



University of Sydney

Health Precinct – Stage 1

**Operational and Construction Waste
Management Plan**

July 2017

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1 Introduction

This Waste Management Plan (WMP) has been developed for the SSD 7974 Health Precinct Stage 1 Development on behalf of the University of Sydney, Camperdown Campus

This WMP provides calculations of projected operational general waste and recycling, based on the development schedules as provided as well as a construction waste management plan. The development essentially consists of teaching spaces, staff/student workplaces, administration areas and research/teaching laboratories.

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

This Operational Waste Management Plan addresses the appropriate segregation, containment and disposal of waste required with waste avoidance being the primary focus.

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 on the environment** – 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 staff/students 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 to avoid odour and litter and collected during suitable times.
- iii. **To ensure waste is managed so as to reduce the amount landfilled and minimise the overall quantity generated** – this will be achieved by implementing systems that assist staff/students to segregate appropriate materials that can be recycled; displaying signage in all tenant areas to remind and encourage avoidance and recycling, and through associated signage in the to reinforce these messages.

This Plan has been developed with reference to the City of Sydney's *Policy for Waste Minimisation in New Developments* and the University of Sydney's *Resource Recovery & Waste Management Standard*.

2 Waste & Recycling Volume Calculations

Based on the development profile (as per Section 1), the following are the predominant waste streams that would be expected:

- General waste;
- Comingled recycling (including paper and cardboard);
- Organic (food) waste; and
- Hazardous waste (clinical waste and chemicals)

A waste assessment will be conducted once the site is operational to determine the additional types and quantities of wastes that may be generated. Following this, appropriate management systems will be implemented and where necessary generators advised of these management requirements.

Essentially, principles of sustainability will be applied to management decisions so that the minimum of materials is ultimately disposed of to landfill.

The following tables shows the estimated waste generated from the various components of the development. These estimates are based on averages for quantity of waste generated and composition as determined by industry data (ie., data/information provided by WACS' waste audits conducted in a broad range of sectors) as well as consideration of waste generation rates as detailed in the City of Sydney "Policy for Waste Minimisation in New Developments, 2005". Management aspects have incorporated both Council's and the University's requirements.

Table 1 – Total Development waste generation estimate (weekly)

Waste Type	L
General Waste	7,284
Paper/Cardboard	4,907
Commingled	1,050
Organics	180
TOTAL	12,191

Calculations for the hazardous waste are difficult until exact types of teaching and research activities are defined. However, based on similar developments in other Universities, it would be expected that there would be approximately (per week):

- 720 litres of clinical waste (including sharps)
- 100 litres of chemical waste

3 Waste Management & Recycling Systems

The waste and recycling systems to be implemented will comply with the City of Sydney's "Policy for Waste Minimisation in New Developments, 2005" and University's requirements, which are detailed in the "Resource Recovery & Waste Management Standard".

Based on the calculated waste volumes per week, the following are the numbers of bins required in the storage areas to enable collection by the appointed contractor.

Table 2 – Estimated bin requirements

Waste Stream	Bin Size (MGB)	No. of Bins	Clearance Frequency/week	Capacity (weekly)	Estimated volume / week	Footprint per bin (m2)	Total Footprint
General Waste	660	4	3	7,920	7,284	1.16	4.64
Paper/Cardboard	660	3	3	5,940	4,907	1.16	3.48
Commingled	660	1	3	1,980	1,050	1.16	1.16
Organics	120	1	3	360	180	0.27	0.27
Hazardous	240	2	1	480	820	0.43	0.86
TOTAL		7		13,860	12,191		10.4

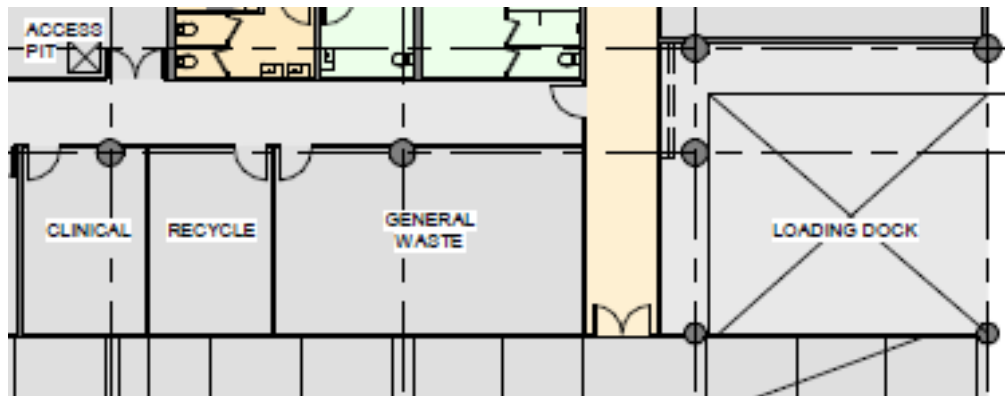
The waste rooms have the following floor space allocations:

- General Waste Room: 50 m²
- Recycle Room: 20 m²
- Clinical Waste Room: 20 m²

Therefore there is sufficient space to store the estimated waste bin numbers as well as allowing for peak generation rates and contingencies.

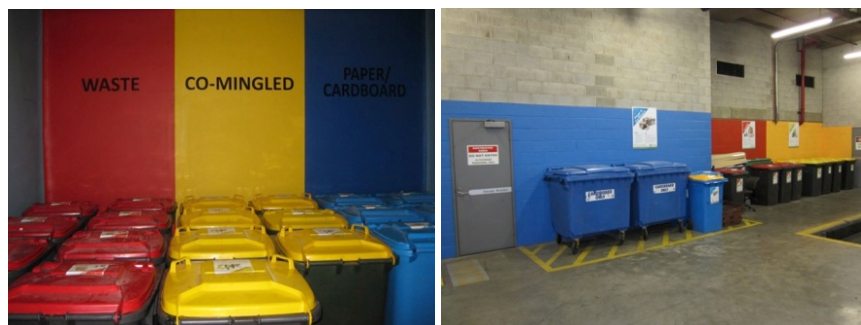
4 Storage Area Requirements

All wastes and recyclables will be stored in the following locations (the storage areas are located on the Ground Level):



Note that there are separate areas for clinical waste, recyclables and general waste.

The University in the “*Resource Recovery & Waste Management Standard*” has specified design standards for waste/recycling storage facilities and these will be complied with in regards to design, colour coding signage etc. All storage areas should also be similarly colour-coded as shown in the examples below



Waste storage rooms must be provided with appropriate impervious floor and wall finishes and must be provided with wash-down facilities including hot and cold water supplies and wastes. Provision must be made for a main waste recycling and general waste collection storage space sized to safely accommodate expected daily maximum quantities of waste and recyclables.

The main waste recycling and general waste collection storage room must include bin cleaning facilities and compactor as appropriate. Adequate and safe vehicle access, entry and egress provisions must be provided for movement and manoeuvring of heavy waste collection vehicles.

In addition we suggest the following best practice measures for the waste rooms to minimise odours, deter vermin, protect surrounding areas, and make each a user-friendly and safe area:

- Floor to be sealed with a two pack epoxy
- Walls and floor surfaces are flat and even
- All corners covered and sealed to 100mm up to eliminate build-up of dirt
- A bin wash facility with hose cock with tap height of 1.6m, and drainage to sewer
- All walls painted with light colour and washable paint

- Electric outlets to be installed 1700mm above floor levels
- The room must be mechanically ventilated
- Waste rooms must be well lit (sensor lighting recommended), with switch installed at 1.6m
- All personnel doors are hinged and self-closing
- Conformity with the Building Code of Australia, Australian Standards and local laws
- (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

In regards to the clinical waste storage room, according to the Industry “best practice” waste management manual (*Waste Management Association of Australia, Biohazardous Waste Industry Group, Manual for the Management of Biohazardous Waste, 7th edition, 2014*), storage can be a dedicated and purpose built room or mobile garbage bins – what is appropriate depends on the type of waste, volumes and servicing processes.

However, for this facility, the following will be included in the design of this storage room:

- (a) Its base is an impervious surface (eg. concrete) surrounded by a bund appropriate to contain any spill;
- (b) All loading/ unloading takes place within the bunded area in such a manner to ensure any spills are appropriately managed;
- (c) The base and walls of bunded areas are free of gaps or cracks;
- (d) Be signposted with the bio-hazard symbol and other labelling appropriate to the types of waste stored in the area (eg. clinical, cytotoxic);
- (e) No liquid waste, wash down waters or stormwater contaminated with clinical and related waste are disposed of via the stormwater drainage system; and
- (f) The bunded area drains to a sump or sewer to collect spills and wash waters. Cut-off drains, which drain to a sump, should be used instead of bunds if approved by the relevant authority.

Conditions related to security of clinical and related waste include the following:

- (a) The operator shall ensure that loading/ unloading of waste is carried out in accordance with designated safe procedures, and relevant records are completed and maintained.
- (b) Containers in which clinical and related waste are stored shall be secured when loading/unloading is not taking place.

Spill Kits for clinical waste shall be located in the storage area.

5 Waste Management Systems

University of Sydney cleaners will be responsible for collecting and transporting all waste and recycling to the ground level storage rooms where the materials will be deposited in the designated bins.

All internal areas will be provided with bins to maximise the separation of materials so as to ensure that the minimum amount of material is disposed of to landfill. Based on the University's CIS RR & Waste Management calculation spreadsheet, the following is an estimate of the required internal bins. Note that this does not include the provision of bins for clinical and hazardous wastes:

- (72 L) Recycling Bin for--Staff Workspace (Desks)
- (72 L) Landfill (General) Waste Bin for--Staff Workspace (Desks)
- (72 L) Recycling Bin for--Teaching & Learning Space (ex. Wet Labs)
- (72 L) Landfill (General) Waste Bin for--Teaching & Learning Space (ex. Wet Labs)
- (90 L) Recycling Bin for--Kitchen Areas
- (90 L) Landfill (General) Waste Bin for--Kitchen Areas
- (90 L) Recycling Bin for--Open space & Study/Breakout Areas
- (90 L) Landfill (General) Waste Bin for--Open space & Study/Breakout Areas

All bins will be colour-coded to conform to the Australian standard (and University requirements), as shown below, or otherwise an alternative scheme consistent with the University's existing systems.

Material 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

All staff/students will receive information regarding the waste collection systems including how to use the system, which items are appropriate for each stream and collection regimes.

On a quarterly basis waste and recycling performance reports will be reported back to staff/students so that they are aware of their performance and areas for improvement. An active waste monitoring program will be employed – particularly for ensuring correct segregation of clinical and hazardous wastes.

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.

Waste will generally be collected in various parts of the facility in coloured wheelie bins and transported to the General/Clinical/Recycled Waste Stores by staff. Clinical Waste will be collected in locked self-bunding yellow wheelie bins (240 litre MGB located in the relevant teaching/research areas). General waste and recyclable material bins will be decanted into larger skips before being returned to areas of the building for use.

Note that sharps containers will also be located in relevant areas of the teaching and research areas. Based on advice from the contractor, these can be deposited into the 240 litre MGB clinical waste bins for collection and treatment/disposal.

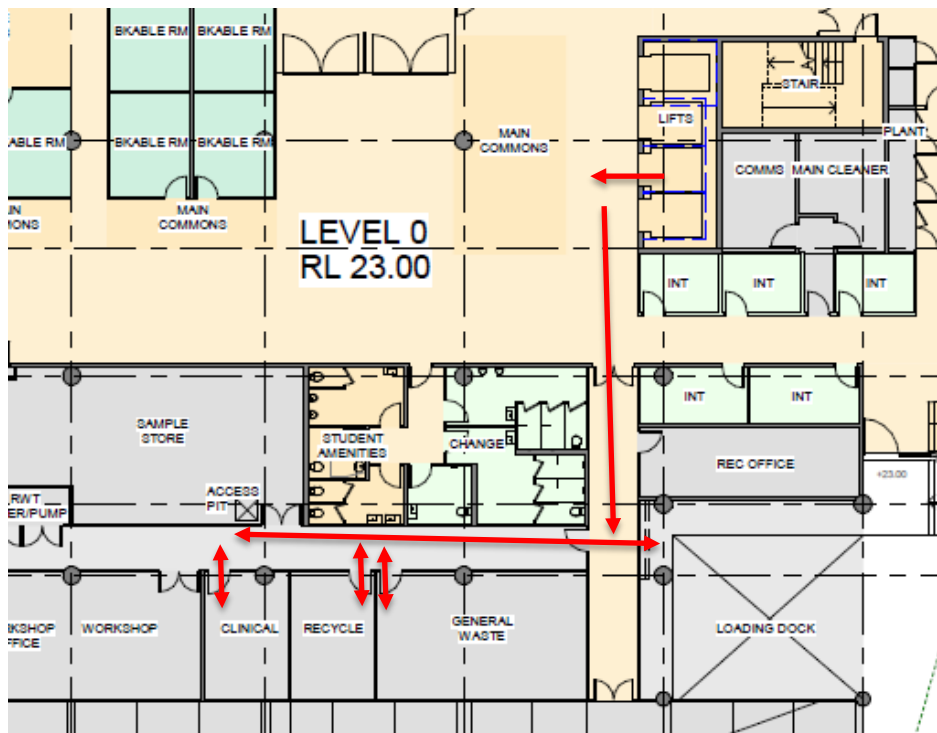
Confidential waste will be collected in blue locked wheelie bins in Utility rooms throughout the building, and will retrieved on a swap-out basis from their various locations.

Removal of waste and recycling will be aligned with the University's existing collection timetable so that bins are put out as close to the collection time as possible. It is our understanding that the current collection schedule is 3 x weekly, Mon-Wed-Fri. All bins should be placed onto the loading dock for collection. Cleaning staff will also have to bring the bins back to each building as soon as possible following collection, and return them in their correct configuration in each of the storage rooms. These staff will also be responsible for washing bins as required. We suggest that this be done on a weekly basis, to prevent build-up of odours and possible infestations.

All internal areas where waste and/or recycling bins are located will have signage placed on the adjacent walls indicating the correct placement of materials. Examples include:



Marked up building plans showing movement pathways are illustrated over the page with red arrows (note that the internal lifts will be used to transport waste/recyclables from all levels to the storage areas).



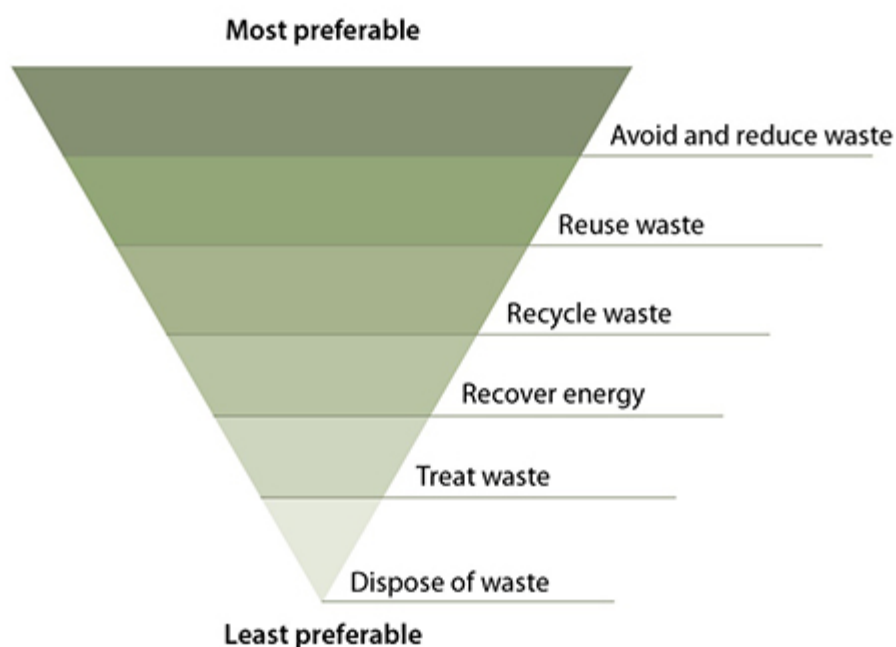
Wastes and recyclables will be serviced from the loading dock. This is designed with a minimum 4.5 metre headroom so as to allow waste collection vehicles to enter and empty bins.

6 Construction Waste Management Plan

The Construction Waste Management Plan has been developed to ensure that all waste resulting from construction activities is managed in an effective, safe and environmentally aware manner. Specifically,

- To minimise the generation of waste to landfill
- To maximise waste material avoidance and reuse on site
- To ensure that where practicable, an efficient recycling procedure is applied to waste materials
- To raise awareness among employees and subcontractors of their waste management responsibilities

The following waste hierarchy will be used as a guiding principle:



Avoid and Reduce

Minimise the production of waste materials in the construction process by:

- Assessing and taking into consideration the resultant waste from different design and construction options
- Purchasing materials that will result in less waste, which have minimal packaging, are pre-cut or fabricated.
- Not over ordering products and materials

Reuse

Ensure that wherever possible, materials are reused either on site or offsite.

- Identify all waste products that can be reused
- Put systems in place to separate and store reusable items
- Identify the potential applications for reuse both onsite and offsite and facilitate reuse

Recycling

Identify all recyclable waste products to be produced on site.

- Provide systems for separating and stockpiling of recyclables
- Provide clear signage to ensure recyclable materials are separated
- Process the material for recycling either onsite or offsite

Note: In some cases, it may be more economical to send the unsorted waste to specialised waste contractors who will separate and recycle materials at an offsite location.

Disposal

Waste products which cannot be reused or recycled will be removed and disposed of. The following will need to be considered:

- Ensure the chosen waste disposal contractor complies with regulatory requirements
- Implement regular collection of bins

The principles outlined above are applied to the expected waste sources for the development as follows:

Excavation Material

Earthworks will be completed over the site as required to achieve proposed levels. Where feasible, removed earth will remain on-site for reuse.

Green Waste

All green waste material will remain onsite (shredded and or composted), and be reused in landscape areas around the development if possible. If this is not possible, then the contractor will transport the materials off-site for mulching or composting.

Bricks, Tiles, Concrete

Bricks will be stockpiled and reused wherever possible. Surplus, unused bricks will be reused in pavement construction or for temporary access tracks etc if possible. Unusable bricks will be collected and recycled at an appropriate brick/rubble recycling facility to be used in aggregate gravel products.

Timber

Recyclable timber (untreated) will be collected and recycled at appropriate timber yard. Unrecyclable (treated) timber will be disposed at landfill.

Timber that is not of the standard for reuse will be transported to a site for chipping for use as garden mulch if acceptable for this process.

Metals

All metal materials will be reused or recycled as follows:

- Metal drums and packaging to be returned to the supplier
- Any metal suitable for recycling will be separated and stored in a designated scrap metal bin for transport to a metal recycling facility

Paper and cardboard

Cardboard and paper will be produced mainly from packaging materials and office paper waste. These should be disposed of into a designated recycling bin and collected regularly as required.

Liquid Waste

Liquid waste may be produced on site for environmental control measures such as:

- Site and vehicle cleaning
- Dust control waste

The following measures will be taken to minimise the impact of liquid waste:

- Ensure water is used in moderation and no taps are left continuously running
- Use any grey water produced on site for irrigation or for dust suppression
- Only discharge clean water into storm water

Stormwater Pollution Prevention

All actions will be undertaken to avoid pollution entering stormwater drains and for litter generation. The following will be initiated:

- i. Prior to commencement of any works a Safe Work Method Statement will be completed and reviewed to determine potential for stormwater pollution and/or litter generation
- ii. The proponent (contractor), will need to develop a management strategy to manage the potential for these issues to be realised
- iii. Site inspections will be conducted during the working day to monitor potential for stormwater pollution generation and where identified, works will cease until appropriate controls are implemented
- iv. Wastewater and storm water will be managed and disposed of in accordance with Water Authority requirements.

Litter Management

- i. Daily site inspections will be conducted to identify litter, remedy the situation and investigate the cause so as to reduce the potential for the issue to occur in the future.
- ii. Sufficient quantities of bins (and/or bin space), will be made available so as to avoid dumping of materials outside bins
- iii. All waste/recycling bins will have covers so as to ensure that wastes cannot be blown out during windy conditions. This will also apply to relevant stocks of materials to be used in construction.
- iv. Personnel will be allocated the role of litter management in that they will periodically inspect the site and surrounds for litter and if identified collect and dispose of it.

Records

Records will be kept of all wastes and recyclables generated and either used on site, or transported off-site.

It will be a condition of appointment, that all waste/recycling contractors provide these records and that they also contain details of the types of materials weights/volumes and the facilities that the materials are transported to.

These records will be made available to Council or any relevant government agency on request.

Waste/recyclables storage (on-site)

All waste and recycling materials will be stored in bins provided by the appointed contractor(s). These bins will be appropriately coloured and signed to indicate what materials are to be deposited into them and located so as to maximise the recovery of reusable/recyclable materials.

As construction activities progress, the designated bins may be re-located so as to maximise the collection of materials that will be diverted from landfill. This will also involve relocating signage advising as to correct waste management.

All locations where waste/recycling bins are located will be designed so as to avoid contaminating surface/stormwaters and have active litter control measures.

Waste/recyclables treatment (on-site)

There will be no treatment of wastes or recyclables on-site except for possible removal of contaminants prior to forwarding to off-site recyclers.

The following summarises the types, quantities and management systems for construction materials that may be generated during the civil works activities.

The quantity of waste materials to be generated onsite are estimates and therefore the systems that will be put in place need to incorporate flexibility to allow for variation in the total quantities generated. Active site management during the construction phase will ensure all waste/recyclable materials are disposed of appropriately and that all waste receptacles are of sufficient capacity to manage onsite activities.

The table below details the estimated composition by m³ of construction waste to be generated for the total site.

Finalisation of the system(s) that will be implemented for the recovery of materials and for disposal of others to landfill will occur following appointment of contractor(s). A component of the appointment will be that contractors will be required to provide data as to the disposal pathway (eg., materials, volumes and final disposal site), as well as a validation process for this information.

The appointed contractor(s) will also be responsible for sourcing speciality recycling facilities for the materials that cannot be reused on site.

Based on the volume of materials estimated to be generated during construction activities, approximately 86% will be diverted from disposal at landfill.

Materials on site		Destination		
Type of material	Estimated volume (m ³)	On-site (Reuse or recycle)	Off-site (Detail contractor and recycling contractor)	Disposal (Detail contractor and landfill site)
Concrete	20m ³	No on-site reuse	Collected by contractor and disposed at concrete recycling facility	Facility TBA upon appointment of contractor

Materials on site		Destination		
Type of material	Estimated volume (m ³)	On-site (Reuse or recycle)	Off-site (Detail contractor and recycling contractor)	Disposal (Detail contractor and landfill site)
Timber (formwork and construction)	35m ³	Separated and where feasible, reused for further formwork	Unused material separate and stockpiled onsite. Collected by specialist timber subcontractor for recycling	Facility TBA upon appointment of contractor
Brick	5m ³	No on-site reuse	Unusable bricks collected by contractor and disposed at brick recycling facility	Facility TBA upon appointment of contractor
Plasterboard	10m ³	Unused material taken back by supplier for reuse where possible	Material to be separated and stockpiled onsite. Collected by the waste subcontractor on a weekly basis (or as required) for recycling. Possible use as soil improver with gypsum etc removed by recycler	Facility TBA upon appointment of contractor
Ferrous Metals (eg., roofing, cladding, balustrades, fittings, door frames, guttering, studs etc)	3m ³	No on-site reuse	Collected by specialist metal subcontractor for recycling	Facility TBA upon appointment of contractor
Non-Ferrous Metals (eg., wiring)	2m ³	No on-site reuse	Collected by specialist metal subcontractor for recycling	Facility TBA upon appointment of contractor

Materials on site		Destination		
Type of material	Estimated volume (m ³)	On-site (Reuse or recycle)	Off-site (Detail contractor and recycling contractor)	Disposal (Detail contractor and landfill site)
Glazing	3m ³	No on-site reuse	Recyclers consulted as to potential for recycling and if suitable separated for recycling by a facility (possibly as road base, but generally not accepted for recycling due to film in the glass)	Facility TBA upon appointment of contractor
Carpet/Underlay	3m ³	No on-site reuse	This will be disposed of into a designated bin and collected regularly as required for recycling if of the required quality or disposal to landfill	Facility TBA upon appointment of contractor
Plastics (eg., plumbing fixtures)	5m ³	No on-site reuse	Contractor appointed to collect and recycle	No disposal to landfill
Mixed Recyclables	20m ³	No on-site reuse	Contractor appointed to collect and recycle	No disposal to landfill
General waste	40m ³	No on-site reuse	No recycling or reuse	Facility TBA upon appointment of contractor

Each subcontractor working on the site will be required to adhere to this Waste Management Plan.

The Head Contractor will ensure each subcontractor:

- Takes practical measures to prevent waste being generated from their work
- Implements procedures to ensure waste resulting from their work will be actively managed and where possible recycled, as part of the overall site recycling strategy or separately as appropriate
- Ensures that the right quantities of materials are ordered, minimally packaged and where practical pre-fabricated. Any oversupplied materials are returned to the supplier
- Implements source separation of off cuts to facilitate reuse, resale or recycling.

The Site Manager will be responsible for:

- Ensuring there is a secure location for on-site storage of materials to be reused on site, and for separated materials for recycling off site.
- Engaging appropriate waste and recycling contractors to remove waste and recycling materials from the site
- Co-coordinating between subcontractors, to maximise on site reuse of materials
- Monitoring of bins on a regular basis by site supervisors to detect any contamination or leakage
- Ensuring the site has clear signs directing staff to the appropriate location for recycling and stockpiling station/s. And that each bin/skip/stockpile is clearly sign posted
- Providing training to all site employees and subcontractors in regards to the WMP as detailed in section 8 below.

Should a subcontractor cause a bin to be significantly contaminated, the Site Manager will be advised by a non-conformance report procedure. The offending subcontractor will then be required to take corrective action, at their own cost. The non-conformance process would be managed by the Head Contractors' Quality Management Systems.

All site employees and sub-contractors will be required to attend a site specific induction that will outline the components of the WMP and explain the site specific practicalities of the waste reduction and recycling strategies outlined in the WMP.

All employees are to have a clear understanding of which products are being reused/recycled on site and where they are stockpiled. They are also to be made aware of waste reduction efforts in regards to packaging.

The site manager will post educational signage in relation to the recycling activities on site in breakout areas, lunch rooms etc.

