

# **Susan Wakil Health Building & Blackburn Demolition**

## **Waste Management Plan**

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**Revisions**

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0	2/8/18	Initial document for submission to PCA	G Olivares
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## Terms and Definitions

The following terms, abbreviations and definitions are used in this plan:

Terms	Explanation
CEMP	Construction Environmental Management Plan
HSEM	Health, Safety and Environmental Manager
EPA	Environmental Protection Authority
ERAP	Environmental Risk Action Plan
DECCW	Department of Environment, Climate Change and Water
CWMP	Construction Waste Management Plan

## *Contents*

Terms and Definitions .....	2
<b>1. Introduction .....</b>	<b>4</b>
1.1 Project Overview.....	4
1.2 Objective .....	4
1.3 Targets.....	5
<b>2. Legislation .....</b>	<b>5</b>
2.1 Waste Avoidance and Resource Recovery Act 2001.....	5
2.2 Protection of the Environment Operations Act 1997.....	6
2.3 Protection of the Environment Operations (Waste) Regulation 2005 .....	6
2.4 Waste Classification Guidelines, Part 1: Classifying Waste (DECC 2008).....	6
2.5 Asbestos Regulations .....	6
<b>3. Waste Classification .....</b>	<b>6</b>
<b>4. Waste Management .....</b>	<b>7</b>
4.1 Waste Sources .....	7
4.2 Waste Minimisation and Recycling.....	8
4.3 Waste Storage and Handling .....	9
<b>5. Waste Records .....</b>	<b>10</b>
<b>6. Appendix 1 – Asbestos Removal Control Plan .....</b>	<b>11</b>
<b>7. Appendix 2 – Review of Environmental Factors: Minor Works .....</b>	<b>12</b>
<b>8. SSD Appendix W – Operational and Waste Management Plan.....</b>	<b>13</b>

## 1. Introduction

This Construction Waste Management Plan (CWMP) has been developed to address the demolition activities associated with the demolition of the Blackburn Building (note approval for Blackburn Demolition was approved under a separate planning approval). In particular, the plan has been developed to address requirements of SSD 7974 Condition B24 from the project conditions of approval (SSD 7974 development approval is for the construction of the Susan Wakil Health Building (SWHB)).

CoA Reference	CoA Detail
<b>B24</b>	<p><b>Construction Waste Management Plan</b></p> <p>a) Prior to the commencement of works, a Construction Waste Management Plan (CWMP) must be submitted for the approval of the Certifying Authority. The CWMP must address, but not be limited to, the following matters where relevant:</p> <ul style="list-style-type: none"> <li>i) recycling of demolition materials including concrete; and</li> <li>ii) removal of hazardous materials and disposal at an approved waste disposal facility in accordance with the requirements of the relevant legislation, codes, standards and guidelines, prior to the commencement of any building works.</li> </ul> <p>b) Details demonstrating compliance with the relevant legislative requirements, associated with the removal of hazardous waste, particularly the method of containment and control of emission of fibres to the air, are to be submitted for the approval of the Certifying Authority prior to the removal of any hazardous materials;</p> <p>c) The Applicant must notify the RMS Traffic Management Centre of the truck route(s) to be followed by trucks transporting waste material from the Subject Site, prior to the commencement of the removal of any waste material from the Subject Site; and</p> <p>d) The Applicant must submit a copy of the plan to the Department and to the Council prior to the commencement of work.</p>

Table 1 - Condition of Approval B24

### 1.1 Project Overview

The University of Sydney Health Precinct Stage 1 Project Development is a key initiative of University to support the needs of the health disciplines through the creation of an attractive and world class multi-disciplinary research and education precinct. Due to its function and location, the Health Precinct will have a strong physical connection to the Camperdown campus as well as Royal Prince Alfred Hospital (RPAH).

Given the proximity to the RPAH, the Health Precinct site has always maintained a health and medical research function. Since 2013, Stage 1 has been identified as a major transformational project. It is noted that any subsequent stages beyond this project are not yet considered or funded.

In 2014, the project received approval from the Building and Estates Committee for funding to develop the site.

The Health Precinct Stage 1 will provide a contemporary, collaborative and flexible teaching and learning environment for students and staff alike.

The creation of the Health Precinct Stage 1 will enable co-location of the Faculty of Nursing and Midwifery (FNM), the Faculty of Health Sciences (FHS) and the Central Clinical School (CCS).

### 1.2 Objective

The objective of this CWMP is to ensure that all risks associated with demolition and construction waste management are considered and managed effectively during construction.



This CWMP seeks to ensure that construction and demolition waste is managed effectively to prevent any negative environmental impact on the surrounding environment or receiving resource recovery and waste facilities.

This CWMP aims to satisfy the following objectives:

- Address the requirements of planning approval condition B24
- Address the requirements of the relevant environmental legislation as it applies to this project
- Summarise potential impacts on the environment from the proposed works
- Document environmental procedures to control potential environmental impacts.

### **1.3 Targets**

The following targets have been identified in terms of soil and water management for the project:

- Waste products are recovered and reused on site where reasonable and practical.
- Undertaken recovery/recycling of all recyclable materials such as concrete, steel, aluminium, paper and plastics. This may be undertaken on site or at an offsite recovery facility.
- All residual waste products are sent to appropriately licensed destinations for recycling, reuse, treatment or disposal.
- No contamination incident occurring as a result of waste storage, transport or disposal.
- No rejection of loads by the receiving facility for non-compliant wastes.
- Regulated wastes stored, transported, tracked and disposed of as per regulated waste legislation
- No construction waste/litter to leave the site in an uncontrolled manner.
- Documentation of the intended management of wastes e.g. avoid, reduce, reuse, recycle or dispose to ensure waste is managed in accordance with accepted standards and appropriately implemented waste control measures.
- Implementation of waste minimisation initiatives where practical.

## **2. Legislation**

Waste legislation and regulatory framework is outlined below.

### **2.1 Waste Avoidance and Resource Recovery Act 2001**

The Waste Avoidance and Resource Recovery (WARR) Act 2001 establishes the waste hierarchy to ensure that resource management options are considered against the following priorities:

- Avoidance – actions to reduce the amount of waste generated and undertaking activities
- Resource Recovery – which includes reuse, reprocessing, recycling and energy recovery, consistent with the most efficient use of the recovered resources and
- Disposal – an “end-of-pipe” option that must be carefully undertaken to minimise any negative environmental outcomes.
- The NSW Government’s priority areas and actions for waste avoidance and resource recovery is outlined in the Waste Strategy 2007 (an update of the Waste Strategy 2003).
- The four identified “key target areas” in the Strategy are:

- Preventing and avoiding waste
- Increasing recovery and use of secondary materials
- Reducing toxicity in products and materials
- Reducing litter and illegal dumping.

## 2.2 Protection of the Environment Operations Act 1997

All material that is imported to or exported from the SPBT3 project will be undertaken in strict accordance with the requirements of the POEO Act 1997 including:

- Ensuring waste is classified appropriately and in accordance with relevant guidelines
- Waste materials are disposed of to appropriately licensed facilities
- Other materials are removed to facilities lawfully able to accept such materials.

## 2.3 Protection of the Environment Operations (Waste) Regulation 2005

The proposed works shall be undertaken in accordance with this regulation.

## 2.4 Waste Classification Guidelines, Part 1: Classifying Waste (DECC 2008)

All wastes generated and proposed to be disposed off-site shall be assessed, classified and managed in accordance with this guideline.

## 2.5 Asbestos Regulations

Asbestos containing materials shall be undertaken in accordance with the requirements of the:

- Work, Health and Safety Act 2011 (NSW)
- Work, Health and Safety Regulation 2011 (NSW)
- Code of Practice - How to safely remove Asbestos, December 2011
- Waste Classification Guidelines: Part 1: Classifying Waste (DECC 2008).

## 3. Waste Classification

Waste is generally classified on the basis of its potential harm to the environment. A summary of NSW waste classification requirements is provided below. Further details on the classification of waste can be found in the OEH's Waste Classification Guidelines.

Waste Classification	Description
Special Waste	<p>Special waste includes clinical and related waste, asbestos waste and waste tyres.</p> <p>Clinical and Related Waste includes:</p> <p>Asbestos waste means any material or material that contains the fibrous form of mineral silicates.</p> <p>Waste Tyres is any used, rejected or unwanted tyres including shredded or tyre pieces.</p>
Liquid Waste	<p>Liquid waste means any waste that:</p> <ul style="list-style-type: none"> <li>• Has an angle of repose of less than 5 degrees, or</li> </ul>

Waste Classification	Description
	<ul style="list-style-type: none"> <li>Becomes free-flowing at or below 60 degrees Celsius or when it is transported, or</li> <li>Is not generally capable of being picked up by a spade or shovel.</li> </ul>
General Solid Waste (putrescible)	Household waste that contains putrescible organics waste from litter bins collected by local councils:
General Solid Waste (non-putrescible)	<ul style="list-style-type: none"> <li>Glass, plastic, rubber, plasterboard, ceramics, bricks, concrete or metal</li> <li>Paper or cardboard</li> <li>Grit, sediment, litter and gross pollutants from stormwater treatment devices, stormwater management systems that has no free liquids</li> <li>Garden &amp; wood waste</li> <li>Containers previously containing dangerous goods, as defined under the Australian Code for the Transport of Dangerous Goods by Road and Rail, where residues have been appropriately removed by washing or vacuuming drained</li> <li>Oil filters (mechanically crushed), rags and oil-absorbent materials that only contain non-volatile petroleum hydrocarbons and have no free liquids</li> <li>Drained motor oil containers that do not contain free liquids</li> <li>Synthetic fibre waste from fibreglass, polyesters and other plastics and is packaged securely to prevent dust emissions, that is confirmed as not being asbestos waste</li> <li>Virgin excavated natural material</li> <li>Building and demolition waste</li> <li>Asphalt waste, including asphalt from road construction and waterproofing works</li> <li>Cured concrete waste from batch plants</li> <li>Fully cured and set thermosetting polymers and fibre-reinforcing resins, glues, paints, coatings and inks</li> </ul>
Hazardous Waste	<ul style="list-style-type: none"> <li>Waste with pH <math>\leq 2.0</math> or <math>\geq</math> pH 12.5</li> <li>Containers that have not been cleaned and that contained dangerous goods as described in the Australian Code for the Transport of Dangerous Goods by Road and Rail</li> <li>Coal tar or coal tar pitch waste, which is the tarry residue from the heating, processing or burning of coal or coke, being materials comprising of more than 1% (by weight) of coal tar or coal tar pitch</li> <li>Waste lead-acid or nickel-cadmium batteries, being waste generated or separately collected by activities carried out for business, other commercial or community services purposes</li> <li>Lead paint waste other than solely from residential premises or educational or child care institutions</li> </ul>

Table 2 - NSW Waste Classifications

## 4. Waste Management

### 4.1 Waste Sources

The following information in this section outlines the wastes anticipated and proposed waste management options to address the waste generated. All waste will be removed progressively with the minimum amount feasible stored on site.

Waste not removed immediately will be stored in designated areas in proprietary storage facilities until it is reused or removed.

Waste will be classified according to the OEH Waste Classification Guidelines (2008).

## Susan Wakil Health Building Waste Management Plan

Waste Category	Waste Generated	Classification
Waste produced from the strip-out of the existing structures	<ul style="list-style-type: none"> <li>• Carpet</li> <li>• Kitchen facilities</li> <li>• Appliances</li> <li>• Windows (glass)</li> <li>• Internal fittings</li> </ul>	General Solid
Waste produced from the demolition of the existing structures	<ul style="list-style-type: none"> <li>• Concrete</li> <li>• Steel</li> <li>• Brick</li> </ul>	General Solid
Waste from on-site maintenance and servicing of plant and equipment – note minor servicing only. Major servicing to be completed off site. (non-liquid)	<ul style="list-style-type: none"> <li>• Drained and crushed oil filters and grease tubes</li> <li>• Used and defective parts</li> <li>• Oil soaked rags</li> <li>• Used oil absorbent materials</li> <li>• Tyres</li> </ul>	General Solid
Waste from crib sheds and office areas	<ul style="list-style-type: none"> <li>• Food scraps, waste wrappers, waste paper towels</li> </ul>	General Solid Putrescible
Office and packaging waste (non-liquid)	<ul style="list-style-type: none"> <li>• Paper, cardboard, glass, plastic (no food scraps etc)</li> </ul>	General Solid
Waste from construction activities (non-liquid)	<ul style="list-style-type: none"> <li>• Waste is not contaminated or mixed with any other type of waste and does not contain asbestos</li> <li>• Concrete pour residues</li> <li>• Aggregates</li> <li>• Damaged and off cuts of PVC pipes</li> <li>• Rejected or defective precast concrete</li> <li>• Steel waste</li> <li>• Used Geotextile</li> <li>• Timber waste</li> </ul>	General Solid
Any waste that meets the criteria for assessment as dangerous goods under the Australian Code for the Transport of Dangerous Goods by Road and Rail	<ul style="list-style-type: none"> <li>• Poisonous (toxic) substances and corrosive substances</li> <li>• Non sag epoxy mortar binder</li> <li>• Synthetic rubber based adhesive</li> <li>• Epoxy resins</li> <li>• Batteries</li> </ul>	Hazardous

Table 3 - Waste Sources

## 4.2 Waste Minimisation and Recycling

The following strategies will be implemented on site to minimise the generation of waste:

- Include project waste strategy in the project induction.
- Establishment of a combined waste collection system by a reputable service provider.
- Appropriate quantities of materials will be ordered to minimise wastage.
- Quality of materials supplied will be controlled to reduce rework and problems due to quality and additional material consumption.
- Prefabricated elements used where practical and reasonable.
- Establishment of comingled recycling receptacles for packaging and food container waste.
- Waste steel will be separated and disposed of into the steel recycling bin provided on site.
- Form work will be reused as often as possible.

- Waste timber and formwork will be sent to a recycling facility
- Waste concrete will be sent to a recycling facility.
- Any green waste is to be mulched and removed from site. Where possible, with regard to the species, it is to be reused for landscaping purposes off site.
- Recycling of general waste such as paper, cardboard, aluminium cans and similar materials from offices and site facilities. Source separation will be provided for these facilities as shown below.



### 4.3 Waste Storage and Handling

During demolition, site strip-out and excavation waste has been removed by a suitably licensed contractor and sent to pre-approved waste and resource recovery facilities. The handling, storage and transport of hazardous materials and waste shall be in accordance with Laing O'Rourke Construction Health and Safety Management Plan, the National Code of Practice, the relevant Safety Data Sheet (SDS) on the product and the hazardous materials management procedures.

During construction, Laing O'Rourke will provide 9.5m<sup>3</sup> (11tonne capacity) skip bins on the ground floor. These bins will be provided for the use of subcontractors on a daily basis. Laing O'Rourke will also supply 2m<sup>3</sup> tipper bins, 1m<sup>3</sup> wheelie bins and Otto bins throughout the duration of the project. A food scrap bin will also be provided for putrescible waste products, separate from the general purpose bins.

The type of bin will be required for the various activities being carried out;

- 2m<sup>3</sup> bins will be utilised during the structure phase on the decks and cores
- 1m<sup>3</sup> bins during typical floor services and fitout stages
- Otto bins during the finishes to completion.

Storage of waste oils and chemicals shall be in a purpose built secured bunded area. The capacity of the bunded area is to be at least 110% of the chemical stored within. An emergency response spill kit shall be located adjacent to the bunded area.

Where spoil material is to be removed from the site for offsite disposal, Laing O'Rourke has ensured that the waste is classified in accordance with the OEH Waste Classification Guidelines.

Records or a material register have been retained detailing the quantity and classification of spoil material removed from the site.

## Susan Wakil Health Building Waste Management Plan

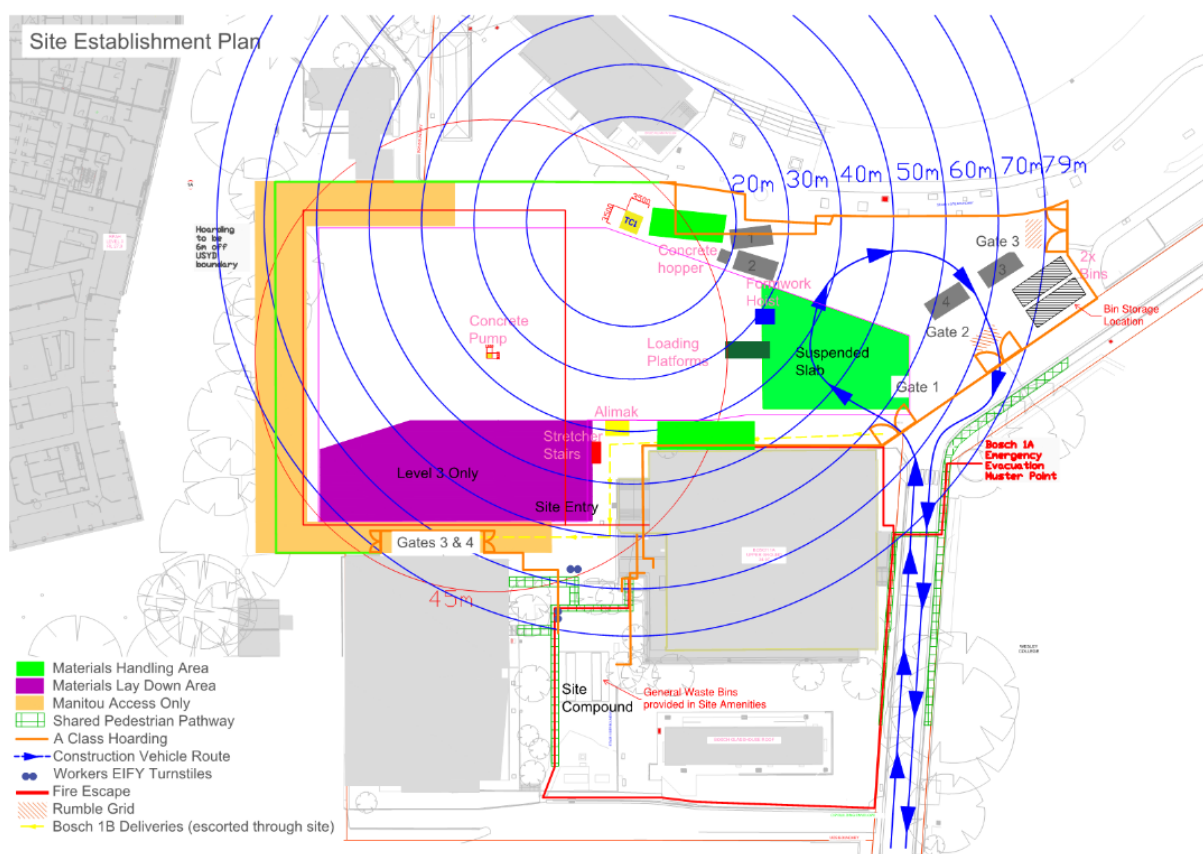


Figure 1: Site Establishment Plan showing waste storage areas

## 5. Waste Records

Records of waste disposal must be maintained. All material that leaves the site must be classified and its disposal or recovery location recorded. Waste records are entered into Laing O'Rourke's online assurance application; Impact.

Where any external waste contractors are used by Laing O'Rourke, a copy of the relevant environment protection licence and disposal forms shall be obtained and verified.

All records will be filed, stored and archived in accordance with the project filing system. In any case, records will be maintained for a minimum of four years.

**6. Appendix 1 – Asbestos Removal Control Plan**



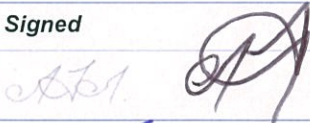
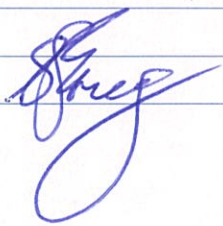
## Asbestos Removal Control Plan

### Asbestos Removal Works

<b>Project Name</b>	Syd Uni – Blackburn Building Demolition
<b>Client</b>	Laing O'Rourke
<b>Date</b>	18 October 2017
<b>Version No</b>	001
<b>MCM Reference No</b>	860 0135

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<b>Prepared By</b>	Mick Merriman		13 <sup>th</sup> October 2017
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<b>Approved By</b>	Shaun Emery		18/10/17



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0	18 October 2017	Work Method Statement	Mick Merriman

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## Table of Contents

Purpose & Introduction .....	4
Work Method Statement .....	4
Overview .....	4
Notification .....	5
Critical Items .....	5
Plant & Equipment .....	6
Personnel .....	6
Environmental .....	6
Hazardous Materials .....	7
Scope of Works .....	8
Site Establishment .....	8
Removal of Hazardous Materials .....	9
Air Quality Monitoring / Hygiene .....	9
Asbestos Removal – Friable & Non-Friable .....	10
Friable Removal .....	11
Leaving The Removal Area .....	15
Using and Maintaining RPE .....	21
Asbestos Removal .....	18
Hold Points .....	22



## Purpose & Introduction

The purpose of this Work Method Statement (WMS) is to show task appreciation and detailed procedures for the removal of asbestos materials & other hazardous materials from the Blackburn Building & Dangerous Goods Store, Sydney University Camperdown campus.

The following methodology has been compiled so as to comply with Safe Work Australia

- NSW Work, Health and Safety Act 2011,
- NSW Work, Health and Safety Regulations 2017,
- Code of Practice - How to Safely Remove Asbestos
- Code of Practice - How to Manage and Control Asbestos in the Workplace

## Work Method Statement

This WMS has been compiled so as to provide written instruction(s) for the Asbestos removal, waste management & disposal activities required to safely achieving the desired outcome. This document will be supported by the following:

- Job Safety Analysis (JSA's) sheets; these will be derived by using the WMS as a guide. Individual risk assessments will be undertaken for all high risk work procedures. These will be "Living Documents" and can lawfully carry over but will be subject to a daily review, as applicable. The review process will take place at the "work face";
- Daily "Pre-Start" meetings will be conducted in the crew amenities area prior to works commencing;
- Weekly work reviews will take place in the form of a "Tool Box" meeting. This will be conducted each Friday;
- If the "Scope of Works" change from that of the activities listed in this document, then Addendums to the WMS will be formulated and included to form part of the works documentation. All or any alterations will be reflected in the revision of JSA's etc.
- All addendums will be openly dis-cussed as part of the Daily Pre-Start criteria.

## Overview

McMahon Services fully understands the identified risks and required controls to undertake the Hazardous Materials remediation stage of the Blackburn Building demolition project. These works have the potential to impact the professional reputation(s) of both Laing O'Rourke and McMahon Services. As such, we give a commitment to approach and undertake all works associated with this project in a thoroughly professional manner and in full compliance to all statutory requirements. McMahon Services personnel will be supervised and instructed to a standard that complements the level of the hazard(s). All works will be carried out sequentially so as to enable localized control.

We also fully appreciate the emotive issues that may arise and as such, we will deal with all areas of concern with a delicate approach when interacting with neighbouring properties and / or general members of the public. All members of the McMahon Services team, including sub-contractors will be instructed to defer direct consultation with areas of the media and refer all enquiries to LOR's site representative.



Due to the nature of the works to be undertaken when removing asbestos in a shared environment, there is likelihood that a visual interface will be created between the work front and the public. This is particularly the case with the Bosch 1B & Bosch 1A Campus buildings located adjacent to the site works.

These may include, but may not be limited to:

- Pedestrian access and movements;
- Interaction with neighbors;
- Increased vehicular traffic;
- Noise;
- Air dust release (non-hazardous);
- Handling & removal of hazardous materials &
- Operation of Plant & Machinery.

## Notification

McMahon Services will submit written Notification of Asbestos removal (WH&S Regs 2011 – Reg 466) via the State authority, this being SafeWork NSW. This notification will be submitted a minimum of 5 working days prior to any disturbance of hazardous material(s) & only preparation works will be carried out prior to the acceptance of this notification.

Once work has been approved, then the following will apply, but not be limited to:

- Work method formulation(s) incl. Job Safety Analysis task appreciation
- Pre-start workshop (Clients Representatives and McMahon Key Personnel)
- Site establishment
- Service disconnections – Electrical
- Notification of neighbouring properties – this is the Role of the Principal Contractor in Laing O'Rourke
- Hazardous materials remediation

## Critical Items

The critical items that have been identified and addressed in this WMS are:

- Site establishment;
- Traffic Management for initial site access;
- Environmental controls (filtering of waste water etc.);
- Locating & dis-connection of known services – all service dis-connections are to be the responsibility of the contractor, McMahon Services.
- Traffic Management including installation of fixed egress / access points;
- Establishment of an Asbestos removal exclusion zone(s) & Asbestos removal work area(s);
- Work at Height(s);
- Removal of Asbestos and Hazardous Materials;
- Handling procedures of discovered, previously undocumented hazardous materials (if any);

- Decontamination procedures for personnel, equipment & waste bags / bins;
- Asbestos removal clearance / validation;
- Waste Management (Handling, transport & disposal);

## Plant & Equipment

- Temporary site fencing
- Site amenities (General) – to be supplied by Principal Contractor
- First Aid to be supplied by Principal Contractor & McMahon Services
- Dedicated power supply – to be supplied by Principal Contractor
- Dedicated Potable water supply – Towns pressure access to be provided by Principal Contractor
- Hazmat Decontamination unit(s)
- Negative Air Filtration Fans
- HEPA Vacuum Units
- Equipment Container(s)
- Hazardous waste storage (lined skips)
- Hazardous waste transportation

## Personnel

- McMahon Services logistic support (off site);
- McMahon Services Operations Manager – 25% site attendance
- McMahon Services site management team consisting of
  - Project Manager
  - Asbestos Removal Supervisor(s) (A Class)
- Asbestos removal technicians (A Class)
- Sub-contractors
  - Plant Hire e.g. Coates Hire
  - Waste Transportation
  - Licenced Asbestos Services (LAA) – JBS&G Services Pty Ltd

## Environmental

McMahon Services will commit to best practice for the following

- The Removal & handling of all hazardous materials, pertaining to this project (asbestos / PCB's / Lead dust;
- The on-site storage of asbestos materials, prior to removal from site;
- Disposal of all hazardous waste;
- Working with-in allowable Noise parameters;



- Compliance to allowable working timelines;
- No transfer of foreign materials, from site to public thoroughfares;
- Control and management of waste water.

## Hazardous Materials

McMahon Services has listed the known hazardous materials from a copy of the current Greencap Demolition / Refurbishment Hazardous Materials Risk assessment 08-11-2016 C107332:J140874.044:D06:5415:V1; this is a comprehensive register showing location / condition of the presumed & proven Asbestos Containing Materials (ACM's) having resulted from sample testing. There are also entries covering the additional Hazardous Materials in PCB's & residual Lead Dust.

The limitations of this audit document are that Greencap could not access all levels / rooms due to operational activities and the sampling was largely non-destructive.

Page N0:51 of the audit document lists the "Areas Not Accessed"; as such, McMahon Services have engaged JBS&G services to carry out an intrusive audit to help confirm or refute the presence of Hazardous Materials being present.

As the Audit was available at time of tender and given the age of the structure(s) being Circa 1930, it is a safe presumption that the below scope will relate to this project.

The handling of Hazardous Materials for this project will relate to:

- Asbestos gaskets to plant – Friable / Non-Friable;
- Asbestos linings & wall sheeting – Non Friable;
- Asbestos eaves lining – Non Friable;
- Asbestos sheet – Non Friable - electrical switch panel backing board;
- Asbestos vinyl floor tiles – Non-Friable;
- Asbestos vinyl floor sheet – Non-Friable;
- Asbestos residual floor adhesive – Friable;
- Asbestos mastic / putty to windows – Non-Friable;
- Asbestos Pipe Lagging – Friable;
- Asbestos Core Fire Doors – Non-Friable;
- Asbestos Pipe – Non-Friable;
- Asbestos Residual Dust – Friable;
- Asbestos Cross Contamination (General) – Friable;
- Asbestos Roof Tiles / Shingles – Non-Friable.
- Polychlorinated Biphenyls (PCB'S) – Fluoro Lighting Ballast;
- Residual Lead Dust.

**McMahon Services is to engage an independent third party Licenced Asbestos Assessor to undertake atmospheric monitoring, visual inspections and to provide clearance certificates.**

McMahon Services site management will formulate and produce **an Asbestos Removal Control Plan in line with MSA Form F-061** designed to address all removal procedures to be utilized for this project.

The asbestos removal site supervisor will determine the asbestos removal zone boundary requirements and will establish the following:

- **An asbestos removal site** – this will be the placement of entry restriction barriers at and around the work area greater footprint and adjacent to the asbestos work area; supporting signage will be installed at the gated entry points.
- **An asbestos work area** – this will be the immediate area in which the ACM removal is taking place with controlled egress / access via the decontamination Haz-mat shower units; supporting signage will be installed at the external entry point of the HazMat de-contamination unit & and at intervals around the controlled work area i.e. waste storage bins etc.

## Scope of Works

- Site Establishment – Installation of temporary construction fencing / barricading to site boundary(s);
- Disconnection of existing electrical services – by McMahon Services
- Installation of temporary 240/415v power supply – with Lifebuoy outlets
- Installation of a dedicated potable water delivery source located at a point to be accessible for connection to the HazMat de-contamination unit.
- Building encapsulation(s) so as to establish a negative air pressure works environment;
- Smoke test to verify integrity of building enclosure – by independent 3rd party A Class Asbestos Assessor appointed by McMahon Services;
- Removal of asbestos and hazardous materials;
- Third party inspection and clearances – by independent 3rd party A Class Asbestos Assessor appointed by McMahon Services;
- Dismantling of asbestos removal infrastructure(s);
- Asbestos waste transportation;
- Asbestos waste disposal.

## Site Establishment

### Site Boundary Fencing

The work zone footprint is to have a fully compliant 1.8m high temporary construction fence / "A" Class Hoarding erected to the full extent of the boundaries. This is the responsibility of McMahon Services.

Dedicated site egress / access points will be established, utilising the existing roads / concrete cross overs and or driveways. These will be fully gated and controlled.

The boundary fence line will have the appropriate construction signage attached to the external face i.e. PPE requirements, Entry restrictions etc.

This signage will be including the description, Asbestos Removal / Demolition activities, so as to reasonable inform all personnel of the activities / restrictions / PPE / RPE requirements.

Additionally, signage will also be displayed at all main entry points to the Controlled Work / Removal zone.



### Site Amenities

A construction compound is to be established and complete site amenities will be installed. These are to be supplied and maintained by Laing O'Rourke; good housekeeping to these amenities will be expected of all McMahon personnel as the end users.

A dedicated 240 / 415v power supply will be drawn from the existing Sydney University grid; an electrical sub-contractor will be engaged to install a series of commercial grade electrical cabling to deliver this supply to the various outlets. Distribution will be via portable distribution boards.



*This image shows a "Life Buoy" electrical power distribution board typical of the type to be spread throughout the various levels of the Blackburn Building.*

Potable water will be drawn from the 25mm domestic line that is to remain operational for the duration of the project.

### Establishment Sediment Control

McMahon Services are responsible for the management of all filtered waters resulting from the removal / decontamination process.

The Principal Contractor / Asbestos Removal firm are to consult with all project stakeholders and / or adjacent property tenants regarding any possible impact(s) that the disposal to sewer of the filtered waste water (below 5microns) may have, actual or perceived.

## Removal of Hazardous Materials

All documented hazardous materials (relevant to the project scope) will be handled and removed in accordance with the following;

- WH&S (How to Safely Remove Asbestos Code Of Practice)
- WH&S (How to Manage and Control Asbestos in the Workplace Code of Practice)
- Dangerous Substance (General) Regulation 2004

## Air Quality Monitoring / Hygiene

McMahon Services will engage an independent third party Licenced Asbestos Assessor firm, in JBS&G Services Pty Ltd, to provide the services required for:

- Encapsulation Smoke Testing;
- Controlling of Air Monitoring during removal / demolition in accordance with Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Dust, 2nd Edition [NOHSC: 3003 (2005)]
- Clearance Inspection(s) & Reporting.

All duties will be carried out by individuals who hold Licenced Asbestos Assessor (LAA) accreditation



Action level	Control	Action
Less than 0.01 fibres/ml	No new control measures are necessary	Continue with control measures
At 0.01 fibres/ml or more than 0.01 fibres/ml but less than or equal to 0.02 fibres/ml	1. Review	Review control measures
	2. Investigate	Investigate the cause
	3. Implement	Implement controls to eliminate or minimize exposure and prevent further release
More than 0.02 fibres/ml	1. Stop removal work	Stop removal work
	2. Notify regulator	Notify the relevant regulator by phone followed by fax or written statement that work has ceased and the results of the air monitoring
	3. Investigate the cause	Conduct a thorough visual inspection of the enclosure (if used) and associated equipment in consultation with all workers involved with the removal work
More than 0.02 fibres/ml	4. Implement controls to eliminate or minimize exposure and prevent further release	Extend the isolated/barricaded area around the removal area/enclosure as far as reasonably practicable (until fibre levels are at or below 0.01 fibres/ml, wet wipe and vacuum the surrounding area, seal any identified leaks (e.g. with expandable foam or tape) and smoke test the enclosure until it is satisfactorily sealed.
	5. Do not recommence removal work until further air monitoring is conducted	Do not recommence until fibre levels are at or below 0.01 fibres/ml

## Asbestos Removal – Friable & Non-Friable

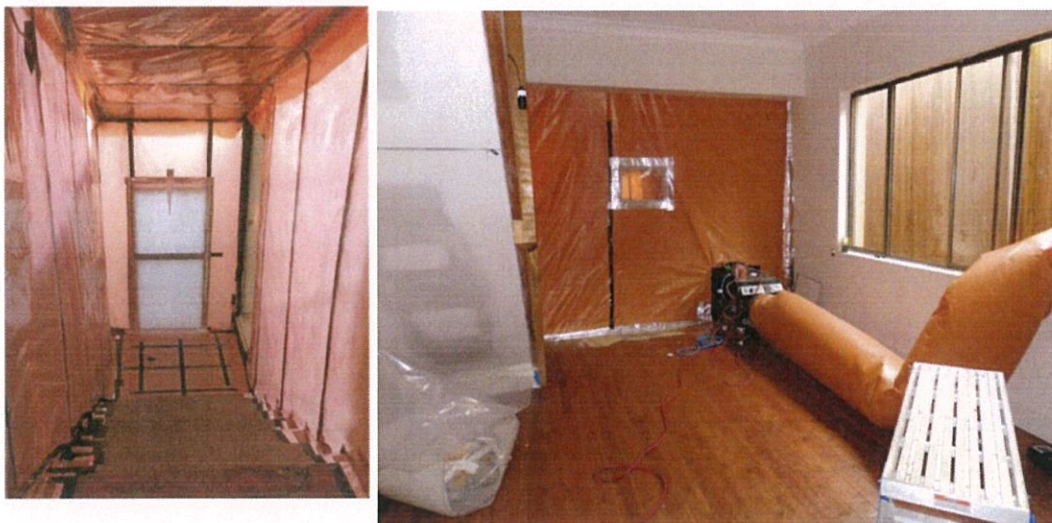
McMahon Services has listed the known hazardous materials from a copy of the current Greencap Demolition / Refurbishment Hazardous Materials Risk assessment 08-11-2016 C107332:J140874.044:D06:5415:V1; this is a comprehensive register showing location / condition of the presumed & proven Asbestos Containing Materials (ACM's) having resulted from sample testing. There are also entries covering the additional Hazardous Materials in PCB's & residual Lead Dust.

## Friable Removal

Removal of Friable Asbestos products will require fully controlled environment(s) as the actual work zone(s), these will include the following elements:

### Friable Asbestos Removal Enclosure

- Establishing a Friable Asbestos removal work zone will require the creation of a negative air pressure environment. This will entail the roof / ceiling / wall(s) encapsulation of the structure; with a plastic sheet product with a density rating of no less than 200um.
- All windows and penetration(s) will be enclosed in 200um plastic sheeting that has been adhered to the internal vertical wall areas.
- Viewing portal(s) will be installed as part of the encapsulation works; these will provide vision into the controlled working environment for interested parties such as LOR.
- The internal structure will have all clear areas pre-covered with the 200um plastic sheet.
- The application of the 200um plastic product may see the need for "Working at Heights" methodology(s); these will be safely addressed by utilising mobile scaffolding / platform ladders.
- Where there is an opportunity to extend the negative air working environment so as to include adjoining rooms etc. the method will be by creating a tunnel system so as to maintain the exhaust air flow.



**Figure 1:**

Image shows an example of an adjoining tunnel encapsulation process so as to allow for multiple rooms enclosures to be shared.

**Figure 2:**

Image shows an example of an AMS-1500-NSU Negative Air Exhaust Fan unit set up to wall with observation panel. Note the filtered air being exhausted through an opening



### Testing the Enclosure

Following the installation of the de-contamination showers and the negative air exhaust fan units, then the enclosure is to be tested for air tight integrity. This is called a "Smoke Test".

- The licensed Asbestos Assessor will be in attendance during the smoke test of the asbestos enclosure; any leaks observed during the smoke test will be sealed and retested. Only when the Assessor has verified the integrity of the asbestos enclosure will works be allowed to proceed.
- Copies of documented test results will form part of site records.



This image shows the application of non-toxic "smoke" into the single encapsulated area.

This smoke will be viewed for any external release by the LAA

**Figure 3:**



This image shows a larger non-toxic "smoke" producing unit being utilised for the testing of removal zones encompassing multiple rooms and / or greater floor areas.

**Figure 4:**

## Installation of Negative Air Filtration Exhaust Units

### Negative Air Pressure

Due to the EPA requirements of maximum 35db external noise levels being allowed the negative air pressure exhaust fan units will be installed internally with 450mm flexible ducting being utilized to direct the exhausted air to external areas.

- Make up air will be drawn through the hazmat decontamination unit through the asbestos enclosure.
- The level of negative air pressure to be constantly maintained is approximately 12 Pa (water gauge). This will be monitored by the use of a differential pressure monitor and data logger.
- These negative air units will incorporate warning devices for filter integrity / overload and power failure; they will have a manometer or magnehelic gauge and an audible / visual alarm system. These will be set up external of the encapsulation and be connected to the internal air pressure by hollow 13mm tubing.
- All of the Negative Pressure Units (Model: AMS-4000) have been tested for:
  - Filtration DOP maximum Allowed penetration
  - Air Flow capacity
  - Electrical Test & Tag

The following formula will be used to calculate the required amount of Negative Pressure Units that will be installed to create a negative air working environment:

- The required numbers of negative air exhaust fan units will be placed at selected positions so as to create an internal negative air working environment

The following formula will be used to calculate the required amount of Negative Pressure Units that will be installed to create a negative air working environment:

- The required numbers of negative air exhaust fan units will be placed at selected positions so as to create an internal negative air working environment
- These calculations are based on installing Neg-Air units Model: AMS-4000 which has a listed exhaust capacity of 5,166m<sup>3</sup>/hr. Allowing for a 25% safety factor this still leaves a exhaust capacity of 3,874.5m<sup>3</sup>/hr.
- The internal area volume will be measured so as to calculate the number of NSU's required; *an example of a area having a volume of 1025m<sup>3</sup> air capacity, is as follows so as to show the calculation formula.*
- *(1) AMS-4000 model fan unit will allow for a minimum of 7 air changes an hour.*
- *We intend to install 4 x AMS-4000 model units thus increasing our maximum air change capacity to 12 changes / hour whilst allowing for ability to adjust down to a minimum of 8 air changes per hour.*

### Airflow Calculations

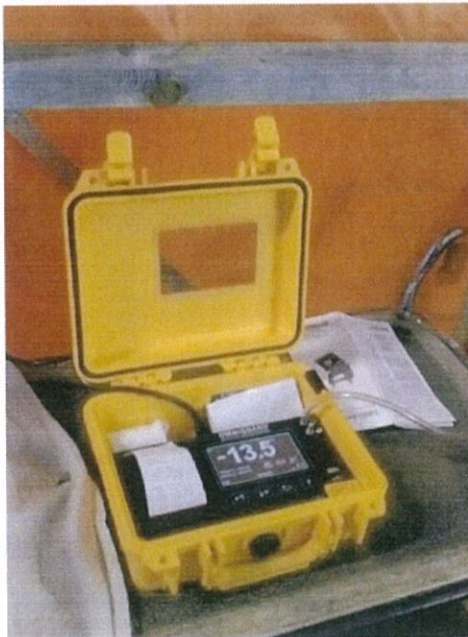
- Calculation of Volume (Cubic Metres):
- Length x Width x Height (Example 12 x 14 x 4 = 672 cubic metres).
- Calculation of Airflow required (Cubic Metres per Hour):
- Take the volume of the area in cubic metres and multiply by the number of air changes required per hour = airflow required in cubic metres per hour.



- Calculation of Volume (Cubic Feet):
- Length x Width x Height (Example 15'x20'x18' = 5,400 cubic feet).
- Calculation of Airflow required (Cubic Feet Per Minute):
- Take the volume of the area in cubic feet multiplied by number of air changes per hour divided by 60 (minutes) = airflow required in cubic feet per minute.

The positioning of the NPU's will be such so as to promote laminar flow through the enclosure and help prevent the creation of dead air zones.

Ideally, they should be positioned opposite the positive air draw through the decom shower units but not directly opposite to so as to create too fast an exhaust with-out drawing air from adjacent zone



*Image No.5 shows a Differential Pressure Recorder – brand “Omni-Guard”*

*This device provides a warning if the internal negative air pressure falls below 12 Kilo-pascals (water level)*

*The unit will be positioned external of the encapsualtion and an air sampling tube will be inserted into the access tunnel wall so as to register the clean air intake level.*

## Personel Decontamination Units

### Access / Egress for the Friable Asbestos Removal Enclosures

Dedicated access – egress portals for the Friable Removal zones will only be permitted through the decontamination shower units – see below required process for personnel entering / exiting the removal work area(s)

### Entering The Removal Area

- **Clean change area:** Change into clean work clothes and put on clean protective clothing. Store any removed clothing in a dust-proof container. Move into clean decontamination area.
- **Clean decontamination area:** Put on RPE. Check that it is working properly and there is a good facial seal such as, fit check. Move to the dirty decontamination area.
- **Dirty decontamination area:** Put on any additional PPE that has been stored in the dirty decontamination area such as footwear. Connect to the RPE air supply if required. Move from the decontamination unit to the removal work area.

### Leaving The Removal Area

- **Asbestos removal area:** Use an asbestos vacuum cleaner to remove any obvious signs of asbestos dust from protective clothing. Remove footwear and leave shoes/boots inside the asbestos removal area next to the decontamination unit (footwear should be stored upside down to minimize further contamination). Proceed into the dirty decontamination area.
- **Dirty decontamination area:** If shoes/boots have not already been removed, remove them and store upside-down within the dirty decontamination area. Disconnect air-line respirator if being used. Shower while wearing protective clothing and RPE. Leaving RPE on, remove protective clothing and place in labelled waste bags. Remove wet underclothing, such as t shirts or shorts, while showering and place in the storage unit provided within the dirty decontamination area. Pass through the airlock into the clean decontamination area.
- **Clean decontamination area:** Shower and remove RPE. Thoroughly wash hands, fingernails, face, head and respirator. Store RPE in a suitable container within the clean decontamination area. Move to the clean change area.
- **Clean change area:** Change into clean clothing.
- All resulting waste water will be channeled into a receptor box that has particulate filtration capabilities down to five microns. This will allow for the lawful disposal of the filtered water straight to sewer.

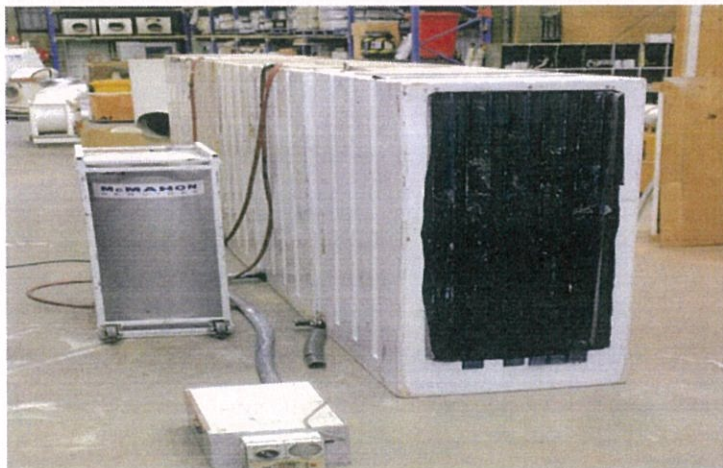




*Figure 6: Image shows the portable 2 shower decon unit with adjoining water filtration unit*



*Figure 7: Image shows an external fully contained 2 shower decon unit*



*Figure 8: Image shows an additional style of modular decontamination shower units to be used on site. The system to the left side will provide hot water for shower.*

### Water Filtration down to 5microns for EPA approved release to a sewer in-let

There are various systems designed for the treatment of asbestos fibre impacted water emanating from the removal area wash down or personal decontamination procedures.

The end target is to filter the residual water(s) down to a minimum of 5 microns before being released into the city's sewer system(s).

#### Washing down the work areas

All residual waters from work area wash-downs are to be collected by a Wet Vacuum equipped with a HEPA filtration system.

The collected waters are then deposited into the filtration system for further processing. *All wet vacuum units are to be treated as contaminated and kept encapsulated in 200um plastic bags when not being used with-in a controlled asbestos removal environment*

#### Filtration of De-Contamination Shower Water(s)

The showers units have a built-in pump system designed to collect all "Dirty" shower water resulting from either the personal decontamination process or the wash down of bagged asbestos waste.

All collected water will be pumped through an external filtration system, passing through double 5micron cartridges before being released to sewer.

The 5micron cartridges are visible through transparent container and will be regularly monitored for flow rates. Manufactures recommendations will be followed advising the effective usage "Life" time span with the filter cartridges being swapped out as needed.

All recovered filter cartridges will be classified Friable Asbestos Waste and treated accordingly.

See the filtration unit example below; this design be typical of a unit utilised by McMahoNS for the asbestos removal phase of the Blackburn Building demolition project.

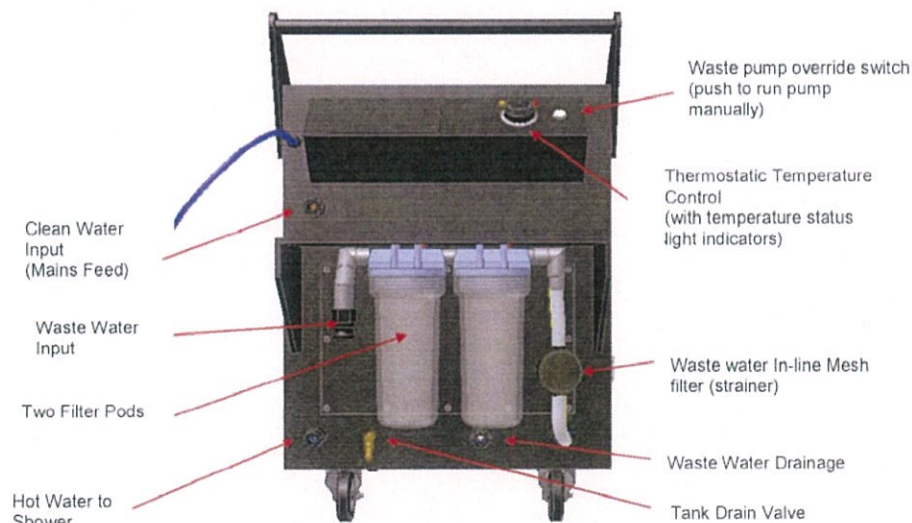


Figure 1.1 – Unit Controls & Components



## Asbestos Waste Storage and Disposal

The generated asbestos waste will be double encapsulated in plastic bags with a 200um (minimum) density rating. These bags will, in turn, be placed in a disposal skip that also has a 200um plastic sheet lining.



**Figure 6:**

*The above image shows an example of the double bagged friable asbestos waste being stored in a 200um plastic lined bin following load out via the waste decontamination portal.*

### **Alternatively**

The material that has been collected by utilizing the portable HEPA filter vacuum unit will be designated 100% friable in its consistency. As such, vacuum waste will be removed within the negative air environment and placed into a 200um rated plastic bag clearly marked as Asbestos waste – Do Not Inhale Dust.

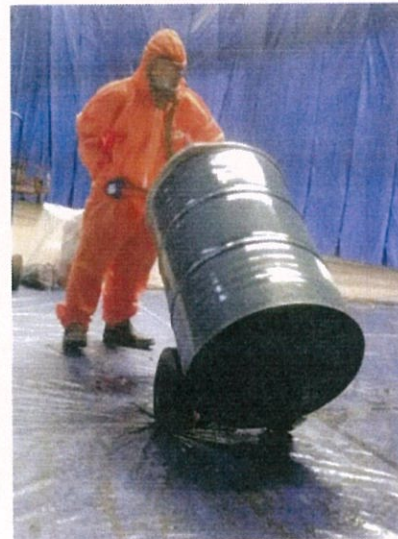
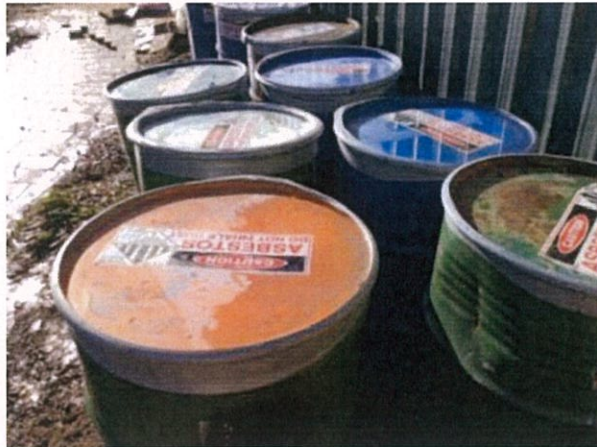
These bags will be placed into an open topped 205lt capacity steel drum that has been pre-lined with 200um plastic sleeve.

When the drum has been filled, to a capacity level that allows for ease of handling by a 2 man team, it will have a lid installed. This lid will be secured by a metal clamp and tightened by a threaded bolt system. The clamp / lid junction will then be fully encased in an adhesive tape so as to negate the risk of fibre escape between lid and drum rim.

The outer drum will have Friable Asbestos Warning Labels attached to the lid and sides. These labels will also show a Category 9 Hazardous Waste classification.

It is proposed to store the drum(s) inside the controlled area and subject them to a de-contamination process as part of the final clearance procedures. This will involve the vacuuming / wet wiping and spraying of PVA sealant to all external surface areas.

These drums would then be removed from the internal area following the clearance being issued and then placed into skips for transport to a EPA licenced disposal facility.



**Figure 6:**

*The above image shows an example of the friable asbestos fibre waste packaging utilising 205lt steel drums. Note the addition of adhesive tape to further seal the clamped lid attachment.*



## **PPE / RPE for Friable Asbestos removal with-in a Negative Air environment**

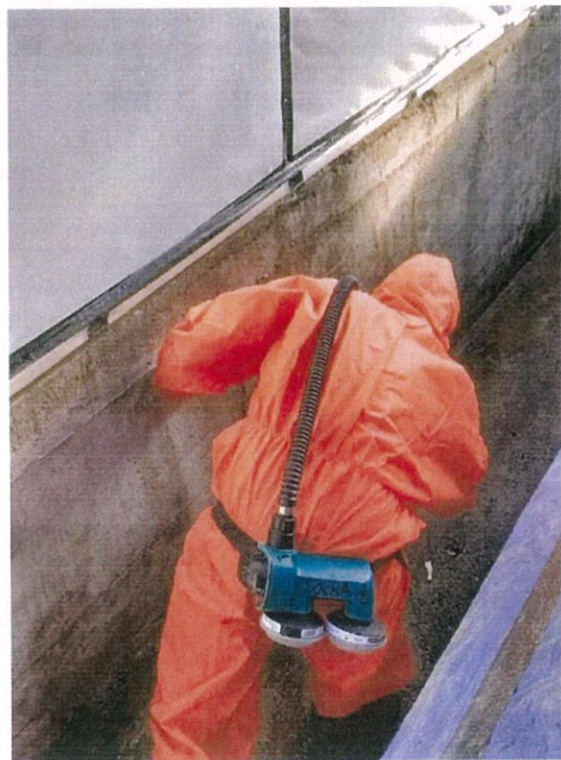
## **PPE / RPE for Non- Friable Asbestos removal with-in a Controlled environment**

The following listed equipment will form the minimum requirement for the non-friable & friable asbestos removal works for the Blackburn Building.



*This image (left) shows a P2 Half-Face as the selected RPE for non-Friable Asbestos Removal.*

*This image (below) shows the P3 Full-Face with the battery powered filtered air generator attachment.*



### Personal Protection Equipment (PPE)

- Tyvek Type 5 Category 3 (prEN ISO 13982-1) (disposable) 1 change per work shift
- Lace free steel capped boots / gumboots (to remain as controlled equipment)
- Safety Helmet(s)
- Gloves – disposed of as controlled waste
- Safety eyewear, as applicable (to remain as controlled equipment)
- Hearing protection (as applicable) (disposable)

### Personal Respiratory Equipment (RPE)

Prior to using respiratory protection in a controlled work environment, it must be determined that the mask provides a safe level of air tight integrity; this is ascertained by conducting a "Fit Test". This test is carried out by a competent person and the results are recorded and form part of the site documentation.

## Using and Maintaining RPE

RPE must be worn at all times with-in the asbestos removal area and until the appropriate stage of personal decontamination has been completed.

The asbestos removalist(s) or asbestos removal supervisor(s) must ensure that all workers who are undertaking asbestos removal work(s) receive instruction training in:

- Fit test checking
- The importance of correct facial fit
- The correct method of using their respirators
- The procedures for regular cleaning, inspection and maintenance of respirators, before use
- When to stop asbestos removal work and leave the area if they think their RPE is not working properly.

The respirator must be worn in accordance with the manufactures instructions and the coverall hood must go over the respirator straps. It should be examined, in accordance with the manufacturer's instructions before use to ensure that it is not damaged and is good working order.

Respirator defects should be reported immediately to the asbestos removal supervisor.

The pre-use examination should include an inspection of:

- The condition of the straps and face piece, including the seal and the nose piece
- The condition of the exhalation valve
- A fit test

Non-disposable respirators should be cleaned, disinfected and stored in a safe place, away from the asbestos removal area.

The length of time a particulate filter can be used for the asbestos removal work depends on the level of resistance to breathing and any damage to the filter.



- All disposable PPE / RPE filters will be disposed of as asbestos waste
- Non-disposable PPE will be decontaminated as per equipment decontamination or double bagged as controlled equipment.
- P3 level of respiratory protection Model: Pro-flow SC 160 (for all friable removal)
- This is a full face mask with battery operated filtered air delivery with capacity of 160l/min.
- The full face unit(s) has an Audible alarm for low battery and filter clogging.
- The typical battery (new) has a life of 10hrs but the workers will place same on re-charge during breaks.
- P3 level of respiratory protection Model: Sundstrom SR100 Half Face Respirator (for non-friable removal)
- This is a half face mask that provides filtered air protection by utilising a P3 SR510 Particulate main filter.

## Project Hold Points

### 1. Smoke Test of Encapsulation – prior to commencing physical removal of Friable Asbestos

The requirement of "Smoke Testing" to check the air-tight integrity of the negative air removal encapsulation will see the engagement of a Licenced Asbestos Assessor (LAA) so as to carry out the visual inspection(s).

Only when the LAA is satisfied that the removal enclosures plastic walls are air tight and a Certification has been supplied, will the Hold Point be released

### 2. Validation Clearance Testing – following removal of Friable Asbestos

At this point of the asbestos removal work areas with-in the structure should have been stripped and cleaned to a point that a visual inspection can be carried out to all internal surfaces.

All loose materials and remaining surfaces areas will have been dampened with a water solution delivered by airless spray units.

The pre-clearance inspection will be undertaken by a licensed Asbestos Assessor and will include both visual and physical investigation of the exposed surface areas.

If the LAA is satisfied that all visible asbestos containing material(s) has been removed and all surfaces cleaned to an acceptable standard, then an instruction will be issued to apply a pigmented PVA sealant to all internal surfaces.

Allowing for sufficient drying time of the PVA, the Assessor will then install a final round of air quality monitors.

If the LAA is satisfied with the visual inspection and providing the air monitor results show a reading that is below the reportable standard <0.01 fibres/ml in accordance with the Guidance Notes on the Membrane Filter Method for Estimating Airborne Dust, 2nd Edition [NOHSC: 3003(2005)], then a Clearance Certificate will be issued thus allowing for the dismantling of the controlled work environment.

The airless spray, used for the final application of pigmented PVA sealant will be subject to the equipment decontamination process as listed below.

The decontamination unit will also be subject to the above listed clearance procedures and will be deemed as a controlled zone until the clearance certificate is issued.

### Dismantling the Encapsulation

The outer skin material (200um plastic sheet) used for the decontamination access tunnel to the HazMat unit is to be deemed cross-contaminated and will be disposed of as asbestos waste.

Workers will still be required to utilize the appropriate level of asbestos removal PPE for all handling of the enclosure materials.

Further reassurance air quality monitoring will be maintained during these work activities.

All equipment used within the negative air environment will be subject to a thorough de-contamination process.

This is to be carried out prior to the LAA is engaged to carry out a visual clearance.

- Battery powered hand tools will be placed within 200um bags and stored as controlled materials.
- Hand tools will be wet wiped down, placed within 200um bags and stored as controlled materials.
- Internal safety footwear (gumboots etc.) will be washed down, placed in 200um bags and stored as controlled materials.
- HEPA filter vacuums units will be wet wiped down, emptied of collected bagged material, placed within 200um bags and stored as controlled materials.

### Storage, Transportation & Disposal of Asbestos Waste

A specialist firm with EPA authorization in NSW will be engaged to supply the following:

- Storage bins – to be lined with 200um plastic sheet by McMahon Services;
- Hazardous Waste Transportation – from site to point of disposal;
- Disposal of Hazardous Waste – Dependent upon the waste category;
- Supply of all disposal receipts / documentation including waste tracking.

### Polychlorinated Biphenyls (PCB's) (if discovered)

The Federal Department of Environment and Energy have a National Pollutant Inventory which lists all known products containing PCBs; this website will be accessed to allow comparison of the serial numbers.

The fluorescent lighting will be inspected for the presence of capacitors with the written description. If any are found, then the following handling procedures are carried out.

- They will be removed from the light fitting by simply unscrewing the ballast unit.
- In the case of visual evidence of leeching, then the entire cross contaminated surface will be deemed as hazardous waste and removed as a whole unit.
- The level of PPE will be equivalent to that of asbestos removal with the added pre-caution of double eye protection provided by a helmet visor and the use of Nitrile gloves as inners.

The handling & disposal of the PCB light capacitors will be in line with the *SafeWork NSW Hazardous Materials – Environment Protection Policy & the Environment Protection Authority November 2010*

This will be listed as a Scheduled Waste.



## Lead Dust – residual

### Surface Dust Remediation with a Lead concentration greater than 300mg/kg

The Hazardous Materials Register – Blackburn Building (D06) shows residual lead dust in excess of concentrated levels above 300mg/kg. There are 3 listed locations with-in the buildings where these excessive readings have been identified, these are:

#### Level 2

- Room No.245 – through-out all internal surfaces
- Room No.260 – through-out ceiling space

#### Level 5

- Room N.509 – Hallway adjacent top of ceiling

Due to the residual dust being located in / on non-structural elements of building that are marked down for a pre-demolition “soft” strip-out, then the following precautions will be taken when disturbing these materials:

The areas of cross contamination are to be contained by utilising the same level(s) of control required, by law, for the removal of Friable Asbestos.

Reference Document SafeWork NSW – Assessment of Lead Exposure Associated with Ceiling Dust Removal S-SB1312.10/96 – see below extract:

*The Australian/New Zealand Standard AS/NZS 1715 Selection, use and maintenance of respiratory protective devices states that the selection of respiratory protective devices will be influenced by the following factors:*

- (a) Contaminant.
- (b) Task.
- (c) Operator.

*The Standard provides guidance on selection of adequate protection. The information provided in the Standard should not be viewed as minimum protection requirements. Over-specifying is warned against as generally this will result in increased body burden without any improvement in protection.*

*Approved respiratory protection should be worn during the removal process. Disposable respirators (PI) are suitable up to 10 times the exposure standard based on an 8-hour working day. As the cleaning operation can be of short term duration, disposable respirators would give adequate protection. However, they should be replaced when breathing becomes difficult, overloaded with dust or when there is a break in work i.e. lunch and tea breaks. The used respirators should be disposed of immediately upon replacement. Further, to achieve good facial fit of the respirator, operators must be clean-shaven.*

*When wearing half face respirators, the eye protectors should be selected and used in accordance with Australian/New Zealand Standard AS/NZS 1336 Recommended practices for occupational eye protection and conform with the Australian/New Zealand Standard AS/NZS 1337 Eye protectors for industrial applications.*

*The use of full-face respirators is recommended especially when work is carried out over longer work periods. A full-face respirator also has a protection factor up to 50 times the exposure standard as well as providing protection for the eyes. However, non-disposable respirators need to be maintained, stored correctly and the operators trained in their correct wear and care. Respirators should be selected, used and maintained in accordance with the Australian/New Zealand Standard AS/NZS 1715 The selection, use and maintenance of respiratory protective devices. Further, a respiratory protection program should be set up by management in accordance with AS/NZS 1715 - Section 7 The Respiratory Protection Program. Alternately, a powered air-*

*purifying particulate respirator (PAPR) with P2 filter, suitable up to 50 times the exposure standard may be worn. The selection of this type of respirator may be warranted when considering other hazards in the work environment such as heat stress during summer months. However, these respiratory protective devices must also be maintained and a respiratory protection program put in place.*

*The hair should be covered and gloves should be selected based on the requirements of the task. Assistance on the selection may be obtained from the Control Code9.*

*9 Control of inorganic lead at work [NOHSC:2015] by WorkSafe Australia*



## **7. Appendix 2 – Review of Environmental Factors: Minor Works**

Demolition of Blackburn and dangerous goods building and construction of shared access lane  
REF report



## Review of Environmental Factors: Minor Works

**PROJECT TITLE: DEMOLITION OF BLACKBURN AND DANEROUS GOODS BUILDING AND CONSTRUCTION OF SHARED ACCESS LANE REF REPORT**

**DESCRIPTION OF PROPOSED ACTIVITY**

Demolition of the existing Blackburn Building and adjacent Dangerous Goods Building to make way for the redevelopment of this part of the Health Precinct (this redevelopment being the subject of a separate application to the NSW Department of Planning and Environment). The proposed demolition, and the future development of the health precinct, already have concept approval as State Significant Development under the Campus Improvement Program SSD 13\_6123, approved by the Minister for Planning on 16 February 2015.

In addition, the existing unformalized pedestrian pathway between the Dangerous Goods Building and Oval No.1 that links Western Avenue with the rear of the Bruce Williams (Grandstand) pavilion is proposed to be replaced with a paved surface providing a shared pedestrian and vehicle link and associated regulatory signage. This link is intended to be provided first in order to maintain access to the Grandstand carparking and loading area whilst the demolition works take place.

Excavation will only be undertaken to the extent required to demolish the two buildings and upgrade the access way and existing services affecting the demolition areas will be capped at the building perimeter. Excavation works to facilitate the re-development of the site will be undertaken as part of the separate development approval process.

More specifically, the proposed activity is documented on the various plans within **Appendix 1**.

**LOCATION** (commonly known street address/suburb): 64-106 Mallet Street, Camperdown

**LOT:** 1

**SECTION:** -

**DP:** 785957

**LOCAL GOVERNMENT AREA:** City of Sydney LGA

**LAND USE ZONE:** SP2 Infrastructure (Educational Establishments) – Sydney LEP 2012

**SCOPE OF WORKS:**

Identify all relevant works with a ✓

New construction works	✓
Alterations and/or additions	-
Demolition works	✓
Installation of new services and /or utilities (and/ or re-alignment)	✓
New stormwater and/or flood mitigation works	-
Minor (necessary) earthworks ancillary to permitted activity	✓
Tree removal or pruning (necessary and ancillary to the permitted activity).	✓
Environmental Management Works	-

**SITE INSPECTION UNDERTAKEN ON:** Wednesday 9 November 2016



**PROJECT TITLE: DEMOLITION OF BLACKBURN AND DANEROUS GOODS BUILDING AND CONSTRUCTION OF  
SHARED ACCESS LANE REF REPORT**

**INFORMATION RELIED UPON**

This REF has been prepared by Urbis Pty Ltd (Town Planning Consultants) in accordance with the following plans and supporting information:

- Demolition of site establishment, Concept design package (re shared pedestrian and vehicular access lane), services plan and Electrical and Lighting Schematic Design Report (at **Appendix 1**)
- Arborist reports (at **Appendix 2**)
- Office of Environment and Heritage comments and Heritage Impact Statement (at **Appendix 3**)
- Contamination Assessment Report (at **Appendix 4**)
- Unexpected Finds Protocol (at **Appendix 5**)
- Demolition Hazardous Materials Risk Assessment Reports (at **Appendix 6**)
- Demolition and Environmental Management Plan and Site Management Plan (at **Appendix 7**)
- Technical Design Review (at **Appendix 8**)
- Stakeholder Engagement Plan- Actions List (at **Appendix 9**)

**Note:** This REF Minor Work short-form Assessment Report is based upon the requirements contained within the applicable legislation. The legislative requirements should be consulted if any questions or discrepancies arise.



## Foreword and Certification

### FOREWORD

This Review of Environmental Factors (REF) has been prepared for the University of Sydney.


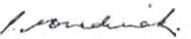
The purpose of this REF is to assess the potential environmental impacts of an activity prescribed by State Environmental Planning Policy (Infrastructure) 2007 as "development without consent" on land vested in the University under Part 5 of the Environmental Planning and Assessment Act.

The REF has been prepared in accordance with the relevant provisions of the *Environmental Planning and Assessment Act 1979*, the *Environmental Planning and Assessment Regulation 2000*, State Environmental Planning Policy (Infrastructure) 2007, and other Federal and State legislation including the *Environment Protection and Biodiversity Conservation Act 1999*.

After the consideration of key environmental aspects and any specialist studies completed, as well as the information presented in this REF, it is concluded that by adopting the mitigation measures identified in this assessment it is unlikely that there would be any significant environmental impacts associated with the proposal.




### CERTIFICATION

This REF provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the proposal. The information contained in this REF is neither false nor misleading.

PREPARED BY	QUALIFICATION AND POSITION	SIGNATURE	DATE
Vijay Prabhu	Senior Consultant (Master Urban and Regional Planning)		03.02.17
REVIEWED BY	QUALIFICATION AND POSITION	SIGNATURE	DATE
Peter Strudwick	Director (Bachelor of Town Planning)		03.02.17

This REF has been examined and considered by those duly appointed and authorised persons and has been accepted on behalf of the University of Sydney, as the determining authority, as having satisfied those relevant objects of the *Environmental Planning and Assessment Act 1979* (EPA&A) and the matters prescribed by Sections 112 and 113 of the EPA&A.

The proposed activity can proceed, subject to the implementation of the specified Mitigation Measures stated in **Section 8**.

CIS REVIEWER	POSITION	SIGNATURE	DATE
Stephane Kerr	Project Director – Campus Improvement Program		7.2.2017
Greg Robinson	Director (CIS)		10.2.17
AUTHORISED UoS DELEGATE*	POSITION	SIGNATURE	DATE
Dr Michael Spence	Vice Chancellor, University of Sydney		14.2.17



# 1 Proposed Activity

This REF has been prepared to support minor works that is in connection with the University uses and operations and does not involve an activity that would increase the number of staff or students enrolled or present on the campus by more than 10%.

## 1.1 ACTIVITY DESCRIPTION

Under the provisions of State Environmental Planning Policy (Infrastructure) 2007, the following activity is to be undertaken:

**TABLE 1 – IDENTIFIED ACTIVITY AND LEGAL MECHANISM**

DIVISION AND CLAUSE WITHIN ISEPP (PART 3)	DESCRIPTION OF WORKS	ACTIVITY PROPOSED (✓/✗)	LOCATED WITHIN A PRESCRIBED ZONE (ZONE DESCRIPTION, ✓/✗)
Div. 3, cl. 29(1)(a)	University-Construction <sup>1</sup> <ul style="list-style-type: none"> <li>Construction of the following (not more than 1-storey in height) library, admin building, classroom, tuckshop, cafeteria or bookshop, car park, toilet block</li> <li>Sports field or sports court (not involving clearing more than more 2ha of native vegetation)</li> </ul>	✗	-
Div. 3, cl. 29(1)(b)	University-Minor alterations or additions	✗	-
Div. 3, cl. 29(1)(l)	University-Restoration, replacement or repair	✓	✓ SP2 Infrastructure
Div. 3, cl. 29(1)(d)	University-Demolition	✓	✓ SP2 Infrastructure
Div. 3, cl. 29(1)(l)	University-Environmental management works	✗	-
Div. 4 cl. 36	Electricity generating works or solar energy systems	✗	N/A
Div. 5, cl. 41	Electricity transmission or distribution	✗	N/A
Div. 7 cl. 50	Flood Mitigation works	✗	N/A
Div. 9, cl. 53	Gas transmission, or distribution and pipelines	✗	N/A
Div.14, cl 77	Public administration buildings and Crown buildings	✗	-
Div. 16, cl .92	Research and/or monitoring station	✗	-
Div. 17, cl. 94	Road infrastructure facilities	✗	N/A
Div. 19, cl. 106	Sewerage systems	✗	-
Div. 19, cl.109	Soil Conservation works	✗	N/A
Div. 20, cl.111	Stormwater management systems	✗	N/A
Div. 21, cl 114	Telco and other communication facilities	✗	N/A
Div. 24, cl.125	Water supply systems	✗	N/A

### <sup>1</sup>ASSUMPTION:

If the proposed activity is captured by Division 3 Clause 29(1)(a), it is assumed that the proposed activity will not necessitate an alteration of transport or traffic arrangements. If this is not the case, further advice should be sought as to the applicability of the Part 5 approval pathway.



The site's key site features, in relation to the proposed activity, are summarised below:

**TABLE 2 – KEY SITE FEATURES**

SITE FEATURES	YES/NO <sup>2</sup>	DETAILS
Does the proposed activity involve the removal or pruning of trees?	Yes	<p>Various trees are proposed to be removed as part of both the demolition zone and also the formalised paved access link in order to accommodate these facilities. Removal of these trees is supported by the Arborist Reports at <b>Appendix 2</b> and mitigation measures for the protection of trees proposed to be retained is also provided within the Arborist Report. These have been incorporated within this REF.</p> <p>The removal of the various trees identified in the Arborist report has been reviewed and endorsed by CIS' Landscape and Grounds Manager.</p>
Does the proposal activity apply to a heritage item (local, state or Section 170)	Yes	<p>The proposed works do not affect any locally listed heritage items under Council's LEP 2012. However, as the works are located on the Camperdown Campus it is listed on the University's Register of Heritage and Conservation (S.170 Register). The proposed demolition already has concept approval as State Significant Development under the Campus Improvement Program SSD 13_6123, approved by the Minister for Planning on 16 February 2015.</p> <p>The proposal has been assessed as satisfactory by Urbis (refer Heritage Impact Statement at <b>Appendix 3</b>).</p>
Is the immediate area (where the proposed activity is being carried out) located within a heritage conservation area?	No	<p>The proposal is located within the University of Sydney Heritage Conservation Area. The proposed demolition already has concept approval as State Significant Development under the Campus Improvement Program SSD 13_6123, approved by the Minister for Planning on 16 February 2015. The demolition and proposed works have been assessed as satisfactory within this context (refer Heritage Impact Statement at <b>Appendix 3</b>).</p>
Is the site burdened by easements or rights of way that are likely to affect the activity?	No	
Is the land identified as Bushfire Prone?	No	
Is the land flood liable land?	Yes	<p>Parts of the perimeter of the proposed works area are affected by the 100 year ARI event involving depths of between 0.1m-1m. However, the works involve the demolition of two buildings and the formalisation of a service and pedestrian access link (as opposed to habitable floor area).</p>

SITE FEATURES	YES/NO <sup>2</sup>	DETAILS
		The specific design of buildings will need to consider the floor levels above the flood levels affecting this part of the site and will be considered as part of the separate State Significant DA process.
Is the area of the site (where the proposed activity to occur) known to be contaminated or likely to be contaminated?	No	A Contamination Report has been prepared for the proposed activity which concludes that the findings of this investigation has not identified contamination within soil or groundwater at the site that exceeds the adopted health or ecological investigation levels. It is noted that excavation is only limited to that required to facilitate the demolition of the two buildings and the formalisation of the access way (as opposed to basement excavation for any new buildings). Separate contamination reporting for the site's redevelopment will be conducted as part of the State Significant DA process.
Are there any watercourses close to the site of the proposed activity (ephemeral or permanent)?	No	
Is the site or land located along the coast line or identified as a foreshore area?	No	

<sup>2</sup>**NOTE:** If 'yes' to any of the above questions, it may be appropriate to seek the advice of a specialist consultant or University advisor to provide the relevant assessment of this issue as part of this REF, or whether it would trigger the preparation of an Environmental Impact Statement.

### 3 Notification

The general and Division-specific notification consultation provisions of the ISEPP have been checked (within Clauses 13-17 and within each relevant Division) and notification is not required to any Council, adjoining land user or public authority. However notification is required under Section 170A of the Heritage Act 1977 given the proposed works will involve the demolition (and hence removal) of buildings that are part of the whole-of-campus listing on the Section 170 register.

**NOTE:** If any of the following statements are incorrect (i.e. marked as 'x'), notification will be required, and consequently, more detailed assessment will be likely.

TABLE 3 – NOTIFICATION TRIGGERS

POTENTIAL CONSULTATION TRIGGER	CHECK AS CORRECT (✓/x)	MATERIAL SUPPORTING THIS POSITION (APPEND IF REQUIRED)
<b>GENERAL TRIGGERS – COMMENT</b>		
The activity will not materially affect a local or state heritage item, or a heritage conservation area.	✓	<p>The proposed works do not relate to either a state or local heritage item and the demolition of the buildings has been assessed as satisfactory as part of the HIS (refer <b>Appendix 3</b>).</p> <p>The proposed demolition already has concept approval as State Significant Development under the Campus</p>





POTENTIAL CONSULTATION TRIGGER	CHECK AS CORRECT (✓/✗)	MATERIAL SUPPORTING THIS POSITION (APPEND IF REQUIRED)
<b>GENERAL TRIGGERS – COMMENT</b>		
		Improvement Program SSD 13_6123, approved by the Minister for Planning on 16 February 2015.
The activity will not have a substantial impact on Council's services and infrastructure (sewer, water, and stormwater or road network).	✓	The site does not include any Council services or infrastructure.
The activity will not significantly affect access to or through Council owned land.	✓	The site is contained entirely within University land and does not affect any Council land.
The activity is not occurring on flood liable land and (if so) will not materially change flood patterns.	✓	<p>Parts of the perimeter of the proposed works area are affected by the 100 year ARI event involving depths of between 0.1m-1m. However, the works involve the demolition of two buildings and the formalisation of a service and pedestrian access link (as opposed to habitable floor area).</p> <p>The specific design of buildings will need to consider the floor levels above the flood levels affecting this part of the site and will be considered as part of the separate State Significant DA process.</p> <p>In effect, the area of the demolished buildings in the interim of being re-developed will act as a natural basin for stormwater pending redevelopment works, or otherwise can be graded not to prevent any material change of flood patterns. A suitable mitigation measure is included within Section 8 of this REF to address any potential impact associated with stormwater flow.</p>
The activity does not involve a "specified activity" requiring consultation with a "specified authority" by virtue of any of the following:	✓	
<ul style="list-style-type: none"> <li>▪ The activity is not adjacent to land reserved under the National Parks and Wildlife Act 1974.</li> </ul>	✓	
<ul style="list-style-type: none"> <li>▪ The activity is not adjacent to a Marine Park declared under the Marine Parks Act 1997.</li> </ul>	✓	
<ul style="list-style-type: none"> <li>▪ The activity is not adjacent to an aquatic reserve declared under the Fisheries Management Act.</li> </ul>	✓	



POTENTIAL CONSULTATION TRIGGER	CHECK AS CORRECT (✓/✗)	MATERIAL SUPPORTING THIS POSITION (APPEND IF REQUIRED)
<b>GENERAL TRIGGERS – COMMENT</b>		
▪ The activity is not in a foreshore area within the meaning of the Sydney Harbour Foreshore Authority Act 1988.	✓	
▪ The activity does not compromise a fixed or floating structure in or over navigable waters.	✓	
▪ The activity is not Bushfire Prone land as defined by the Environmental Planning and Assessment Act.	✓	
<b>DIVISION-SPECIFIC TRIGGERS</b>		
The activity does not involve the construction of buildings (refer to Clause 29(1)(a)(i)-(viii)).	✓	
The activity is not for the purpose of a new or existing sub-station (refer to Clause 42(1)(b)).	✓	

Notwithstanding the above-mentioned regulatory requirements, the University has conducted consultation on various projects (including the proposed works) with stakeholders located within the Health Precinct, including:

- St Andrews College
- Wesley College
- Women's College
- RPA

A table identifying the consultation actions by the University and Lend lease is included at **Appendix 9** of this REF.

## 4 Legislative and Planning Context

### 4.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979 (EP&A ACT) AND ENVIRONMENTAL PLANNING AND ASSESSMENT REGULATION 2000 (REGULATION)

This REF considers the requirements of Sections 5A and 111 of the EP&A Act, as well as clause 228 of the Regulation.

For the purpose of attaining the objectives of the EP&A Act relating to the protection and enhancement of the environment, a determining authority in its consideration of an activity shall, notwithstanding any other provisions of the Act or the provisions of any other Act or of any instrument made under the EP&A Act or any other Act, examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity (refer to Section 111(1) of the EP&A Act). This REF report addresses the provisions of section 111(2)-(4) of the EP&A Act as per the table below. The required impact assessment under Clause 228 of the Regulations is set out in Section 5.1 of this REF.

**NOTE<sup>3</sup>:** If the standard responses (in the table below) regarding the level of impact or applicability to each of the matters for consideration is incorrect, a more detailed assessment should be undertaken in relation to this issue to determine whether the preparation of this REF is sufficient, or whether or not an Environmental Impact Statement (EIS) is required. In particular, reference is made to Section 111(4), ie dealing with matters of critical habitat, threatened species, populations and communities (and their habitats) or protected fauna and flora- the relevant expertise/information should be obtained to confirm the impact of the activity does not require an EIS.

**TABLE 4 – MATTERS FOR CONSIDERATION UNDER SECTION 111 OF THE EP&A ACT**

MATTER FOR CONSIDERATION	IMPACT OF ACTIVITY <sup>3</sup>	CHECK AS CORRECT (✓/✗)
(2)(a) any conservation agreement entered into under the <a href="#">National Parks and Wildlife Act 1974</a> and applying to the whole or part of the land to which the activity relates, and	Not applicable, as no conservation agreement has been entered into for the subject site.	✓
(b) any plan of management adopted under that Act for the conservation area to which the agreement relates, and	Not applicable, as no plan of management applies to the site that has been made under the National Parks and Wildlife Act 1974.	✓
I any joint management agreement entered into under the <a href="#">Threatened Species Conservation Act 1995</a> , and	Not applicable, as no joint management agreement has been entered into for the subject site.	✓
(d) any biobanking agreement entered into under Part 7A of the <a href="#">Threatened Species Conservation Act 1995</a> that applies to the whole or part of the land to which the activity relates.	Not applicable, as no biodiversity agreement has been entered into for the subject site.	✓
(3) Without limiting subsection (1), a determining authority shall consider the effect of an activity on any wilderness area (within the meaning of	Not applicable, as no wilderness area is situated on the site.	✓



MATTER FOR CONSIDERATION	IMPACT OF ACTIVITY <sup>3</sup>	CHECK AS CORRECT (✓/✗)
the <a href="#">Wilderness Act 1987</a> in the locality in which the activity is intended to be carried on.		
<p>(4) Without limiting subsection (1), a determining authority must consider the effect of an activity on:</p> <p>(a) critical habitat, and</p> <p>(b) in the case of threatened species, populations and ecological communities, and their habitats, whether there is likely to be a significant effect on those species, populations or ecological communities, or those habitats, and</p> <p>1 any other protected fauna or protected native plants within the meaning of the <a href="#">National Parks and Wildlife Act 1974</a>.</p>		✓

#### 4.2 COMMONWEALTH ENVIRONMENTAL PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The provisions of the Environment Protection and Biodiversity Conservation Act 1999 do not affect the proposed works as it is not development that takes place on or affects Commonwealth land or waters. Further, it is not development carried out by Commonwealth agencies, nor is the proposed development a matter considered to be of national environmental significance.

**NOTE:** If any of the following statements are incorrect (i.e. marked as 'x'), a more detailed assessment should be undertaken in relation to this issue to determine whether the preparation of this REF is sufficient, or whether or not an Environmental Impact Statement is required.

TABLE 5 – EPBC CHECKLIST

FACTOR	CHECK AS CORRECT (✓/✗)
The activity will not have any significant impact on a declared World Heritage Property?	✓
The activity will not have any significant impact on a National Heritage place?	✓
The activity will not have any significant impact on a declared Ramsar wetland?	✓
The activity will not have any significant impact on Commonwealth listed threatened species or endangered community?	✓
The activity does not involve nuclear actions?	✓
The activity will not have any significant impact on Commonwealth marine areas?	✓
The activity will not have any significant impact on Commonwealth land?	✓



#### 4.3 OTHER NSW LEGISLATION

The following table lists any additional legislation that is required to be considered if it is applicable to the proposed activity:

**TABLE 6 – OTHER POSSIBLE LEGISLATIVE REQUIREMENTS**

LEGISLATION	COMMENT	CHECK AS CORRECT(✓/✗)
Rural Fires Act 1997	The Rural Fires Act 1997 is not relevant, as the area of the proposed works on the site are not identified on the applicable Bushfire Prone Land Map.	✓
Threatened Species Act 1995	The Threatened Species Act 1995 is not relevant as the area of the proposed works on the site does not contain any critical habitat, threatened species or ecological population or community.  Appropriate detailed flora and fauna assessment measures have been incorporated within the future State Significant DA process for the re-development of the site and are included within the SEARs.	✓
Water Management Act 2000	The Water Management Act 2000 is not relevant, as the proposed works are not located within 40 metres of a watercourse.	✓
Contaminated Land Management Act 1997	The Contaminated Land Management Act 1997 is not relevant as the site is not listed on the register of contaminated sites within the Contaminated Land Management Act 1997.	✓
Heritage Act 1977	The Heritage Act 1977 is not relevant as the proposed works do not materially affect any local or state heritage items.	✓ <sup>1</sup>
Roads Act 1993	The Roads Act 1993 is not relevant as the proposed works do not relate to a public road, nor will the works involve the pumping of water onto a public road or involve the connection of a road to a classified road.	✓
Other Acts as Required	There are no other Acts that are required to be addressed.	✓
SEPP 55	<i>State Environmental Planning Policy No 55 – Remediation of Land</i> is not relevant as there is no potential for the site to be contaminated.	✓
Other SEPPs as required	There are no other SEPPs that are required to be addressed	✓

**NOTE:** In the event any other Act requires approval under that Act, such approval will be obtained at the relevant time. Given the Camperdown Campus site is listed on the Section 170 Heritage register, notification is required pursuant to Section 170A of the Heritage Act. Such notification has been provided as further explained in Section 6 of this REF.

## 5 Environmental Impact Assessment

### 5.1 ENVIRONMENTAL PLANNING AND ASSESSMENT REGULATION 2000 - ASSESSMENT CONSIDERATIONS

The relevant assessment considerations under Clause 228 of the Environmental Planning and Assessment Regulation 2000 are provided below:

**Table 7 – SUMMARY OF ENVIRONMENTAL FACTORS REVIEWED IN RELATION TO THE ACTIVITY**

RELEVANT CONSIDERATION	RESPONSE/ASSESSMENT INCLUDING REFERENCE TO APPENDED MATERIAL (IF REQUIRED)	IMPACT CHECK RELEVANT AS (✓)
(a) any environmental impact on a community <i>Prompt only: Does the proposal have any natural or man-made impact on the University campus community, or the broader residential or business community?</i>	No Impact- recommended mitigation measures included within Section 8 of this REF.	-ve Nil ✓ +ve
(b) transformation of a locality <i>Prompt only: Does the proposal significantly change the nature of the locality?</i>	No Impact- noting that a separate State Significant DA will be assessed in relation to the replacement building/s within this precinct and that re-development of this Precinct has previously been identified in the University of Sydney Campus Improvement Program.	-ve Nil ✓ +ve
(c) any environmental impact on the ecosystem of the locality <i>Prompt only: Does the proposal impact on the ecosystem that is relevant to the immediate area? (i.e. the system between natural and man-made environment)</i>	No Impact	-ve Nil ✓ +ve
(d) any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality.	Various trees are proposed to be removed as part of both the demolition zone and also the formalised paved access link in order to accommodate these facilities. Removal of these trees is supported by the Arborist Reports at <b>Appendix 2</b> and mitigation measures for the protection of trees proposed to be retained is also provided within the Arborist Report. These have been incorporated within this REF.  The removal of the various trees identified in the Arborist report has been reviewed and endorsed by CIS' Landscape and Grounds Manager.  Landscaping associated with the future State Significant DA for the Precinct will provide an opportunity to off-set any minor and short-term amenity loss as a result of the removal of these trees. The lack of interface with the broader public domain provides an acceptable situation for this course of action to proceed.	-ve Nil ✓ +ve



<p>(e) Any effect on locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific, or social significance or other special value for present or future generations.</p>	<p>The proposed works do not relate to either a state or local heritage item and the demolition of the buildings has been assessed as satisfactory in the context of the Heritage Conservation Area in which the proposed works sit within (refer to the HIS at <b>Appendix 3</b>).</p> <p>Although the proposed work will involve minimal excavation, the Precinct has nevertheless been highly disturbed in the past and GML's previous archaeology investigations have low to no potential for the preservation of sub-surface archaeology in respect to the likelihood of archaeological potential. Appropriate mitigation measures are included within <b>Section 8</b> of this REF in relation to archaeology discovery during the minor excavation work associated with the proposed works.</p>	<p>-ve Nil +ve</p>	<p>✓</p>
<p>(f) Any impact on the habitat of protected fauna (within the meaning of the National Parks and Wildlife Act 1974)</p>	<p>No Impact</p>	<p>-ve Nil +ve</p>	<p>✓</p>
<p>(g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air</p>	<p>No Impact</p>	<p>-ve Nil +ve</p>	<p>✓</p>
<p>(h) Any long term impacts on the environment <i>Prompt only: Does the nature of the proposal result in a long-term or permanent impact on the natural or man-made environment?</i></p>	<p>No Impact- noting that a separate DA will be assessed in relation to the replacement building/s within this precinct and that re-development of this Precinct has previously been identified in the University of Sydney Campus Improvement Program.</p>	<p>-ve Nil +ve</p>	<p>✓</p>
<p>(i) Any degradation of the quality of the environment <i>Prompt only: Does the proposal reduce the quality of the natural environment?</i></p>	<p>No Impact</p>	<p>-ve Nil +ve</p>	<p>✓</p>
<p>(j) Any risk of safety of the environment</p>	<p>Various plans have been developed to ensure potential risks to the environment are adequately managed including a Site Management Plan, Demolition Environmental Management Plan, Hazardous Materials Risk Assessment, Contamination Assessment and Unexpected Finds Protocol. The various mitigation measures identified within these documents have been referenced within <b>Section 8</b>.</p>	<p>-ve Nil +ve</p>	<p>✓</p>





	The upgraded access pathway has been reviewed by Arup Transport Engineers who have confirmed the concept design, subject to the installation of various signage and alteration of gradient in a section of the access way can meet the relevant design principles established by Transport for NSW. This advice is included in <b>Appendix 8</b> .	
(k) Any reduction in the range of beneficial uses of the environment	No Impact	<div>-ve</div> <div>Nil ✓</div> <div>+ve</div>
(l) Any pollution of the environment	No Impact  It is anticipated that the mitigation measures outlined in <b>Section 8</b> will adequately manage the potential for pollution of the environment.	<div>-ve</div> <div>Nil ✓</div> <div>+ve</div>
(m) Any environmental problems associated with the disposal of waste	No Impact  It is anticipated that the mitigation measures outlined in <b>Section 8</b> will adequately manage the potential for pollution of the environment.	<div>-ve</div> <div>Nil ✓</div> <div>+ve</div>
(n) Any increased demanded on resources (natural or otherwise) that are, or are likely to become, in short supply	No Impact	<div>-ve</div> <div>Nil ✓</div> <div>+ve</div>
(o) Any cumulative environmental effects with other existing or likely future activities.  <i>Prompt only: Does the proposal have an impact when considered in conjunction with other activities that are either under construction or that have been approved in the immediate area?</i>	No Impact	<div>-ve</div> <div>Nil ✓</div> <div>+ve</div>
(p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions.	No Impact	<div>-ve</div> <div>Nil ✓</div> <div>+ve</div>

## 6 Summary of Impacts

Any likely impacts relating to the proposed activity have been considered and include the following:

### Heritage

The proposed demolition already has concept approval as State Significant Development under the Campus Improvement Program SSD 13\_6123, approved by the Minister for Planning on 16 February 2015.

The buildings proposed for demolition are not local or state listed heritage items, however they are located within the University of Sydney Heritage Conservation Area (HCA) identified in Schedule 5 of the Sydney LEP 2012. Further, the Blackburn building is identified on the Section 170 Heritage and Conservation Register for the University of Sydney, as is the Camperdown Campus of the University itself.

A Heritage Impact Statement (HIS) is required as part of the notification to the Office of Environment and Heritage (Heritage Office) in providing an assessment of the proposed demolition works in order to facilitate the removal of these building from the 170 Certificate.

The HIS (contained in its entirety at **Appendix 3**) provides the following conclusions and recommendations:

*Whilst the proposed demolition has an acknowledged heritage impact on the building and on the broader campus, the demolition has however been supported in the context of the need to redevelop the precinct and facilitate the ongoing university functions. The demolition is in accordance with the CMP policy and CIP approval (SSD 6123, 16/02/15). The demolition has also been supported with consideration for the limitations of the site, noting investigations have demonstrated that the partial retention of the site and incorporation into redevelopment would be likely to achieve compromised outcomes for heritage and the use of the site which is therefore considered unacceptable.*

*The demolition of the Blackburn Building is considered to be an essential component of the overarching University of Sydney Campus Improvement Program (CIP), the aim of which is to deliver new development, access, public domain and infrastructure works to accommodate the strategic direction and delivery of the University and its programs. The CIP, including demolition works, is approved as a 'concept proposal' under State Significant Development (SSD) Application No. 6123 (16/02/2015). It is noted that the demolition of the Blackburn Building was both assessed and implicitly approved as part of the approval of the CIP as a concept proposal.*

*It is noted that an archival recording and interpretation plan are being prepared by Urbis for the site as part of conditions of consent for the approved SSD Application No. 6123, which will assist to mitigate impacts of the demolition. The previous HIS also made provision for salvage of nominated significant elements of the building for reuse in the site redevelopment.*

*The following recommendations should also be incorporated in future design development of the site. It is critical that the redevelopment of the precinct generally be sympathetic and should seek to further minimise any negative heritage impacts associated with new development. Consideration must be given to:*

- The detailed and sympathetic design of proposed new buildings to be introduced to the area, and the ways in which they respond and relate to any buildings of significance in the vicinity (e.g. RPA to the west);*
- Where possible, significant view lines should be retained and impact minimised. While it is acknowledged that particular view lines and site elements will be impacted by the proposed demolition and subsequent redevelopment, all retained view lines/significant site elements must be considered as part of the final design scheme.*

*Provided the recommended mitigation measures at Section 5.5 are followed, there are no identified heritage impacts associated with either the demolition of the Dangerous and Flammable Goods Store or the relocation of the L. E. F. Neill Fountain/Monument.*

The management and mitigation measures within Section 8 of this REF have included reference to the various recommended mitigation measures in the HIS.

We note as part of the notification to the Heritage Office, the Heritage Office made the following requests:

- The preparation of a photographic and archival record for the Blackburn Building prior to demolition, with the archival records being undertaken in accordance with the Heritage Division's Guidelines 'Photographic Recording of Heritage Items Using Film or Digital Capture and How to prepare Archival Records of Heritage Items'.
- The lodgement of the photographic and archival documentation (as required above) with the Heritage Division Library, once completed.
- The provision of the updated database record to the Heritage Division of the Section 170 Heritage and Conservation register showing the removal of the Blackburn Building.

These requests have also been incorporated within the management and mitigation measures within **Section 8** of this REF.

In respect to potential impacts on archaeology, although the proposed work will involve minimal excavation, the Precinct has nevertheless been highly disturbed in the past and GML's previous archaeology investigations (within their Aboriginal Heritage Due Diligence Report, dated October 2013) have low to no potential for the preservation of sub-surface archaeology in respect to the likelihood of archaeological potential. Appropriate mitigation measures are included within **Section 8** of this REF in relation to archaeology discovery during the minor excavation work associated with the proposed works.

### **Tree Removal**

Various trees are proposed to be removed as part of both the demolition zone and also the formalised paved access link in order to accommodate these facilities. Removal of these trees is supported by the Arborist Reports at **Appendix 2** and mitigation measures for the protection of trees proposed to be retained is also provided within the Arborist Report. These have been incorporated within this REF.

The removal of the various trees identified in the Arborist report has been reviewed and endorsed by CIS' Landscape and Grounds Manager.

The Arborist Report suggests further tree planting could be undertaken to replace the loss of amenity within a short-medium time-frame. Given the re-development of the Precinct will take place immediately following the demolition process which will involve the provision of a landscape theme for the area, such replacement landscaping as part of that process is best served to address any loss of amenity (as opposed to replacement landscaping that may be compromised by the demolition and early works process). The lack of interface with the broader public domain provides an acceptable situation for this course of action to proceed.

### **Stormwater**

Parts of the perimeter of the proposed works area are affected by the 100 year ARI event involving depths of between 0.1m-1m. However, the works involve the demolition of two buildings and the formalisation of a service and pedestrian access link (as opposed to habitable floor area). The specific design of buildings will need to consider the floor levels above the flood levels affecting this part of the site and will be considered as part of the separate State Significant DA process.

In effect, the area of the demolished buildings in the interim of being re-developed will act as a natural basin for stormwater pending redevelopment works, or otherwise can be graded not to prevent any



material change of flood patterns. A suitable mitigation measure is included within Section 8 of this REF to address any potential impact associated with stormwater flow.

### Contamination

Limited excavation is involved with the proposed works, namely those that are essential to the demolition of the two building and the upgrade of the existing pathway. Further contamination assessment associated with the more detailed excavation process associated with the re-development of the site will be undertaken as part of the State Significant DA process associated with the re-development of the precinct.

The contamination assessment undertaken as part of this project (provided by Coffey at **Appendix 4**) has concluded the following:

*In conclusion, the findings of this investigation has not identified contamination within soil or groundwater at the site that exceeds the adopted health or ecological investigation levels. Therefore, based on the findings of this investigation Coffey concludes that the site is suitable for the proposed development subject to the implementation of the Unexpected Finds Protocol (ref: GEOTLCOV25283AF-L01, dated 9 January 2017) as part of the construction process. The Unexpected Finds Protocol includes procedures for identifying and managing risks and protecting human health and environment should unexpected contamination or hazardous materials (e.g. asbestos containing materials) are discovered during excavation at the site. Given that soil or groundwater contamination has not been identified exceeding the adopted health or ecological investigation levels, a Remedial Action Plan (RAP) is not considered necessary at present.*

*Available soil data indicates that the fill material on the site would classify as General Solid Waste in accordance with the Waste Classification Guidelines (DECCW; 2009). Coffey recommends that the waste classification of fill materials be confirmed by observation of the appearance of fill materials during excavation for basement construction.*

In addition to in-ground assessment, a Hazardous Materials Risk Assessment has been conducted for each of the proposed buildings to be demolished (provided by Greencap at **Appendix 6**). These assessments have identified the presence of various hazardous materials and asbestos throughout the buildings. The findings and recommendations (including mitigation measures) within the Greencap Reports have been incorporated within the Management and Mitigation Measures within **Section 8** of this REF.

### Vehicle and Pedestrian Safety during Construction

The Demolition and Environmental Management Plan and Site Management Plan (prepared by Coffey and Lend Lease, respectively and contained at **Appendix 7**) incorporate commitments and measures in respect to addressing vehicle movement and pedestrian safety adjoining and near the proposed works zone and will be incorporated within the Management and Mitigation Measures within **Section 8**.

In addition, a Stakeholder Engagement Plan has been prepared by Lend Lease for works conducted within the Health Precinct. This Engagement Plan has been used to date and will continue to be used to provide surrounding stakeholders with advanced notice of demolition and construction activities also assisting in mitigating impacts.

The demolition works only involve demolition activity to remove the buildings. No additional excavation is proposed further than is required to demolish the buildings. A mitigation measure has been incorporated to ensure the area is secured and stabilised pending the building and excavation works associated with the site's re-development.

### **Other Construction Impacts**

Both the Demolition and Environmental Management Plan and Site Management Plan (**Appendix 7**) provide commitments and measures addressing matters such as hours of work, waste management, stormwater erosion and sediment control, air quality, noise and vibration and asbestos and hazardous materials handling.

These documents and the commitments made by this documents are incorporated within the Management and Mitigation Measures in **Section 8** of this REF. As referred to above, a Stakeholder Engagement Plan has been prepared by Lend Lease for works conducted within the Health Precinct. This Engagement Plan has been used to date and will continue to be used to provide surrounding stakeholders with advanced notice of demolition and construction activities also assisting in mitigating impacts.

### **Conclusion**

The proposed activity is not likely to result in a significant environmental impact and can be appropriately progressed for approval via Part 5 of the Environmental Planning and Assessment Act 1979, subject to the mitigation measures in **Section 8** being properly implemented.



## 7 General Requirements

### 7.1 PLANS AND REPORTS

- (a) The activity shall be implemented generally in accordance with the following plans and documentation:

TABLE 8 – APPROVED PLANS AND DOCUMENTATION

REPORT/PLAN TITLE	PREPARED BY	DATE
Demolition of site establishment plan No.SK01- Rev 1 (at <b>Appendix 1</b> )	Lend Lease	undated
Concept design package (re shared pedestrian and vehicular access lane) Job No. 4596002, Plan No's S1.01, S1.02, S1.03, S1.04, S1.06, S2.01, S4.01, S5.01, S5.11 (all Issue 2) (at <b>Appendix 1</b> )	Warren Smith and Partners	22.11.16
Services plan Job No. 4596002, Plan No. D9.01 (Issue 1) (at <b>Appendix 1</b> )	Warren Smith and Partners	December 2016
Electrical and Lighting Schematic Design Report (at <b>Appendix 1</b> )	Steensen Varming	25.11.16
Arborist Report letters (at <b>Appendix 2</b> )	Tree IQ	13.12.16
Heritage Impact Statement (at <b>Appendix 3</b> )	Urbis	07.12.16
Contamination Assessment Report (at <b>Appendix 4</b> )	Coffey	09.01.17
Unexpected Finds Protocol (at <b>Appendix 5</b> )	Coffey	09.01.17
Demolition Hazardous Materials Risk Assessments (at <b>Appendix 6</b> )	Greencap	December 2016
Demolition and Environmental Management Plan (at <b>Appendix 7</b> )	Coffey	10.01.17
Site Management Plan (Revision B) (at <b>Appendix 7</b> )	Lend Lease	12.12.16





REPORT/PLAN TITLE	PREPARED BY	DATE
Technical Design Review (at <b>Appendix 8</b> )	Arup	03.02.17
Stakeholder Engagement Plan- Actions List (at <b>Appendix 9</b> )	Lend Lease	undated

Where there is an inconsistency between the listed documents and the mitigation and management measures detailed in the REF and below, the REF shall prevail.

- (b) A copy of the approved and certified plans, specifications and documentation shall be kept at the UoS G12 Building located at 22 Codrington Street, Darlington Campus at all times and should be made available to an authorised officer of the relevant Local Government authority upon request.

## 8 Management and Mitigation Measures

### 8.1 ACTIVITY CERTIFICATION

- a) Prior to the commencement of any construction works the UoS (or their nominated delegate) shall ensure the activity has obtained a crown certification in accordance with Section 109R of the *Environmental Planning and Assessment Act 1979*.
- b) As required by Clause 227 of the *Environmental Planning and Assessment Regulation 2000*, for the purposes of demonstrating compliance with section 109R of the Act, all of the relevant provisions of the *Building Code of Australia* and the Fire Sprinkler Standard (within the meaning of Division 7B of Part 9) are prescribed as technical provisions of the State's building laws.

### 8.2 OTHER APPROVALS AND REGISTRATION

- a) Prior to the commencement of activity on site any other approvals required by other relevant legislation shall be obtained. A copy of all approvals is to be kept and retained as part of the document package register with UoS.
- b) Following completion of construction works and issue of occupation certificate (or equivalent) a copy of the certification details are to be kept and retained as part of the document package with the UoS.

### 8.3 DEMOLITION WORKS (GENERAL)

- a) The commitments, actions and recommendations identified throughout the **Demolition and Environmental Management Plan** (prepared by Coffey) and the **Site Management Plan** (prepared by Lend Lease), both contained at **Appendix 7** of this REF are to be implemented as part of the proposed activity.
- b) Prior to the commencement of any demolition work, all existing services and utilities shall be appropriately disconnected. The proponent shall consult with the various service authorities regarding their easements or requirements for the disconnection of services.
- c) The demolition work shall comply with the provisions of Australian Standard AS2601: 2001 *The Demolition of Structures*. The work plans required by AS2601: 2001 shall be accompanied by a written **Demolition Work Method Statement** prepared by a licensed demolition contractor registered with the Work Cover Authority.
- d) The works shall be carried out in accordance with the University of Sydney's '*Campus Infrastructure and Services Contractors Handbook*', dated October 2014, and as amended as required by other mitigation measures herein.

#### 8.3.1 CONTAMINATION STANDARD

- a) The exportation of waste (including fill or soil) from the site must be in accordance with the provisions of the *Protection of the Environment Operations Act 1997* and the Office of Environment and Heritage (OEH) *Environmental Guidelines Assessment, Classification and Management of Non-Liquid Wastes*.
- b) If any contaminated materials or hazardous substances (for example, asbestos, polychlorinated biphenyls, synthetic mineral fibre, lead dusts, paint containing lead and ozone depleting substances) are encountered during demolition and construction, works must immediately cease and not recommence until such time that safe work method statements and appropriate documented practices are implemented, which may include any plans or approvals mentioned above.

- c) The requirements within the **Contamination Assessment and Unexpected Finds Protocol** prepared by Coffey and contained within **Appendix 5 and 6** are to be adopted as part of the demolition and construction process.
- d) The recommendations within the **Hazardous Materials Reports** carried out by Greencap forming **Appendix 6** of this REF are to be implemented by the contractor as they are relevant to the scope of works, the subject of this REF.
- e) Demolition and construction works should not result in the contamination of the site.

#### 8.4 EXCAVATION WORKS

- a) The use of any rock excavation machinery or any mechanical pile drivers or the like is restricted to the hours of 8.00 am to 5.00 pm (maximum) on Monday to Friday only, to minimise the noise levels during construction and loss of amenity to the surrounding area.

##### 8.4.1 EROSION AND SEDIMENT CONTROL

- a) Prior to the commencement of work, suitable measures are to be implemented to ensure that sediment and other materials are not tracked onto the roadway by vehicles leaving the site. It is an offence to allow, permit or cause materials to pollute or be placed in a position from which they may pollute waters.

#### 8.5 AIR QUALITY AND DUST MANAGEMENT

##### 8.5.1 AIR QUALITY: GENERAL

- a) As soon as practicable following completion of demolition and remediation works (if applicable) the ground shall be stabilised using an appropriate turf or other appropriate stabilisation material that will prevent the dispersion of airborne particulates.
- b) All vehicles involved in any excavation and/or demolition and departing the site with demolition materials, spoil or loose matter must have their loads fully covered before entering the public roadway.
- c) Any mud deposited on the road network due to truck movements to and from the site is to be cleaned up immediately.

#### 8.6 ACCESS, TRAFFIC AND PARKING MANAGEMENT

##### 8.6.1 CONSTRUCTION TRAFFIC

- a) Prior to the commencement of any works onsite (including demolition and excavation works) a **Construction and Traffic Management Plan (CTMP)** shall be prepared. The CTMP shall include details on the following:
  - site location and road network;
  - approved activity;
  - overall principles for traffic management;
  - hours of work;
  - truck routes;
  - traffic and parking effects;



- pedestrian management and safety procedures (in particular, but not exclusive of, the management of pedestrians using the immediate internal road system and interface within the Hospital Precinct).
- any relevant consultation undertaken with adjoining or surrounding stakeholders.

#### 8.6.2 PEDESTRIAN MOVEMENT

- a) Safe pedestrian access and movement to and through the UoS Campus must remain unimpeded at all times.
- b) Appropriate signage and directional information shall be provided.

### 8.7 HERITAGE

#### 8.7.1 ABORIGINAL AND NON-ABORIGINAL ARCHAEOLOGY: UNEXPECTED FINDS

- a) The recommended mitigation measures (as they are relevant to the scope of works relevant to this REF) contained in Section 5.5 of the **Heritage Impact Statement** (at **Appendix 3** of this REF) are to be implemented as part of the proposed activity.
- b) If any item of Aboriginal archaeological significance is discovered during the works, work shall cease immediately and notification undertaken in accordance with the *National Parks and Wildlife Act 1974*.
- c) If any item of Non-Aboriginal heritage is discovered during works, work shall cease immediately and the Project Heritage consultant or Office of Environment and Heritage and UoS notified.
- d) Work shall not recommence on the site until the significance of the find is established, and an Excavation Permit (if required) is obtained from the Heritage Council under Section 139 and Section 140 of the *NSW Heritage Act 1977*.

#### 8.7.2 MANAGING SANDSTONE KERB AND GUTTER

- a) Any existing stone kerbs on the adjoining roadways (if applicable) are to be retained and properly protected during the proposed demolition works.
- b) To avoid damage to stone kerbs during excavation and construction works for the activity, temporary removal and storage of the stone kerbs may be undertaken (if necessary) under the supervision and direction of a qualified heritage consultant. Removed, serviceable stone kerbs (i.e. those that are in good condition as determined by a qualified heritage expert) must be re-installed in accordance with the standard details and specifications after the construction works have been completed. **Note:** A temporary concrete kerb will need to be constructed to retain the footpath until the stone kerbs can be reinstalled. The removed stone kerbs are to be reinstalled as soon as practicable following completion of the activity works.
- c) Damaged kerbs are to be replaced to match existing to the satisfaction or as otherwise advised by the UoS.

### 8.8 MANAGING AMENITY IMPACTS

#### 8.8.1 CONSTRUCTION HOURS

- a) The hours of demolition or construction, including delivery of materials to and from the site, shall be restricted as follows:
  - Between 7.30am and 5.30pm, Monday to Friday;

- 7:30am to 3.30pm on Saturdays;
  - No work or deliveries on Sunday and/or public holidays; and
  - Safety inspections are permitted at 7.00am on work days.
- b) Variation to the above working hours may be considered in extenuating circumstances only with the prior approval of the UoS.

#### 8.8.2 CONSTRUCTION NOISE: GENERAL

- a) Building contractors are to implement the requirements of the Office of Heritage and Environment "Interim Construction Noise Guideline (July 2009)" as far as practicable.
- b) Noise shall be attenuated with the use of engine silencing and substitution by alternative processes to reduce noise emission levels from typical demolition equipment. In addition to these physical noise controls, the following general noise management measures shall be followed:
- Plant and equipment shall be properly maintained;
  - Equipment shall be checked and calibrated to the appropriate design requirements and to ensure that maximum sound power levels are not exceeded;
  - Where possible, plant shall be strategically positioned on site to reduce the emission of noise to the site, surrounding neighbourhood and to site personnel;
  - Unnecessary noise shall be avoided when carrying out manual operations and operating plant; and
  - Any equipment not in use for extended periods during demolition work shall be switched off.

### 8.9 WASTE MANAGEMENT

#### 8.9.1 DEMOLITION AND/OR CONSTRUCTION PHASE

- a) Prior to the commencement of works (including demolition or vegetation removal) a **Waste Management Plan (WMP)** should be prepared in accordance with the 'University of Sydney Site Management Plan' outlined in the 'Campus Infrastructure and Services Contractors Handbook', dated October 2014, and consider the following:
- *The name and address of the company/contractor undertaking the demolition/excavation works. Where material transport of waste material is undertaken by a separate contractor, details (including name and address) of the transport contractor shall also be provided.*
  - *Identify the type and quantify waste likely to be generated through the demolition and construction phase and provide options or requirements for handling and disposal. Where available, recyclable site and construction waste would be recycled in accordance with the NSW Government's Waste Reduction and Purchasing Policy (WRAPP guidelines).*
  - *Non-recyclable waste would be regularly collected and disposed of at a licensed landfill or other disposal site in the area.*
  - *Any bulk garbage bins delivered by Authorised Waste Contractors would be placed and kept within the property boundary.*
  - *Waste management practices for the proposal would follow the resource management hierarchy principles embodied in the Waste Avoidance and Resource Recovery Act 2001. These practices include:*

- *avoid unnecessary resource consumption;*
  - *recovering resources (including reuse, reprocessing, recycling and energy recovery); and*
  - *disposal (as a last resort).*
- b) All excavated materials shall be tested, classified, and disposed of in accordance with the current Waste Classification Guidelines (OEH).

#### 8.10 SERVICES AND UTILITIES

- a) All services and utilities in the area of construction must be appropriately disconnected and reconnected as required. The contractor is required (if necessary) to consult with the various service authorities regarding their requirements for the disconnection of services.

#### 8.11 CONSTRUCTION SITE MAINTENANCE

- a) All materials and equipment must be stored wholly within the work site unless an approval to store them elsewhere is held;
- b) Any run-off and erosion control measures required must be maintained within their operating capacity until the completion of the works to prevent debris escaping from the site into drainage systems, waterways, adjoining properties and roads;
- c) At the completion of the works, the work site must be left clear of waste and debris; and
- d) At the completion of the works, the work site shall be secured by appropriate hoarding or fencing and be finished to match the existing surrounding ground level (pending excavation and building works commencing that are associated with the re-development approval of the site);
- To ensure that stormwater flows are not altered;
  - To avoid any risk to human safety; and
  - To ensure an appropriate and safe road surface.

#### 8.12 TREES

- a) Where the site adjoins a public space all street trees adjacent to the site/works area shall be protected at all times during demolition/excavation and construction in accordance with provisions of the Australian Standard AS4970--2009 Protection of Trees of Development Sites.
- b) All trees located within the immediate vicinity of the works area and not approved for removal by this activity approval shall be retained and protected in accordance with the Australian Standard "AS 4970-2009 Protection of Trees on Development Sites" and the recommendations (relevant to the scope of works within this REF) of the **Arboricultural Reports**, prepared by Tree IQ and contained within **Appendix 6**.

#### 8.13 ACCESS PATH DESIGN

- a) The shared access path design as shown in the concept design drawings within **Appendix 1** is to be implemented in accordance with the applicable design standards, including (but not limited to) the provision of appropriate signage.
- b) The recommendations identified in the Arup Design Review (within **Appendix 8**) are to be incorporated within the final design.





**8. SSD Appendix W – Operational and Waste Management Plan**



University of Sydney

**Health Precinct – Stage 1**

# **Operational and Construction Waste Management Plan**

July 2017



## Table of Contents

1	Introduction.....	4
2	Waste & Recycling Volume Calculations .....	5
3	Waste Management & Recycling Systems.....	6
4	Storage Area Requirements .....	7
5	Waste Management Systems.....	9
6	Construction Waste Management Plan.....	11

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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
<b>TOTAL</b>	<b>12,191</b>

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
<b>TOTAL</b>		<b>7</b>		<b>13,860</b>	<b>12,191</b>		<b>10.4</b>

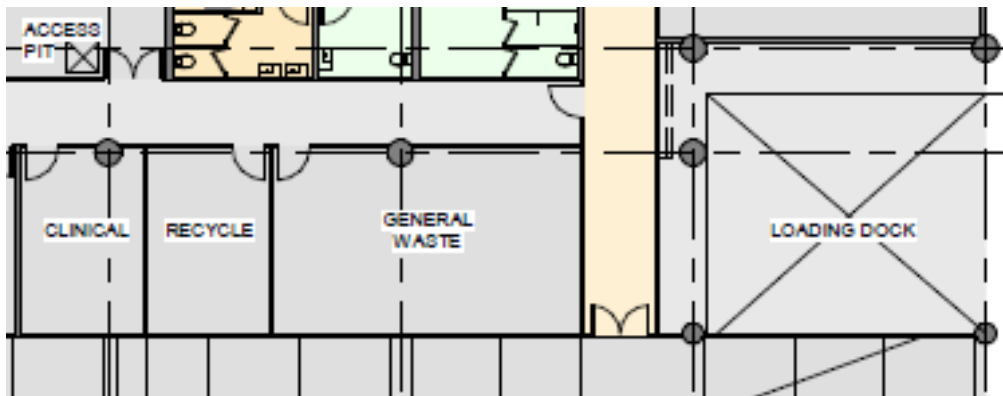
The waste rooms have the following floor space allocations:

- General Waste Room: 50 m<sup>2</sup>
- Recycle Room: 20 m<sup>2</sup>
- Clinical Waste Room: 20 m<sup>2</sup>

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

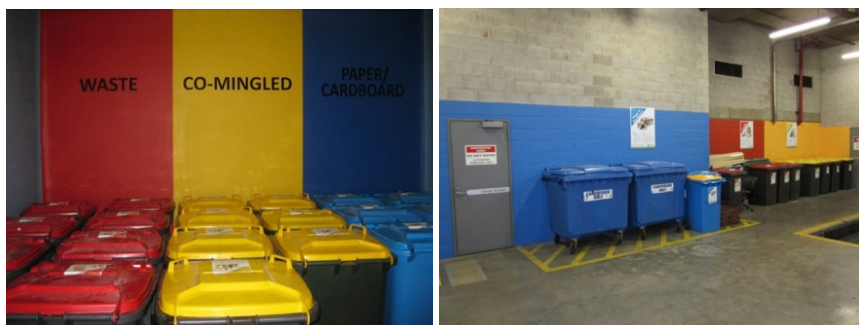
## 4 Storage Area Requirements

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, 7<sup>th</sup> 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.

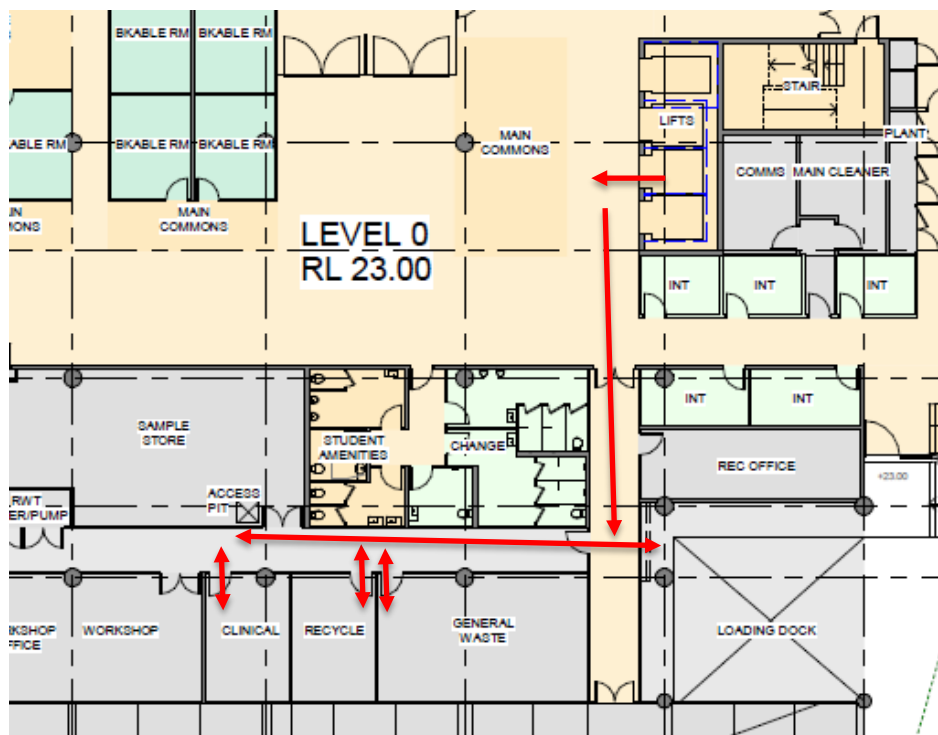
Confidential waste will be collected in blue locked wheelie bins in Utility rooms throughout the building, and will retrieved on a swap-out basis from their various locations.

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).



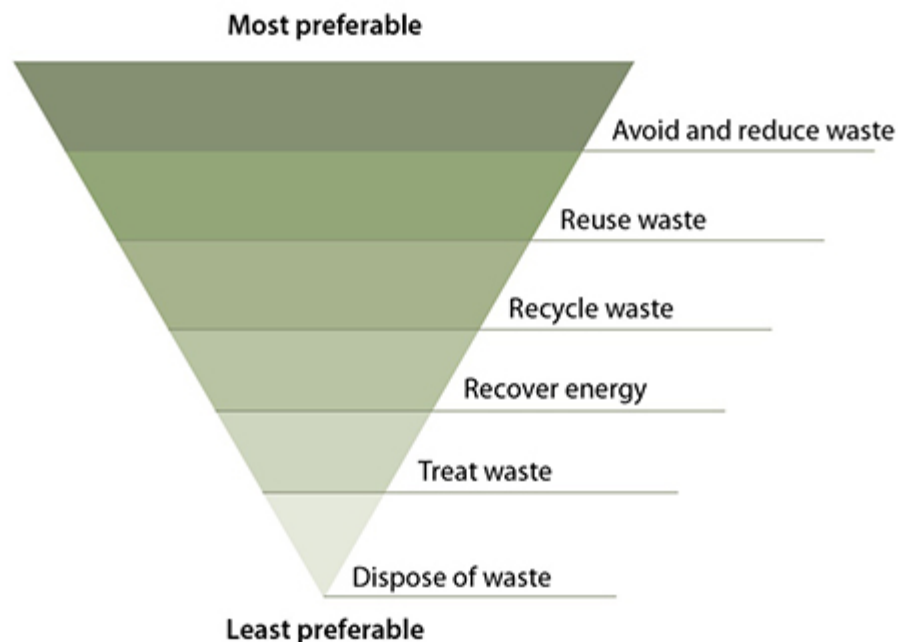
Wastes and recyclables will be serviced from the loading dock. This is designed with a minimum 4.5 metre headroom so as to allow waste collection vehicles to enter and empty bins.

## 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 outlines 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 m<sup>3</sup> 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 <sup>3</sup> )	On-site (Reuse or recycle)	Off-site (Detail contractor and recycling contractor)	Disposal (Detail contractor and landfill site)
Concrete	20m <sup>3</sup>	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 <sup>3</sup> )	On-site (Reuse or recycle)	Off-site (Detail contractor and recycling contractor)	Disposal (Detail contractor and landfill site)
Timber (formwork and construction)	35m <sup>3</sup>	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 <sup>3</sup>	No on-site reuse	Unusable bricks collected by contractor and disposed at brick recycling facility	Facility TBA upon appointment of contractor
Plasterboard	10m <sup>3</sup>	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 <sup>3</sup>	No on-site reuse	Collected by specialist metal subcontractor for recycling	Facility TBA upon appointment of contractor
Non-Ferrous Metals (eg., wiring)	2m <sup>3</sup>	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 <sup>3</sup> )	On-site (Reuse or recycle)	Off-site (Detail contractor and recycling contractor)	Disposal (Detail contractor and landfill site)
Glazing	3m <sup>3</sup>	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 <sup>3</sup>	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 <sup>3</sup>	No on-site reuse	Contractor appointed to collect and recycle	No disposal to landfill
Mixed Recyclables	20m <sup>3</sup>	No on-site reuse	Contractor appointed to collect and recycle	No disposal to landfill
General waste	40m <sup>3</sup>	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.

