Lend Lease (Millers Point) Pty Limited

Barangaroo South - C3 Commercial Building

Waste Management Plan - Project Application

Rev D | 26 October 2011

Arup
Arup Pty Ltd ABN 18 000 966 165

Arup
Level 10
201 Kent Street
Sydney
NSW 2000
Australia
arup.com.au

Job number 220316

ARUP

Contents

Appendices

1 Introduction

This report supports a Project Application submitted to the Minister for Planning pursuant to Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act). The Application seeks approval for construction of a commercial building (known as Building C3) and associated works at Barangaroo South as described in the Project Summary Description section of this report.

1.1 Background

The 22 hectare Barangaroo site has been divided into three distinct redevelopment areas (from north to south) – the Headland Park, Barangaroo Stage 2 and Barangaroo Stage 1 (herein after referred to as Barangaroo South).

Lend Lease was successfully appointed as the preferred proponent to develop Barangaroo Stage 1 (otherwise known as Barangaroo South) on 20 December 2009.

1.2 Planning History & Framework

On 9 February 2007 the Minister approved a Concept Plan for the site and on 12 October 2007 the land was rezoned to facilitate its redevelopment. The Approved Concept Plan allowed for a mixed use development involving a maximum of 388,300m^2 of gross floor area (GFA) contained within 8 blocks on a total site area of 22 hectares.

Modification No. 1 was approved in September 2007 which corrected a number of minor typographical errors.

On 25 February 2009 the Minister approved Modification No. 2 to the Concept Plan. The Approved Concept Plan as modified allowed for a mixed use development involving a maximum of 508,300m^2 of gross floor area (GFA) contained within 8 blocks on a total site area of 22 hectares.

On 11 November 2009 the Minister approved Modification No. 3 to the Concept Plan to allow for a modified design for the Headland Park and Northern Cove. The Approved Concept Plan as modified allows for a mixed use development involving a maximum of 489,500m^2 of gross floor area (GFA) across Barangaroo as a whole.

On 16 December 2010 the Minister approved Modification No. 4 to the Barangaroo Concept Plan. The Approved Concept Plan as modified allows for approximately 563,965m^2 Gross Floor Area of mixed use development across the entire Barangaroo site.

This Project Application forms one of a series of individual Applications that Lend Lease will be submitting to deliver Barangaroo South. This Project Application is consistent with the established planning framework for the site, including the approved Concept Plan (as modified).

A Project Application (MP10_0023) has been approved for the bulk excavation and construction of a basement car park to accommodate up to 880 car parking spaces and associated services and infrastructure to support the initial phases of

the future development of Barangaroo South. A Section 75W Modification Application was subsequently submitted seeking to modify MP10_0023 to extend the area of the approved basement to the south. This modification was approved by the Minister for Planning on 3 March 2011.

A further Section 75W application has been submitted to the Department of Planning and Infrastructure (the Department) and is currently being assessed, which seeks the Minister's approval to modify the depth of the excavation and change the reduced levels of the basement structure, using the same construction methodology as detailed and approved as part of the original project application. This includes:

- reduced excavation and bulk earthworks;
- reduced structural works – foundations, basement levels, perimeter retention system etc; and
- installation of associated services and infrastructure to support the initial phases of the future development of Barangaroo South.

A project application for the first commercial building, known as C4, was submitted to the Department of Planning on 29 October 2010. This application sought consent for construction and use of a new commercial Building C4 with a maximum 98,514m^2 GFA accommodating commercial and retail uses, a child care centre, bicycle parking and associated use and operation of car parking and loading facilities in the basement. Consent was issued by the Minister on 3 March 2011.

A Section 75W application has been submitted to the Department and is currently being assessed which seeks the Minister's approval to modify certain elements of the approved C4 building, including:

- mix of the uses within the building;
- total GFA;
- shape of floor plates of the podium and the tower elements of the building;
- facade details;
- roof treatment; and
- basement layout.

1.3 Site Location

Barangaroo is located on the north western edge of the Sydney Central Business District, bounded by Sydney Harbour to the west and north, the historic precinct of Millers Point (for the northern half), The Rocks and the Sydney Harbour Bridge approach to the east; and bounded to the south by a range of new development dominated by large CBD commercial tenants.

The Barangaroo site has been divided into three distinct redevelopment areas (from north to south) – the Headland Park, Barangaroo Stage 2 (also known as Barangaroo Central) and Barangaroo South.

The area of land within which development is proposed under this Project Application extends over land generally known and identified in the approved Concept Plan as Block 3 which comprises Lot 5 in DP 876514.

1.4 Project Summary Description

This Project Application seeks approval for the construction of a 49 storey building, comprising ground floor retail, a commercial lobby, childcare, podium and office tower, provision for associated cars and bicycle parking and the construction of the surrounding ancillary temporary public domain which includes access streets and landscaping.

1.5 Purpose of this Report

This report has been prepared to accompany the Project Application for the C3 Commercial Building and associated works at Barangaroo South. It addresses the relevant Director-General Requirements for the project. These Director-General Requirements are discussed in the Environmental Assessment Report (EAR) that has been prepared to support the application.

The Waste Management Plan (WMP) identifies waste sources during construction and operation and proposes measures to manage waste in a way that generally satisfies all legislative requirements.

The WMP is provided in a format which can assist with the completion of a Construction Waste Management Plan which will be required by the contractor prior to the construction of the development.

In summary, the key purposes of the WMP are to:

- Address the waste management requirements for the proposal to a standard suitable for approval under Part 3A of the EP&A Act;
- Provide guidance for the project in waste minimisation from construction activities;
- Nominate effective waste separation, recycling and re-use measures; and
- Develop management requirements for construction and operation.

1.6 Assumptions and Limitations

The principles outlined in this WMP will be incorporated into the building design and submitted with the Project Application for the C3 Commercial Building.

All figures and calculations are based on the building layout as set out in the C3 Commercial Building RSH+P drawing included in the Project Application. Waste generation estimations have been made using industry estimates and where appropriate devised from the waste estimation tables contained within City of Sydney's Policy for Waste Minimisation in New Developments 2005 (CoS Waste Policy).

All waste facilities and equipment will be designed and constructed in accordance with City of Sydney requirements as outlined in their Waste Policy where appropriate, the BCA, and Australian Standards.

2 Legislative Requirements

2.1 NSW State Legislation

2.1.1 The Protection of the Environment Operations Act 1997

The Protection of the Environment Operations Act 1997 covers the requirements for waste generators in terms of storage and correct disposal of waste and establishes the waste generator as having responsibility for the correct management of waste, including final disposal.

2.1.2 Waste Avoidance and Resource Recovery Act 2001

The object of the Waste Avoidance and Resource Recovery Act 2001 is to encourage the most efficient use of resources, to reduce environmental harm, and to provide for the continual reduction in waste generation in line with the principles of ecologically sustainable development (ESD).

This Waste Management Plan relates to a new development in NSW and is therefore written with reference to the NSW Waste Avoidance and Resource Recovery Strategy 2003, made under the Act.

The following hierarchy for managing waste, from most desirable to least desirable, meets the objectives of the Act:

- Avoid unnecessary resource consumption;
- Recover resources (including reuse, reprocessing, recycling and energy recovery); and
- Dispose (as a last resort).

2.1.3 The NSW Waste Reduction and Purchasing Policy (WRAPP) 1999

The NSW Waste Reduction and Purchasing Policy (WRAPP) requires all state government agencies and state owned corporations to develop and implement a WRAPP plan to reduce waste in four scheduled areas:

- Paper products;
- Office equipment and components;
- Vegetation material; and
- Construction and demolition materials.

The WRAPP is not directly applicable to the project, but has been used as a suitable guiding document for waste initiatives.

2.2 City of Sydney Council Policy

2.2.1 City of Sydney Council Policy for Waste Minimisation in New Developments 2005

The Council of the City of Sydney Policy for Waste Minimisation in New Developments 2005 (CoS Waste Policy) supports the Department of Environment, Climate Change and Water's (DECCW) NSW Waste Avoidance and Resource Recovery Strategy 2003. This Waste Policy is the guiding document for many of the waste initiatives and requirements for the Barangaroo development.

3 Green Star Requirements

The Green Star tool rates buildings on all relevant aspects of their environmental performance, with the rating divided into nine separate environmental categories:

- Management;
- Indoor Environment Quality;
- Energy;
- Transport;
- Water;
- Materials;
- Land Use and Ecology;
- Emissions; and
- Innovation.

These categories are further divided into credits, each addressing an initiative that improves or has the potential to improve a design, project or building's environmental performance.

3.1 Construction Waste – Commercial and Retail

Within the Management category of Green Star, Waste Management (Man-7) indicator addresses construction waste management and is worth a possible 2 points.

The maximum of 2 points is awarded for achieving 80% reuse or recycling of construction materials by weight, with 1 point awarded for achieving 60%.

The Man-7 indicator is the only directly applicable Green Star indicator to be influenced by the Construction Waste Management Plan. This indicator is the same for Green Star Office (V3) and Retail Centre (V1).

3.2 Operational Waste – Commercial

Within the Material category of Green Star Office (V3), Recycling Waste Storage (Mat-1) indicator allows up to a possible 2 points for inclusion of storage space that facilitates the recycling of resources used within buildings to reduce waste going to landfill.

Two points are awarded where a dedicated storage area for the separation and collection of office recyclables is provided and it:

- Is adequately sized in accordance with 'Sizing the Waste Storage Area' table (Table Mat-1.1 of Green Star);
- Meets the access requirements of 'Policy for Waste Minimisation in New Developments' (NSW, 2004): Section A, points A-12 through A-17, and Section C, points C6 and C7; and

- Is located in the same level as the loading dock with clearly marked, sign-posted, convenient, guaranteed access route within one of the following walking distances:
  - 20m of the exit used for recycling pick-up; or
  - 20m of the lift core serving all floors; or
  - 3m of the shortest route connecting the lift core serving all floors and the exit used for recycling pick-up.

3.3 Operational Waste – Retail

Within the Management category of Green Star Retail Centre (V1), the Waste Management (Man-7) indicator stipulates the following is required to qualify for the credit:

- a comprehensive waste management plan to reuse and/or recycle at least 80% of all waste by weight. This includes:
  - Retaining waste records and providing quarterly reports to the building owner;
  - Ensuring participation in waste minimisation training; and
  - Ensuring compliance with the waste minimisation plan to reduce on-site waste to landfill.

The Recycling Waste Storage (Mat-1) indicator stipulates the following is required to qualify for the credit:

- Provide a dedicated storage area for the separation and collection of recyclables from tenancies and common areas, that is adequately sized to handle the recyclable waste streams below and includes a holding area for items of re-use.
- The waste storage area shall meet the access requirements of 'Policy for Waste Minimisation in New Developments' (NSW, 2004), Section A (points A12 through A17) and Section C (points C14 and C15).
- The area shall be separate from, but adjacent to, general waste facilities; and located in the same level as the loading dock with a clearly marked, sign-posted, convenient and guaranteed access route which allows level access from tenancies (or goods lifts are provided) and avoids the need for manual handling of the waste.

The Waste Management and Recycling Plan (Mat-8) indicator stipulates the following is required to qualify for the credit:

- Provide a comprehensive Waste and Recycling Management Plan for the reduction in the amount, by weight, of the retail centre's overall operational waste.
- Provide waste storage facilities that meet the general, space, access, amenity and management requirements for retail premises of 'Policy for Waste Minimisation in New Developments' (NSW, 2004).

4 Construction Waste

During construction it is anticipated that a significant volume and variety of waste will be generated.

Figure 1 shows an overview of the major waste streams to be expected from the project.

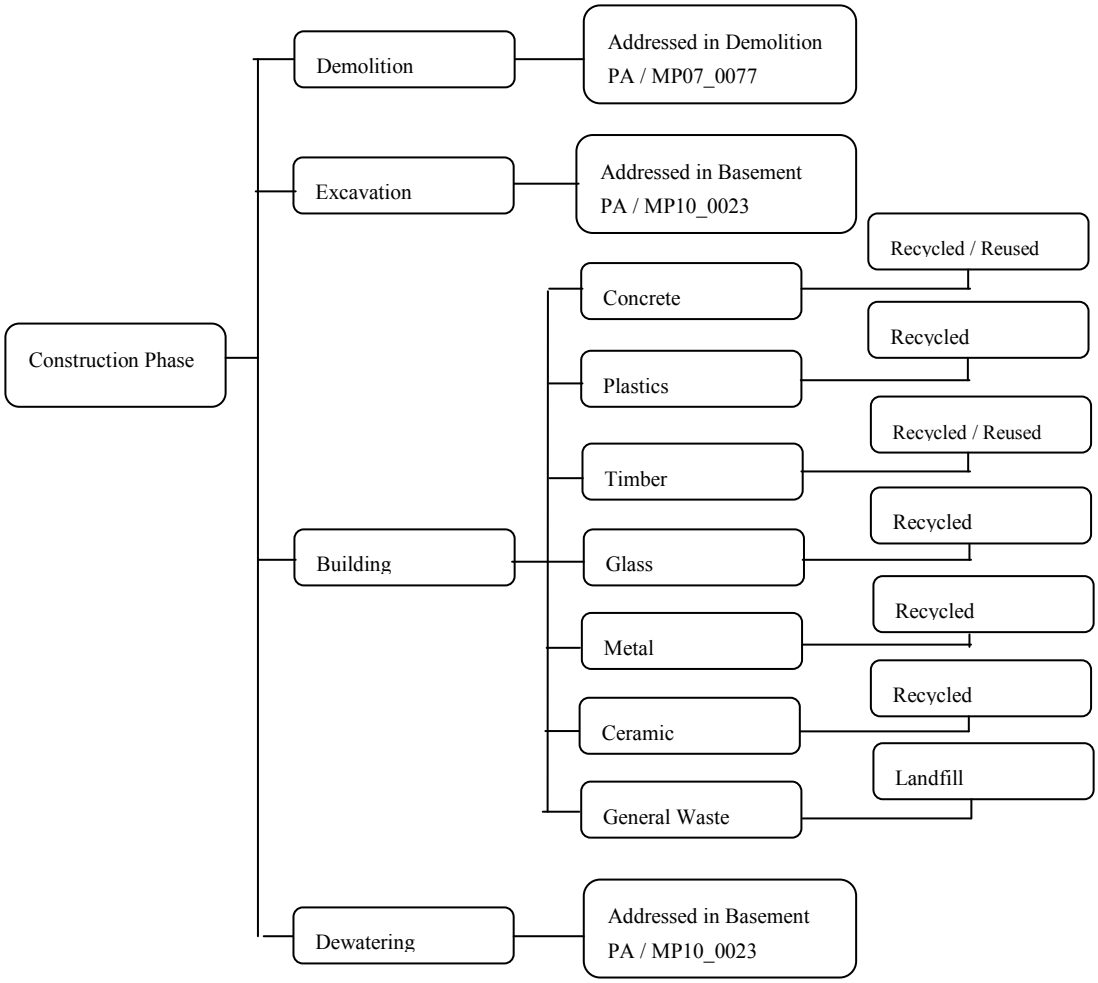


Figure 1: Overview of major waste streams expected from the project

4.1 Demolition & Excavation

Waste management of the site during demolition and excavation is addressed by the following two separate Planning Applications and relevant WMP's:

- Demolition of structures is addressed in the WMP for the Demolition of Existing Structures, East Darling Harbour Planning Application, which was approved by The Minister for Planning in November 2007(MP07_0077); and
- Excavation is addressed in the WMP for the Bulk Excavation and Basement Car Parking Planning Application (MP10_0023).

Waste management during demolition and excavation was detailed under these WMP's in terms of types waste generated and the management strategies. Emphasis was on reuse and recycling.

These WMP's cover the site preparation activities for the construction of C3 Commercial Building.

4.2 Building / Construction

The first goal for construction waste management is the reduction of waste generated. Waste reduction is the responsibility of all on site, as it relates to materials procurement, handling, storage and use. Any residual waste generated during construction will be reused, recycled, or as a last resort disposed to landfill.

While waste reduction is the goal, effective recycling of the waste that is generated will also be undertaken on site.

Waste collection during construction of the building will be appropriately managed through the staged nature of construction and the use of known quantities of materials. The majority of recyclable material that can be recovered during construction is likely to be off cuts and discards of glass, pipe, timber, steel, flooring, tiles and plasterboard. Waste material is also expected from construction packaging materials.

If material is required to be disposed of off-site, it will be classified for off-site disposal and disposed of in accordance with the DECCW's Waste Classification Guidelines 2008.

4.3 Goals / Targets

4.3.1 Overall Project Commitments

Lend Lease are committed to minimising waste to landfill and greenhouse gas emissions associated with waste generation and movement of waste from the site.

The target for construction waste is:

- Greater than 90% reduction of construction waste to landfill.

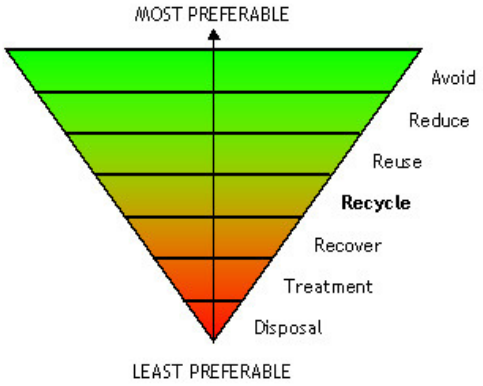
4.3.2 Green Star Credit

Up to two points are sought for the Man-7 Waste Management credit under the Green Star Office Rating Tool (V3). To obtain these points the contractor must:

- Implement a Construction Waste Management Plan (CWMP), retain waste records and quarterly reports to the building owner; and
- Reuse or recycle a percentage (by mass) of all demolition and construction waste as follows:
  - One point for 60% of the waste
  - Two points for 80% of the waste

4.4 General Waste Management Measures

The main goal in the construction phase will be to reduce the total volume of waste produced, which is to be achieved by effective materials procurement, management and supply.



Project managers, engineers, builders and subcontractors will play a key role in achieving on-site waste reduction targets on a day-to-day basis.

The waste management measures that will be implemented during the construction are generally outlined below. Actual strategies and management measures will be refined as the construction program and phasing is defined. This will be documented in the Construction Waste Management Plan (CWMP) for the project.

4.4.1 Waste Management Hierarchy

Waste that cannot be reused or recycled will be disposed in a licensed landfill.

4.4.2 Waste Avoidance and Reduction

Strategies to reduce the actual amount of waste generated during construction may include:

- Use of pre-cut and prefabricated materials where possible;
- Purchasing in bulk;
- Requesting metal straps rather than shrink wrap;
- Using returnable packaging such as delivery and storage pallets and reels;
- Returning packaging to suppliers or bring unpacked goods to site;
- Educating site workers in avoidance procedures;
- Ensuring that subcontractors use new purchasing guidelines;
- Materials being delivered by suppliers only when needed. This reduces the opportunity for waste through error in estimates. It also permits orders to be made from on-site measurements rather than from drawings, and it provides for any modifications that the client may request; and
- Appropriate storage arrangements established to protect products from damage due to weathering or moisture.

4.4.3 Resource Recovery

The 90% resource recovery target will be delivered through an on-site waste segregation solution with all waste streams arising that cannot be reused on-site, being transported to an appropriately licensed facility for recycling, reuse or disposal.

Waste collected from bins around the site will be consolidated into larger bulk bins located in docks around the site. This process will dramatically reduce the processing required to enable this waste to feed into recycled resources production processes.

Separated wastes are a more valuable resource. Waste streams will be separated on site where possible to save double handling and time and labour intensive sorting. On-site solutions will involve setting up waste handling systems, including a bin coding system on site, to segregate the waste into separate streams as it is produced.

The provision of waste skips or bins at the site (or separation off site) will be made for the following materials (as outlined by Man-7 of the Green Star Manual) as relevant and appropriate to the phase of construction;

- Cardboard;
- Timber;
- Metal;
- Soft Plastic;
- Polystyrene;
- Insulation;
- Concrete;
- Glass; and
- Bricks.

Note that recyclables may be combined in a skip so long as evidence is provided that the waste contractor will separate these materials off-site.

4.4.4 Training

Waste education will be included in site inductions to provide a better understanding of the development from a sustainability and environmental perspective.

All contractors, sub contractors and employees are to be informed of the waste management measures to be enforced during the construction, and given appropriate training in performing their duties so as to achieve the set waste minimisation goals.

Through the site induction training process, site staff will be made aware of the placement of the bins and their responsibility to separate materials.

4.4.5 Waste Utilisation on Alternate Sites

If possible it is desirable to co-ordinate with other construction jobs occurring at the time. Waste from the Barangaroo Building C3 project may find an immediate use as a construction material on other parts of the site and/or on another site, and hence save on some costs of collection and disposal.

4.4.6 Good Housekeeping

Litter management will be implemented on site to reduce air borne litter and litter entering the storm water system or Harbour.

4.4.7 Monitoring and Reporting

Documentation of waste removal, deliveries and final disposal is required for confirmation of waste recycling targets under the Green Star rating system. This documentation requirement relates to all three processes of demolition, excavation and construction.

A Waste Tracking Form to assist in the monitoring and reporting process is provided in Appendix A. This form for demolition and construction is obtained from the City of Sydney Council Waste Code. This sheet (or similar) is to be used and regularly updated to document the progress towards the 90% target.

Records must be kept by the contractor to demonstrate the actual percentage of waste recycled, including weight and volume of all wastes leaving the site and destination and name of the recycler/waste hauler, in accordance with legal and the Green Star Man-7 requirements. All documentation of materials disposed, including landfill receipts, contracts and waste plans, will be kept and maintained.

4.4.8 Materials and Procurement

A number of other initiatives will be incorporated to reduce the impact associated with material use during the construction phase of the project. These include:

- Use of off-site pre-assembly wherever possible – building components made off site using more efficient practices that minimise resource consumption, energy, water and waste to landfill; and
- Procurement and re-use of materials from a waste partner or approved waste manager/operator. The approved waste manager/operator can provide materials including recycled aggregates and glass fines that can be reused into new materials on site.

4.4.9 Transportation of Waste

Transportation of construction waste is discussed in the Construction Traffic Management Plan.

5 Operational Waste

The importance of both minimising the generation of waste and importantly the value of waste as a resource is reflected in the commitments for the Barangaroo project and this WMP. The Barangaroo integrated waste strategy is based on the principles of reduce, reuse, recycle and recover. It is designed to deliver the following outcome for operational waste;

- Greater than 80% diversion of operational waste to landfill.

This target involves various third parties and authorities, and will need partnerships and commitments to work with and toward this target. This ambition will be evaluated, measured and reviewed progressively throughout the project life.

The aim is to secure owner and occupant commitment to the following key strategies:

- **Sustainable consumption and waste minimisation** through education and awareness raising, information and monitoring systems, active intervention and assistance and a focus on product stewardship and extended producer responsibility.
- **Source segregation, storage and collection –** simple, easy to use systems will be applied across the precinct to maximise source segregation. Waste collection processes will be improved through precinct wide collection of separated waste streams
- **Resource recovery of recyclable waste** through the engagement of an approved waste manager/contractor with a Material Recycling Facility achieving 90-95% recovery of co-mingled recyclables.
- **Resource recovery and green power generation** using mixed solid waste through approved waste manager/operator's Mixed Waste Processing Facility. Biological treatment can produce inert organic material and methane that is used to power an off-site co-generation plant.

5.1 Waste Estimation

Waste volumes for C3 Commercial Building have been estimated in order to determine the waste storage area and waste storage bins which will be required. These waste storage areas and bins have been allowed for in the design of the basement and are detailed in the WMP for Barangaroo South - Bulk Excavation and Basement Car Parking (MP10_0023).

All waste estimates are based on the waste generation rates for commercial and retail development provided in the CoS Waste Policy. The waste storage area required is calculated based on the Plan Area Bin sizes provided in the CoS Waste Policy:

Table 1: Bin Sizes

Bin Capacity (L)	**Plan Area Bin (m^2)**
240	0.43
660	0.96
1000	1.58
1500	1.87
3000	2.77

The breakdown of the Gross Floor Area (GFA) for C3 Commercial Building is presented in the table below. These estimates have been used for the waste calculations presented in this WMP.

Table 2: Barangaroo, C3 Commercial Building GFA's

Description	**GFA (m^2)**	**Waste generation rate source**
Commercial (Office)	107,000	CoS Waste Policy generation rate for office
Retail	7,500	CoS Waste Policy generation rates for retail
Childcare centre	1,600	Assumed half the Cos Waste Policy generation rates for boarding house

Waste Estimation for C3 Commercial Building is described in the tables below. The different generation rates for retail are shown for information and have not been used in the total waste estimation as the breakdown of different types of retail has not yet been determined. All estimates are based on the applicable waste generation rates in the CoS Waste Policy. Waste generation is calculated from Gross Floor Area (GFA) using the total figures from Table 2.

For the childcare centre, waste generation is assumed at 20L/per person/week waste and 10L/per person/week recyclables. This estimate is half that recommended for a Boarding House in the CoS Waste Policy, as the Childcare centre would operate for no more than 12 hours per day. The childcare centre is assumed to cater for 90 children.

Table 3: Barangaroo C3 Commercial Building General Waste Estimation

Description	**General Waste Generation Rate**		**General Waste (L/day)**
Commercial (Office)	10	L/100m^2 /day	10,700
Retail - Anchor Store	50	L/100m^2/day	9,679
Retail <100m^2	50	L/100m^2/day	
Retail >100m^2	50	L/100m^2/day	
Retail >100m^2 (Greengrocer)	240	L/100m^2/day	
Retail Restaurant	10	L/1.5m^2 /day	
Retail Takeaway	80	L/100m^2/day	
Retail Gym/Common	10	L/100m^2/day	
Childcare centre	20	L/pp/week	257
TOTAL			**20,637**

Table 4: Barangaroo C3 Commercial Building Recyclables Estimation

Description	**Recyclables Waste Generation Rate**		**Recyclables (L/day)**
Commercial (Office)	10	L/100m^2 /day	10,700
Retail - Anchor Store	50	L/100m^2/day	6,122
Retail - <100m^2	25	L/100m^2/day	
Retail >100m^2	50	L/100m^2/day	
Retail - >100m^2 (Greengrocer)	120	L/100m^2/day	
Retail - Restaurant	2	L/1.5m^2 /day	
Retail - Takeaway	0	L/100m^2/day	
Retail - Gym/Common	10	L/100m^2/day	
Childcare Centre	10	L/pp/week	129
TOTAL			**16,951**

5.2 Waste Storage

The provisions included within the Council of the City of Sydney Policy for Waste Minimisation in New Developments 2005 (Section A, All Developments - Construction) will generally be followed for Waste Storage Design where appropriate.

The waste storage areas and rooms will be provided in the Basement.

Wherever possible recyclables and general waste are planned to be stored in separate areas within the basement to prevent waste streams being inadvertently mixed. Final space, access and amenity requirements will be subject to design development.

The appropriate space allocation has been made in the Basement for the C3 Commercial Building based on the waste generation figures presented above and the associated bin requirements presented below.

A number of different bin size options have been applied to the waste volumes estimated for the waste streams for the C3 Commercial Building.

Note:

- the waste storage area figures are based on daily collection for commercial and retail waste;
- the availability of use of 3000L and 1500L bins is not guaranteed, as these are not referenced in the City of Sydney Waste Policy for New Developments. In general bins larger than 1100L will save floor space but would be more difficult to manage. Details of bins of sizes above 1100L have been obtained from the ACT Development Control Code for Best Practice Waste Management 1999.

Table 5: Commercial Waste Storage Options (daily collection with 2:1 compaction on general waste and paper/cardboard) (all figures rounded up to nearest m^2)

Bin Capacity Options (L)	No. bins: General Waste	No. bins: Paper & Card	No. bins: Other Recyclables	Plan Area Bin (m^2)	Total Plan Area: General Waste (m^2)	Total Plan Area: Recyclables (m^2)
240	23	22	3	0.43	10	11
660	9	8	1	0.96	9	9
1100	5	5	1	1.58	8	10
1500	4	4	1	1.87	8	10
3000	2	2	1	2.77	6	9

The expected minimum space requirement for the C3 Commercial areas is:

- General waste – 2 x 3000L bins
- Recyclables – 9 x 660L bins

The table above indicates that the use of 3000L bins for recyclables is the most space efficient, however for the purposes of streaming the recyclable waste and the improved manoeuvrability, the use of 660L bins is recommended.

Using a combination of 3000L and 660L bins with a plan area of 15 m^2 would require waste storage areas to have at least twice this amount of floor area (e.g. x 30 m^2). This is to allow for access to the waste room and movement of bins, cleaning etc. This does not allow for space for a compactor(s).

Table 6: Retail Waste Storage Options (daily collection with 2:1 compaction on general waste and paper/cardboard) (all figures rounded up to nearest m^2)

Bin Capacity Options (L)	No. bins: General Waste	No. bins: Paper & Card	No. bins: Other Recyclables	Plan Area Bin (m^2)	Total Plan Area: General Waste (m^2)	Total Plan Area: Recyclables (m^2)
240	21	5	17	0.43	9	10
660	8	2	7	0.96	8	9
1100	5	1	4	1.58	8	8
1500	4	1	3	1.87	8	8
3000	2	1	2	2.77	6	9

The expected minimum space requirement for the retail areas is;

- General waste – 2 x 3000L bin
- Recyclables – 9 x 660L bins

Using a combination of 3000L and 660L bins with plan area of 15m^2 would require waste storage areas to have at least twice this amount of floor area (e.g. 30m^2). This is to allow for access to the waste room and movement of bins, cleaning etc. This does not allow for space for a compactor(s).

Table 7: Childcare Waste Storage Options (daily collection with 2:1 compaction on general waste and paper/cardboard) (all figures rounded up to nearest m^2)

Bin Capacity Options (L)	No. bins: General Waste	No. bins: Paper & Card	No. bins: Other Recyclables	Plan Area Bin (m^2)	Total Plan Area: General Waste (m^2)	Total Plan Area: Recyclables (m^2)
240	1	1	1	0.43	1	1
660	1	1	1	0.96	1	2
1100	1	1	1	1.58	2	4
1500	1	1	1	1.87	2	4
3000	1	1	1	2.77	3	6

The expected minimum space requirement for the Childcare area is;

- General waste – 1 x 240L bins
- Recyclables – 2 x 240L bins

Using three 240L bins with plan area of $2m^2$ would require waste storage areas to have at least twice this amount of floor area (e.g. $4m^2$). This is to allow for access to the waste room and movement of bins, cleaning etc. This does not allow for space for a compactor. In the event that compaction of waste is not undertaken due to the small volumes involved, twice the number of bins and floor area can be expected.

5.2.1 Compactors

It is likely that compactors will be provided for the general waste and cardboard/paper recycling for C3 Commercial Building and storage areas described above assume that compaction is being used. The type and size of compactor will be subject to design development and they will be provided in the Basement.

5.3 Waste Management Responsibility

The General, Space, Access and Amenity requirements detailed in Section A (All Developments) and Section D (Mixed Use Developments) in the CoS Waste Policy have generally been followed in determining waste management and storage requirements for Barangaroo. Green Star requirements on waste management and waste storage have also been addressed (see Section 3).

5.3.1 Commercial Waste Management

The following is likely to be adopted for commercial waste management:

- General waste will be stored in a dedicated waste storage area;
- Recyclables will typically be stored in a dedicated recyclables waste storage area;
- Compactors will be provided for the general waste and cardboard/paper waste where appropriate;

- Waste collection is assumed to be by private contractor occurring once every day; and

The final management requirements will be subject to design development.

5.3.2 Retail Waste Management

The following is likely to be adopted for retail waste management:

- General waste will be stored in a dedicated waste storage area;
- Retail wet waste will typically be stored in a separate semi enclosed area;
- Recyclables will typically be stored in a dedicated recyclables waste storage area;
- Compactors will be provided for the general waste and cardboard/paper waste where appropriate;
- Waste collection is assumed to be by private contractor occurring once every day.

The final management requirements will be subject to design development.

5.3.3 Childcare Waste Management

The following is likely to be adopted for childcare waste management:

- General waste will be stored in a dedicated waste storage area (with retail waste if need be);
- Recyclables will typically be stored in a dedicated recyclables waste storage area (with retail waste if need be);
- Compactors will be provided for the general waste and cardboard/paper waste where appropriate;
- Waste collection is assumed to be by private contractor occurring once every day.

The final management requirements will be subject to design development.

5.3.4 Waste Management Responsibility

The following measures outline the general responsibilities associated with waste management at the Barangaroo South development;

- The responsibility for cleaning the waste storage area will be on the building manager;
- Removal of waste to the waste storage rooms is the responsibility of building management;
- Recyclables are to be moved to the waste storage areas via the goods lifts;
- Labelling of the bins will be the responsibility of the building manager. This includes adequate signage identifying the waste and recycling area, and instructions outlining how to use the waste management system and what materials are acceptable for recycling;

- Transfer of bins from the storage area to the collection truck will be carried out by the waste collection contractors. After emptying the bins the contractors will return them immediately to the waste storage room within the premises;
- If truck access is limited, loading dock areas have provision for some bins to be moved here by building management (for a short period) prior to collection by waste contractors; and
- The final allocation of responsibilities will be subject to design development.

6 Conclusion

The purpose of this Waste Management Plan is to inform and accompany the Project Application for C3 Commercial Building for Barangaroo South under Part 3A of the Environmental Planning and Assessment Act (EP&A Act).

The Waste Management Plan concludes that waste management practices can be implemented under the proposal to achieve a significant reduction in waste going to landfill during construction and operation, and that adequate storage and handling facilities for the project waste streams from the C3 development are catered for within the central basement facility below.

Appendix A

Waste Tracking Form
(Construction)

Details of waste management – construction phase

MATERIALS ON-SITE			DESTINATION		
			REUSE AND RECYCLING		DISPOSAL
Type of materials	**Est.Vol. (m^3)**	**Est.Wt. (t)**	**ON-SITE** **- specify proposed reuse or on-site recycling methods**	**OFF-SITE** **- specify contractor and recycling outlet**	**- specify contractor and landfill site**
Excavated Materials					
Garden Organics					
Bricks					
Tiles					
Concrete					
Timber – please specify					
Plasterboard					
Metals					
Other waste eg. ceramic tiles, paints, PVC tubing, cardboard, fittings					