The University of Sydney Electrical Engineering Building

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Waste Management Plan

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1 Introduction

This Waste Management Plan (WMP) has been prepared on behalf of The University of Sydney to accompany a Development Application for the Electrical Engineering Building development.

The Plan has been developed with consideration of the Council of the City of Sydney and other Authority's requirements. It is intended to inform the design of the waste services by identifying the estimated waste profile for the development and providing the total area required by the recommended equipment/systems.

In doing so this Plan, which includes waste estimates and related management requirements, has been developed in accordance with the City of Sydney's *Policy For Waste Minimisation in New Developments 2005*, and The University of Sydney's *Environmental Sustainability Policy 2015*, as well as the University's waste and recycling guidelines.

The development involves significant additions to the existing Electrical Engineering Building. In relation to this waste management plan, the key components of the new development are:

- New workspaces
- New teaching and learning facilities
- New laboratories
- Existing laboratories
- New support (communal) facilities
- New waste and recycling facilities

Waste audit and management strategies are recommended for new developments to provide support for the building design and promote strong sustainability outcomes for the building. All recommended waste management plans will comply with council codes and any statutory requirements.

To assist building management in achieving effective waste and recycling management, this waste management plan has three key objectives:

i. **to minimise the environmental impacts of the operations of the development** – this will be achieved by ensuring maximum diversion of waste from landfill; correct containerisation and transport of materials; correct segregation of materials into appropriate management streams; awareness among tenants of waste avoidance practices.

ii. **to minimise the impact of the management of waste within the development on local residents** – this will be achieved by ensuring waste is managed so as to avoid odour and litter and collected during suitable times.

iii. **to ensure waste is managed so as to reduce the amount landfilled and to minimise the overall quantity generated** – this will be achieved by implementing systems that assist tenants to segregate appropriate materials that can be

recycled; displaying signage in all tenant areas to remind and encourage avoidance and recycling to staff; and through associated signage in the commercial areas to reinforce these messages.

2 Waste Generation

2.1 Waste Streams

Based on the development profile, the following waste streams would be expected:

- General waste
- Commingled recycling
- Paper & cardboard recycling

2.2 Waste Generation Estimates

Expected quantities of general waste and recycling have been estimated based on the UFA of the building's functional areas; based on the information provided to us, these are as follows:

Table 1 – Building UFA

Functional Area	UFA m^2
Laboratory/Workspace	5,050
Teaching/Learning	2,335
Existing Laboratories	2,668
Support (communal areas)	893
Total	**10,946**

Based on averages for quantity of waste generated and composition as determined by industry data (i.e. data/information provided by WACS' waste audits conducted in a broad range of sectors) as well as consideration of the waste generation rates as detailed by the City of Sydney Council's *Policy For Waste Minimisation in New Developments,* it is estimated that the entire development will generate a total of **9, 323 litres** of waste and recyclables per 5-day week. A 5-day week has been applied to best reflect the times when the building's functional areas will be utilised.

The expected quantities of waste and recyclables generated for the development in terms of weight and volume per week are as follows:

Table 2 – Waste/recycling total generation

	L/week
General Waste	4,949
Commingled Recycling	708

Paper & Cardboard	3,666
Total	**9,323**

A breakdown of waste and recyclables generated by functional area is provided in table 2.

Table 3 – Waste/Recycling Generation by Functional Area

Functional Area	Paper/CB (L/week)	Commingled (L/week)	General Waste (L/week)	Total
Laboratory/Workspace	2,020	379	2,651	**5,050**
Teaching/Learning	467	93	607	**1,168**
Existing Laboratories	1,067	200	1,401	**2,668**
Support (communal areas)	112	36	290	**438**
Total	**3,666**	**708**	**4,949**	**9,323**

Note: The weights and volumes are based on correct segregation of waste and recyclables.

3 Waste Management Systems and Spatial Requirements

3.1 Waste Systems and Bin Requirements

The following table shows the recommended systems required to manage the estimated waste profile as detailed in the above tables for the development. The systems refer to the level 1 waste storage system rather than the internal bins that will be used within the development.

Table 4 – Waste Systems

Waste Stream	Bin Size	No. of bins	Clearance (frequency/ week)	Capacity (Weekly)	Estimated Volume/Week	Footprint per bin (m2)	Total Footprint
Paper & cardboard	240	6	3	4,320	3,666	0.43	2.58
Commingled	120	2	3	720	708	0.27	0.54
General Waste	240	7	3	5,040	4,949	0.43	3.01
TOTAL		**15**		**10,080**	**9,323**		**6.13**
						Plus 30%	**7.97**

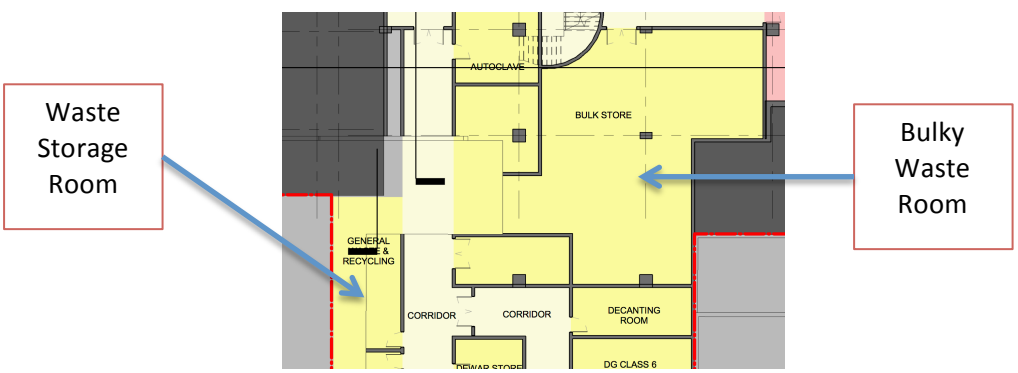
Based on the estimates of waste generation and the number of bins required (with the collection schedule as noted), as well as allowing 30% space for bin movement, the minimum size of the waste storage facility should be approximately **8 m^2**.

Currently **37.2 m^2** of space has been allocated in the waste room for the housing of bins, which will be sufficient to manage and implement the recommended system.

3.2 Waste Storage

The following diagram illustrates the location of the waste storage room, including the bulky storage room.

Diagram 1 – Level 1 Waste Storage Room



The waste areas will be accessed by cleaning/maintenance staff via the service lifts, where they will dispose of wastes/recyclables into the designated bins provided.

The waste and recycling bins will be colour coded and clearly signed. Each stream will be located in a designated area. This will assist in easy identification of correct bins by tenants and cleaners.

This principle will apply to the waste storage room and the bulky waste room – signage will clearly indicate where to deposit materials.

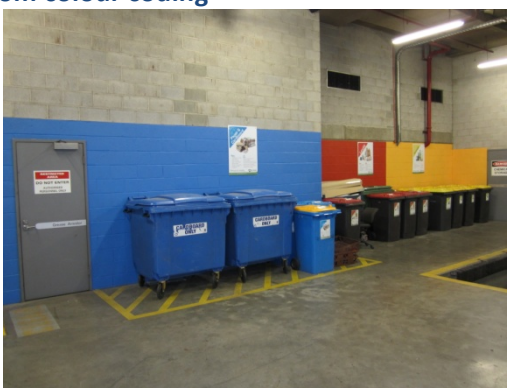
3.3 Storage Design

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

There will be a need to ensure that there is sufficient space to allow for bin movement. As a general rule, it is recommended that an additional 30% of the estimated footprint for bins be allocated to this (and this has been calculated in estimating the waste storage space requirements).

The waste and recycling bins will be colour coded and clearly signed. Each stream will be located in a designated area. This will assist in easy identification of correct bins by cleaners and staff.

Photographs 1 & 2 - Examples of waste room colour coding



The garbage room will contain the following to minimise odours, deter vermin, protect surrounding areas, and make it a user-friendly and safe area:

- waste room floor to be sealed with a two pack epoxy;
- waste room walls and floor surface is flat and even;
- all corners coved and sealed 100mm up, this is to eliminate build-up of dirt;
- a water facility with hose cock must be provided for washing the bins;
- any waste water discharge from bin washing must be drained to sewer in accordance with the relevant water board;

- tap height of 1.6m;
- storm water access preventatives (grate);
- all walls painted with light colour and washable paint;
- equipment electric outlets to be installed 1700mm above floor levels;
- the room must be mechanically ventilated;
- light switch installed at height of 1.6m;
- waste rooms must be well lit (sensor lighting recommended);
- optional automatic odour and pest control system installed to eliminate all pest types and assist with odour reduction – this process generally takes place at building handover – building management make the decision to install;
- all personnel doors are hinged and self-closing;
- waste collection area must hold all bins – bin movements should be with ease of access;
- conform to the Building Code of Australia, Australian Standards and local laws; and
- childproofing and public/operator safety shall be assessed and ensured.

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 will attend to all spills immediately, as they occur.

4 Waste Management Systems

The following summarises the recommended waste and recycling systems that will be implemented. These recommendations are based on City of Sydney Council requirements and systems implemented for similar developments (ie., types of tenants and residential areas).

4.1 Systems

All University staff, students and cleaning/maintenance staff (and contractors) will be briefed on the proper use of waste management systems. Recycling streams will be monitored and reported by cleaners/building management, as it is imperative that they remain free of contamination to ensure compliance with City of Sydney Council and the appointed waste service contractor collection protocols. University staff and students will be encouraged to maximise the separation of general waste and recyclables to aid the proper disposal of all materials.

Waste/recyclables will be disposed of into the internal designated general waste and recycling bins located throughout the building. On a daily basis cleaners will collect waste and recycling from these bins and, via the service lift, will transfer materials into the designated bins located in the level 1 waste room.

An appointed contractor will then provide waste and recycling collection services. Utilising an appointed contractor affords The University of Sydney greater flexibility regarding collection schedules, with the potential for appropriate collection frequencies to be determined in consultation with the waste contractor once the system is in operation.

Prior to collection cleaners will be responsible for moving the bins from the waste room onto Shepherd St, at the end of the loading dock, where a kerbside collection will take place. As future plans for the precinct intend to pedestrianise Maze Crescent, Shepherd St offers the most efficient and safest point for collection. Following collection by the appointed contractor it will be the responsibility of cleaning staff/building management to return the empty bins to the waste room.

Items such as furniture/whitegoods stored within the bulky items storage rooms will be managed by building/University management and reused if desired. If items remain unused, appropriate collection organisations will be called to collect the items for recycling/reuse as required.

In addition, University staff and students will be provided with ad hoc recycling systems such as e-waste; batteries; fluorescent light tubes etc. These systems are already implemented by The University of Sydney, and are described in Section 7.

Signage will be a crucial element of the waste management system. Appendix B contains examples of signage. These are the type of signs that should be used throughout the commercial tenancies and waste storage area(s).

4.2 Summary of management process

The following summarises the management system for the wastes and recyclables for the commercial tenants.

Table 5 – Overview of management process

Stream	System	Comment
Comingled Recycling	120L MGBs	University staff and students separate commingled materials and deposit directly into internal bins located throughout the building. Cleaning staff transfer recyclables from internal bins to MGBs, located in the Waste Room. Cleaning staff transfer bins to and from Shepherd St for collection.
Paper & cardboard Recycling	240L MGBs	University staff and students separate paper and cardboard materials and deposit directly into internal bins located throughout the building. Cleaning transfer recyclables from internal bins to MGBs, located in the Waste Room for collection. Cleaning staff transfer bins to and from Shepherd St for collection.
General Waste	240L MGBs	University staff and students separate general waste and deposit directly into internal bins located throughout the building. Cleaning transfer materials from internal bins to MGBs, located in the Waste Room for collection. Cleaning staff transfer bins to and from Shepherd for collection.

4.3 Disposal of Wastes/Recyclables

The following summarises the disposal pathway for the wastes and recyclables generated once the development is operational. Note though that this management summary cannot specify the actual locations until the waste/recycling contractor is appointed.

Table 4 – Waste Management Systems

Type of material	Destination
Commingled recycling	Transported to a recycling facility for recycling by the appointed contractor
Paper & Cardboard Recycling	Transported to a recycling facility for recycling by the appointed contractor
General waste	Transported to a recycling facility for recycling by the appointed contractor

5 Waste Stream Acceptance Criteria

5.1 Acceptance Criteria

General Waste:

General waste bins will be 240L MGB's. The lids and signage should be colour-coded red. The general waste stream does not include hazardous material (such as batteries, fluorescent light tubes, light bulbs and/or toner cartridges), recyclable material or electronic equipment such as computers, TVs and mobile phones.

Commingled Recycling:

The commingled recycling system will be 120L MGB's and should accept all recyclable plastic containers, aluminium containers, glass bottles and steel cans, wet paper towels, dirty paper and cardboard (such as pizza boxes). It does not include clean, uncontaminated paper and cardboard. Comingled recycling bin lids and signage should be colour-coded yellow.

Paper & Cardboard Recycling:

The paper & cardboard recycling system will be 240L MGB's and should accept clean, printed paper and cardboard, including stapled documents and magazines. It does not include dirty, contaminated paper and cardboard.

5.2 Bin Requirements

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 5: Standards Australia waste/recycling container colour coding

Waste Stream	Bin Body Colour	Lid Colour
Paper Recycling	Blue	Blue
Cardboard Recycling	Green	Blue
Food Organics	Burgundy	Burgundy
Commingled Recycling	Green	Yellow
Used Cooking Oil Recycling	NA	NA
General Waste	Green	Red

Appendix A contains illustrations of bins (and other waste management equipment) that could be used within the various tenancies and commercial areas. The pictures provide examples of the different options for equipment such as MGB, tugs for transporting bins, trolley unit and a wheelie-safe trolley.

6 Students and Staff Education

All University students and staff will receive information regarding the waste collection systems including how to use the system, which items are appropriate for each stream and collection times. Appropriate signage and updated information will also be provided, as well as receiving feedback on issues such as contamination of the recycling stream or leakage of the recyclables into the general waste. The University will have the responsibility for these tasks.

All waste receptacles will be appropriately signed and additional room signage is usually provided from most waste contractors during implementation of the waste contract. Examples of signage are included in Appendix B.

It is recommended that all signs should:

- Clearly identify the waste/recycling stream;
- Use correct waste/recycling stream colour coding;
- Identify what can and cannot be disposed of in the receptacle; and
- Include highly visual elements to accommodate for individuals with inadequate English literacy.

On a quarterly basis waste and recycling performance reports will be reported back to tenants so that they are aware of their performance and areas for improvement. An active waste monitoring program will be employed. The waste and cleaning contracts will ensure that contractors actively participate in the waste reduction program for the site and meet monthly to identify performance and new opportunities for diversion and avoidance.

7 Other Systems

In addition to the diversion system that will be implemented, the following waste diversion and minimisation practices are also implemented by The University of Sydney:

Batteries

This stream accepts single-use batteries, rechargeable batteries and utton cell batteries. In the Darlington campus batteries can be disposed of at the Merewether Building (H04) Room 129, the New Economics Building (H69) Room 117 and the Wilkinson Building (G04) Room 272.

Fluorescent Light Tubes

This stream accepts light globes, fluorescent globes, light fittings, compact fluorescent lamps (CFLs), linear fluorescent and high intensity, discharge (HID) lamps, and commercial lights (T8, T5). The University uses a contractor to replace and recycle spent lights, which can be organised with a service request with Campus Assist.

E-Waste

Electronic equipment should be recycled on an as-needed basis. This stream accepts Computer monitors TVs, PCs, servers, laptops, keyboards and mouse, printers, speakers mixed cables, AV equipment (CD/DVD/VHS) and miscellaneous materials (whitegoods, lab equipment etc.). For the disposal of e-waste a storage and collection point is located in Institute Building (H03), which is accessible by car from City Road or via Merewether car park on Butlin Avenue.

Hazardous Waste

Chemical waste disposal is managed by the University's WHS. To safely dispose of or recycle hazardous waste the University's WHS guidelines must be followed.

The following provide an example of other types of systems:

Toner Cartridges

A toner cartridge recycling bin/box should be placed in key printing areas to capture used cartridges. These can be recycled on an as-needed basis.

Mobile Phones

Mobile phones can be collected in secure receptacles at centralised collection points. Alternatively, boxes containing postage satchels can be placed in centralised areas for use as needed.

Note: Should the building require any further site-specific waste systems there is enough free space within the waste room (29.2 m^2) to do so. This should be done so only with consultation of the appropriate contractor and by following correct Council and University protocol.

8 Ongoing Management

Having suitable systems in place is only one element of an effective waste management system. Compliance by all stakeholders is essential.

Cleaners are a key element in the effectiveness of the systems in place. Prior to acceptance of the cleaning contract, the contractor will be required to demonstrate how the management of waste and recycling will be carried out so as to ensure that segregated materials are placed in the correct systems. This process will be agreed and a training program implemented by the cleaning contractor to ensure full understanding by all cleaners. The cleaning supervisor and site management throughout the term of the contract will carry out monitoring of the system.

In addition, cleaners will be required to feed back to site management any non-compliance issues they observe during their cleaning activities. This may include contamination of recycling, non-participation in the recycling system, or missing or damaged bins. In this way issues can be promptly dealt with by management.

Waste and recycling contractors will be required to report actual volumes collected by stream so that site management can monitor performance and feed this back to stakeholders.

It is highly recommended that a basic reporting program be set up at the site which would include bin tally sheets that detail the number of bins collected and how full they are at the time of collection, in addition to communication procedures to allow waste contractors to provide feedback regarding contamination and leakage.

All University staff and students should be educated and made aware of any changes to the existing waste systems.

If a public place recycling system was implemented it would need to be accompanied by clear signage and colour coding to help differentiate the systems. It is likely that staff would also be required to inform the public about the systems and to guide their waste disposal practices. Additionally, notices and information sheets could be placed on public notice boards informing the public of the changes at the centre.

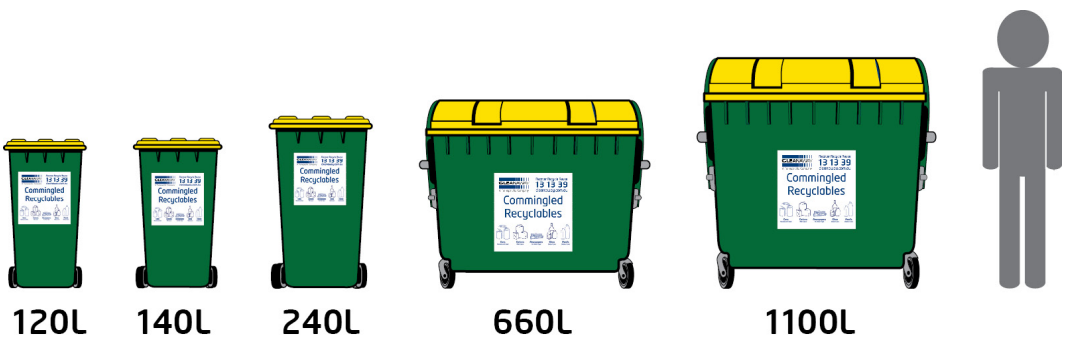
Appendix A – Waste Management Equipment

The following diagrams illustrate colours and sizes of different bins that could be used within the development.

Figure 1 – MGB bin

Figure 2 – MGB bin

Figure 3 – Indicative size of MGB



Figures 4, 5, 6 and 7 – Bin movers and tugs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Appendix B – Example Signage