Department of Sustainability, Environment, Water, Population, and Communities (2012) Construction and Demolition Waste Guide – Recycling and Re-use Across the Supply Chain.
- Environment Protection and Heritage Council (2009) National Waste Policy: Less Waste, More Resources. Available at: <http://www.nepc.gov.au/system/files/resources/906a04da-bad6-c554-1d0d-45216011370d/files/wastemgt-rpt-national-waste-policy-framework-less-waste-more-resources-print-ver-200911.pdf>.
- Newcastle Council (2012) Local Environmental Plan. NSW legislation.
- Newcastle Council (2012) Newcastle Development Control Plan.
- NSW EPA (2019) Better practice guide for resource recovery in residential developments.
- NSW EPA (2016) Recycling Signs, Posters and Symbols. Available at: <http://www.epa.nsw.gov.au/wastetools/signs-posters-symbols.htm>.
- NSW OEH (2008) NSW Better Practice Guide for Waste Management in Multi-Unit Dwellings, Australian Standards and Statutory Requirements.
- Standards Australia (1994) AS 1319: Safety signs for the occupational environment, Homebush, NSW: Standards Australia.
- Standards Australia (2008) AS 4123 Mobile waste containers.
- WorkCover (2011) Managing Work Environment Facilities Code of Practice

Appendix A Site Plans

Figure 5: Site C&D waste management area

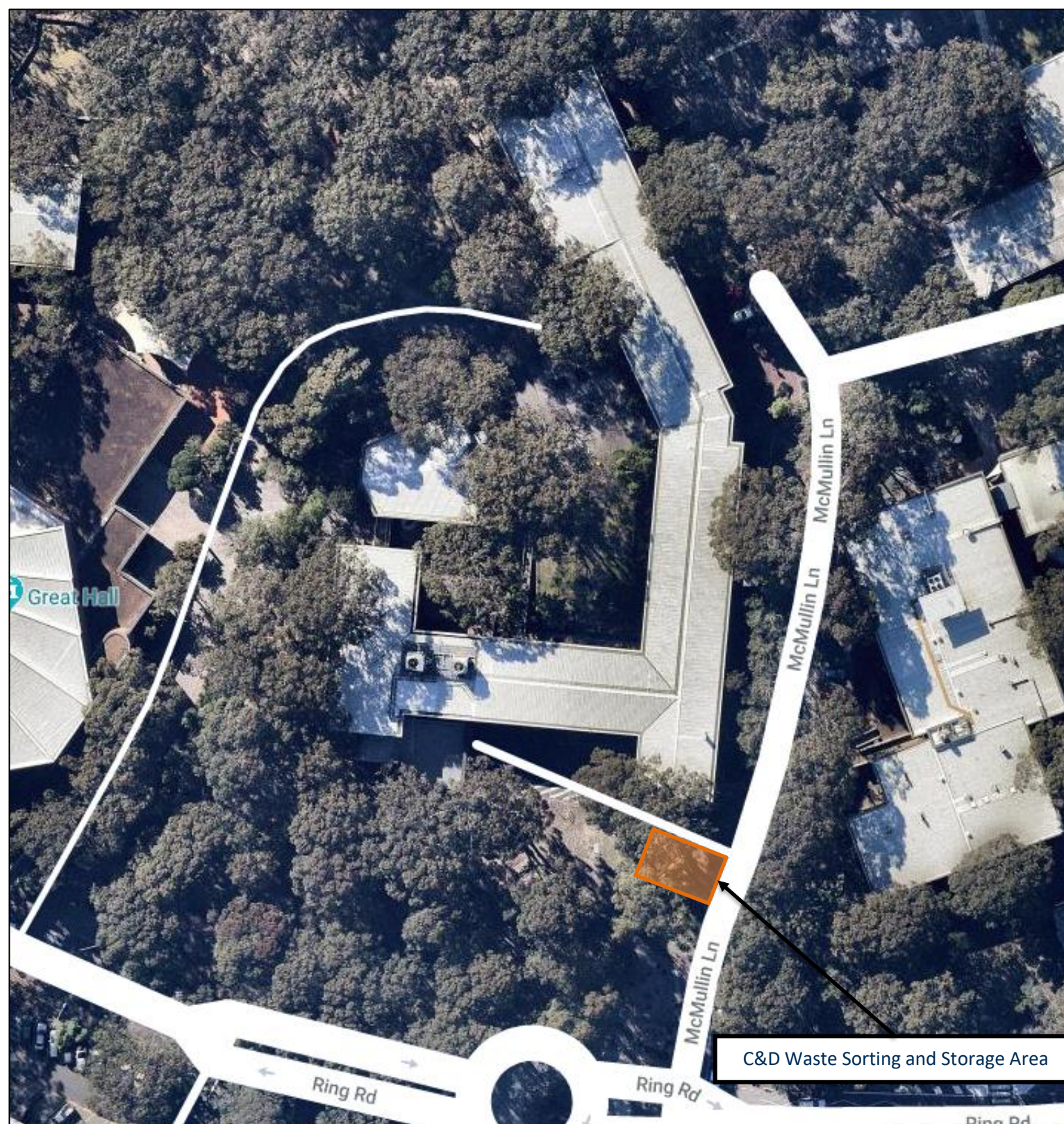
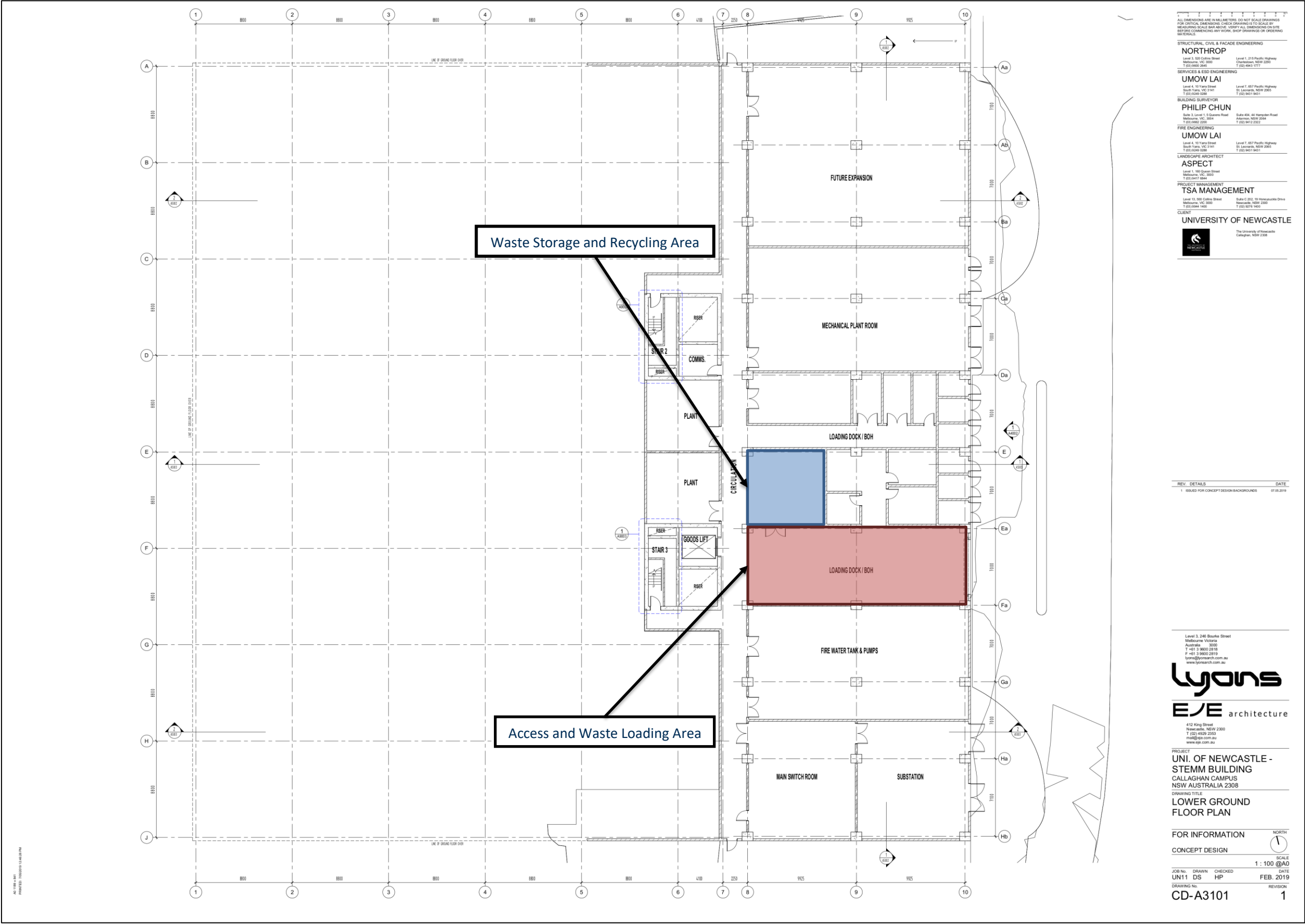


Figure 6: Site waste storage and recycling area, and waste loading area



Appendix B Standard Signage

Waste Signage

Signs for garbage, recycling and organics bins should comply with the standard signs promoted by the NSW Office of Environment and Heritage (NSW OEH 2008b).

Standard symbols for use in signage, bin facade and educational materials are promoted through the NSW Environment Protection Authority. They are available for download from the NSW EPA website (NSW EPA 2016b), in black and white and colour versions. The Australian Standard series AS 4123 (Part 7) details colours for mobile waste containers (Standards Australia 2008).



Figure 7: Examples of standard signage for bin uses

Safety Signs

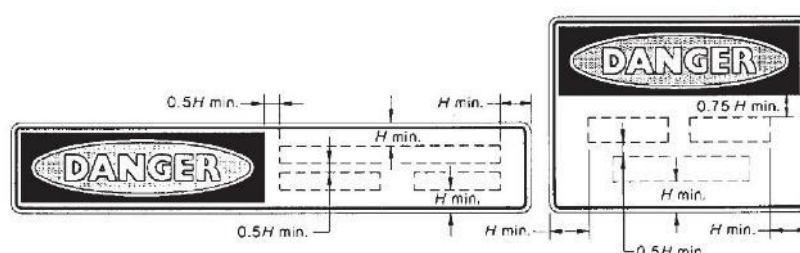
The design and use of safety signs for waste and recycling rooms and enclosures should comply with AS 1319 (Standards Australia 1994). Safety signs should be used to regulate, and control safety related to behaviour, warn of hazards and provide emergency information, including fire protection information. Below are some examples. Clear and easy to read 'NO STANDING' and 'DANGER' warning signs must be fixed to the external face of each waste and recycling room where appropriate.

Figure 8: Example and layout of safety signage



(d) Horizontal

FIGURE D5 TYPICAL ARRANGEMENTS OF DANGER SIGNS



Appendix C Waste Compactor Example

WastePac 1100L Bin Press WASTE INITIATIVES



BALER DIMENSIONS

Height	2.120 m
Width	1.160 m
Depth	1.150 m
Weight	270 kg
Power Supply	240V 1 Phase
Motor	1.5kW
Pressing Force	Up to 3.5T
Noise Level	72 dB
Cycle Time	20 Seconds

BALE DIMENSIONS

Height	-
Width	-
Depth	-
Weight	-

LOADING APERTURE SIZES

Height	-
Width	-

1100L Bin Press FEATURES

- Reduces the frequency of daily/weekly bin collections
- Base lifting plate ensures wheels are not damaged during compaction
- Compaction ratio of 3:1
- Two hand operation makes for a safer work environment



OPTIONAL EXTRAS

- Adaptor available to compact 660L bin

Appendix D Organics Equipment

Figure 9: Example of equipment for on-site organics processing

CLOSED LOOP ORGANICS UNIT SPECIFICATIONS

Closed Loop's organic recycling units are fully contained, commercial aerobic on-site composting units that can reduce food waste by up to 90 per cent in 24 hours.

CLO10s		Capacity/day: 20kg Electricity usage/month: 500kWh (maximum) Electricity requirements: AC 240V Power rating: 50Hz, 2.1kW Overall footprint (mm): 1160 (w) x 620 (d) x 1030 (h) Overall dry weight: 240kg
CLO30s		Capacity/day: 60kg Touchscreen Controls Automatic Operation Electricity usage/month: 1100kWh (maximum) Elec. requirements: AC 3 phase, 20 amp, 5 pin dedicated outlet Power rating: 415V, 50Hz, 4kW Overall footprint (mm): 1960 (w) x 870 (d) x 1250 (h) Overall dry weight: 450kg
CLO50s		Capacity/day: 100kg Touchscreen Controls Automatic Operation Electricity usage/month: 1700kWh (maximum) Elec. requirements: AC 3 phase, 20 amp, 5 pin dedicated outlet Power rating: 415V, 50Hz, 6kW Overall footprint (mm): 2155 (w) x 1060 (d) x 1350 (h) Overall dry weight: 660kg
CLO100s		Capacity/day: 200kg Touchscreen Controls Automatic Operation Electricity usage/month: 3500kWh (maximum) Elec. requirements: AC 3 phase, 20 amp, 5 pin dedicated outlet Power rating: 415V, 50Hz, 13kW Overall footprint (mm): 2584 (w) x 1250 (d) x 1580 (h) Overall dry weight: 1100kg

OPTIONAL FEATURES

- Load cells for accurate measurements of inputs and outputs (CLO30 and above)
- Internet connection for SMS Alerts and remote connection (CLO30 and above)
- 120 Litre Bin Lifter (CLO100)

Dehydrators

Dehydrators reduce the volume of food and garden organic waste by removing the majority of water held by the waste. The products from dehydrators include extracted water which can be re-used, as well as dehydrated organic material which can be used as a soil amendment or fuel. Dehydrators differ from composters as they only dehydrate waste and do not produce compost.

Typical materials

- ☒ Food organics

Specifications

- **Loading:** Manual, Semi-Automatic (pump/hopper)
- **Unloading:** Manual
- **Consumables:** N/A
- **Working Life:** 10-20 Years
- **Power:** 415V
- Sewage/waste water hookup may be required to operate a dehydrator. This may require additional Council approval.
- Lateral and Overhead clearances need to be considered in some cases, and are variable.

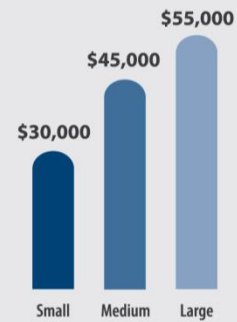
Please note: Dehydrators will only be approved for a rebate when the outputs are sent to a commercial composting service or licensed facility or if the equipment has a resource recovery exemption.

Relevant standards

AS 4024.1 2006 Series: Safety of Machinery by Third Party Independent verification

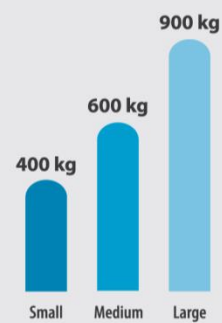


Price (\$AUD)



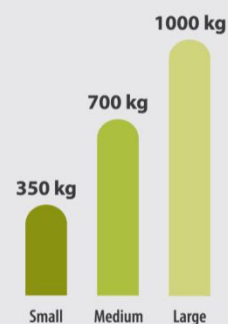
Dehydrator size

Machinery weight (kg)



Dehydrator size

Processing (kg/week)



Dehydrator size

Pre-Digestion with disposal to sewer

Biologically converts solid food waste into liquid. System uses microorganisms to decompose food waste into a liquid that can be disposed to sewer.

Typical materials

- ☒ Food organics
- ☒ NOT large bones and oils
- ☒ NOT fibrous material
e.g. corn husks

Specifications

- **Loading:** Manual
- **Consumables:** Microbes need to be replaced yearly
- **Working Life:** 15 Years
- **Power:** 208V, 3 Phase Power
- Cold water hook up required
- Sewer connection required (must have approval from a water authority to hook up to sewer)
- Lateral and Overhead clearances need to be considered in some cases, and are variable
- Can be linked with a grinder to manage bones and fibrous materials.

Cost:

\$55,000 – \$75,000

Machinery weight:

1300 lbs (small unit)

Processing (per hour):

300 lbs (small unit)

1000 lbs

(medium unit)

1500 lbs (large unit)

Relevant standards

AS 4024.1 2006 Series: Safety of Machinery by Third Party Independent verification



Macerators

Macerators reduce the volume of food waste by turning the solid food waste into pulp. The pulp slurry is pumped to an exterior holding tank for collection by a licensed contractor. Macerators are usually a leased piece of equipment. Leased equipment is not eligible under the Bin Trim Rebate Program.

Typical materials

- ☑ Food organics
- ☑ NOT oyster and mussel shells
- NOT fibrous material
e.g. corn husks

Specifications

- **Loading:** Manual
- **Unloading:** Semi-Automated
- **Consumables:** N/A
- **Working Life:** 15 Years
- **Power:** 415V
- Cold water hook up required
- Lateral and Overhead clearances need to be considered in some cases, and are variable.

Cost:

\$50,000 – \$60,000

Machinery weight:

140 kg

Processing:

2000 kg per hour

Please note: Macerators will only be approved for a rebate when used in conjunction with a commercial collection service to a licensed organic recycling facility or a Resource Recovery Exemption compliant land application system.

Relevant standards

AS 4024.1 2006 Series: Safety of Machinery by Third Party Independent verification

