Lend Lease (Millers Point) Pty Limited

Barangaroo South – Concept Plan Amendment (MP06_0162 MOD4)

Waste Management Plan

ARUP

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July 2010

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Contents

		Page
1	Introduction	1
1.1	Background	1
1.2	Planning History	2
1.3	Purpose	3
1.4	Assumptions and Limitations	3
2	Legislative Requirements	4
2.1	NSW State Legislation	4
2.2	City of Sydney Council Policy	4
3	Green Star Requirements	5
3.1	Construction Waste – Commercial & Residential	5
3.2	Operational Waste – Commercial	5
3.3	Operational Waste – Residential	6
4	Construction Waste	7
4.1	Demolition	7
4.2	Excavation	8
4.3	Building / Construction	8
4.4	Goals / Targets	9
4.5	General Waste Management Measures	9
5	Operational Waste	12
5.1	Site Wide Waste Strategy	12
5.2	Waste Estimation	14
5.1	Waste Management and Storage	14
5.2	Waste Management Responsibility	15
6	Conclusion	18

Appendices

Appendix A

Waste Tracking Form (Demolition & Construction)

1 Introduction

1.1 Background

On the 20 December 2009, Lend Lease (Millers Point) Pty Limited (Lend Lease) was appointed as the preferred proponent to develop Barangaroo South; comprising of Blocks 1 to 4 and associated public recreation areas.

The area of land that is subject to the Concept Plan Amendment is indicatively shown in Figure 1, and is herein referred to as “Barangaroo South” or the “Site”. It comprises an open apron which is largely reclaimed over water and is identified in the existing approved Concept Plan as Blocks 1 – 4 and the immediately adjacent public recreation area. Barangaroo South also extends beyond the western edge of the existing apron and includes a north-west oriented intrusion into the existing waters of Darling Harbour (see Figure 1).

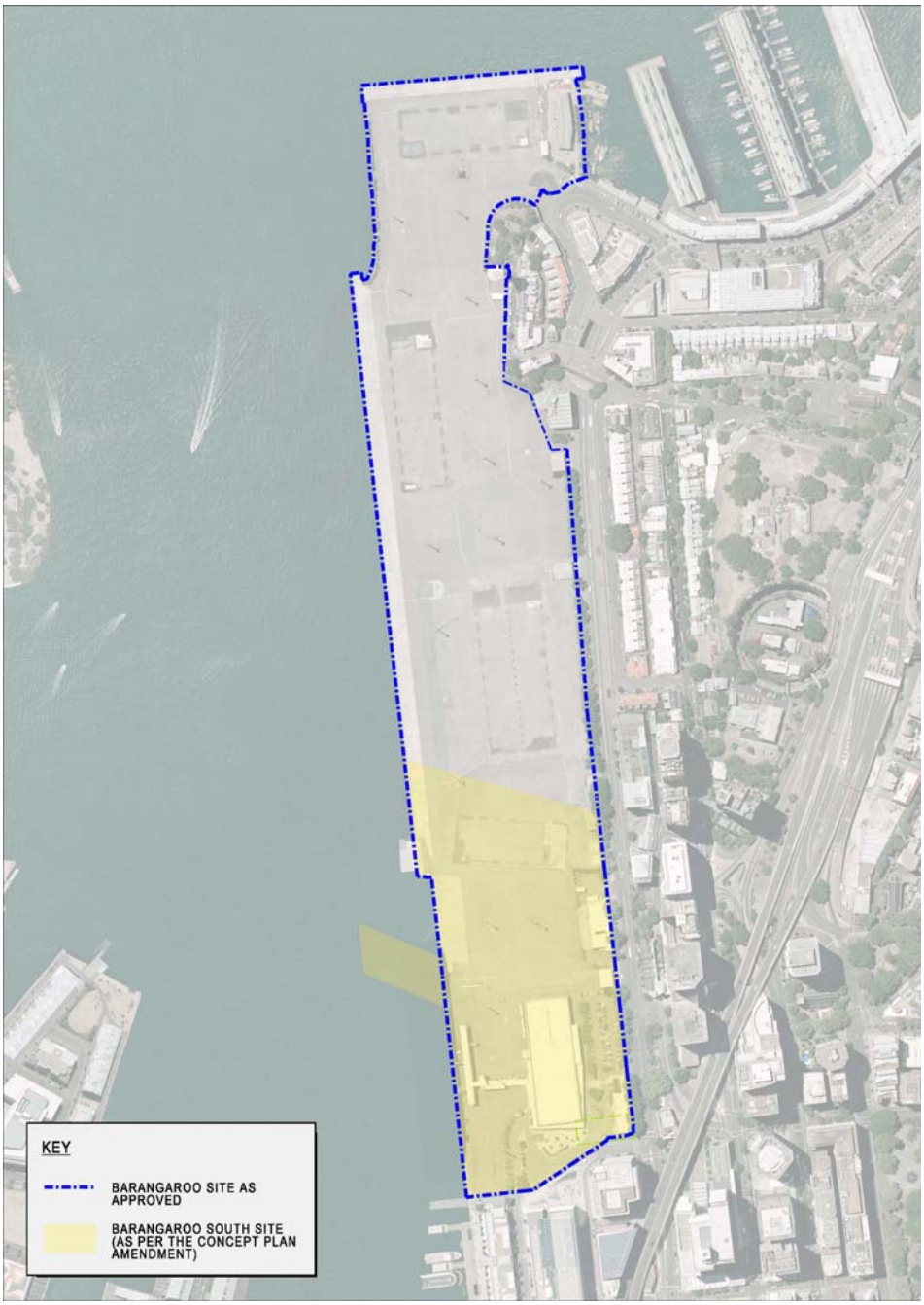


Figure 1: Indicative Site Boundary for Barangaroo South

1.2 Planning History

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;
- approximately 11 hectares of new public open space/public domain, with a range of formal and informal open spaces serving separate recreational functions and including a 1.4km public foreshore promenade;
- maximum building heights and maximum GFA for each development block within the mixed use zone; and
- public domain landscape concept, including parks, streets and pedestrian connections.

A condition of consent also required two enlarged water intrusions into the Barangaroo site, one at the northern end and one at the southern end and the creation of a natural northern headland.

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 allowed for a mixed use development involving a maximum of 489,500m2 of gross floor area (GFA) contained within 7 blocks on a total site area of 22 hectares.

The proposed Concept Plan Amendment (MP 06_0162 MOD 4) seeks the Minister's consent for:

- additional GFA within Barangaroo South, predominantly related to an increase in residential GFA;
- redistribution of the land use mix;
- an increase in height of a number of the proposed towers within Barangaroo South;
- the establishment of the new pier and landmark building extending into the Harbour; and
- reconfiguration and activation of the public waterfront area through the introduction of uses including retail and residential to the west of Globe Street.

1.3 Purpose

This Waste Management Plan (WMP) has been prepared in support of the Concept Plan Amendment (MP06_0162 MOD4) for Barangaroo South.

The WMP identifies waste sources during demolition, construction and operation and proposes measures to manage waste in a way that generally satisfies 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 demolition and construction activities;
- Nominate effective waste separation, recycling and re-use measures; and
- Develop management requirements for construction and operation.

1.4 Assumptions and Limitations

The principles outlined in this WMP will be incorporated into the design of Barangaroo and submitted with the subsequent Planning Applications.

All figures and calculations are based on building layouts as set out in the Concept Plan Amendment documentation. 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 in the Waste Policy where appropriate, the BCA, and Australian Standards.

2 Legislative Requirements

2.1 NSW State Legislation

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.

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 objects of the Act:

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

The NSW Waste Reduction and Purchasing Policy (WRAPP)

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

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 & Residential

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 Multi Unit Residential (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 – Residential

Within the Material category of Green Star Multi Unit Residential (V1), 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.

Up to two points are awarded as follows:

- One point is awarded where any three of the five initiatives below are implemented; and
- Two points are awarded where all of the four initiatives below are implemented.

Dedicated storage area - Dedicated storage area for the separation, collection and recycling of waste is provided and it:

- Can be easily accessed by all building occupants;
- Has suitable access for recycling companies; and
- Is sufficiently sized to accommodate the storage equipment for the following recyclables, as a minimum:
    - cardboard;
    - glass;
    - plastics - mixed containers;
    - plastics - soft plastics;
    - plastics - polystyrene;
    - metals; and
    - batteries.

Convenience of recycling - Disposal of recycling is at least as convenient as disposal of general waste, for example where waste chutes are provided for general waste, chutes are also provided for recycling.

Waste Chutes - Recycling and general waste chutes are provided on each floor in close proximity to each other.

Compost Facilities - Facilities are provided for on-site disposal and re-use of compost and green waste.

Facilities for over-sized household items - Space is provided in common areas for the collection of over-sized household items to facilitate re-use within the building and it must be:

- Large enough to contain a $2m^3$ cage;
- Clearly labelled for items for re-use;
- Separated from the general waste and recycling area; and
- Its existence and location must be communicated to tenants.

4 Construction Waste

During construction of Barangaroo South it is anticipated that a significant volume and variety of waste will be generated. Figure 2 shows an overview of the major waste streams to be expected from the Barangaroo South development and anticipated management measures.

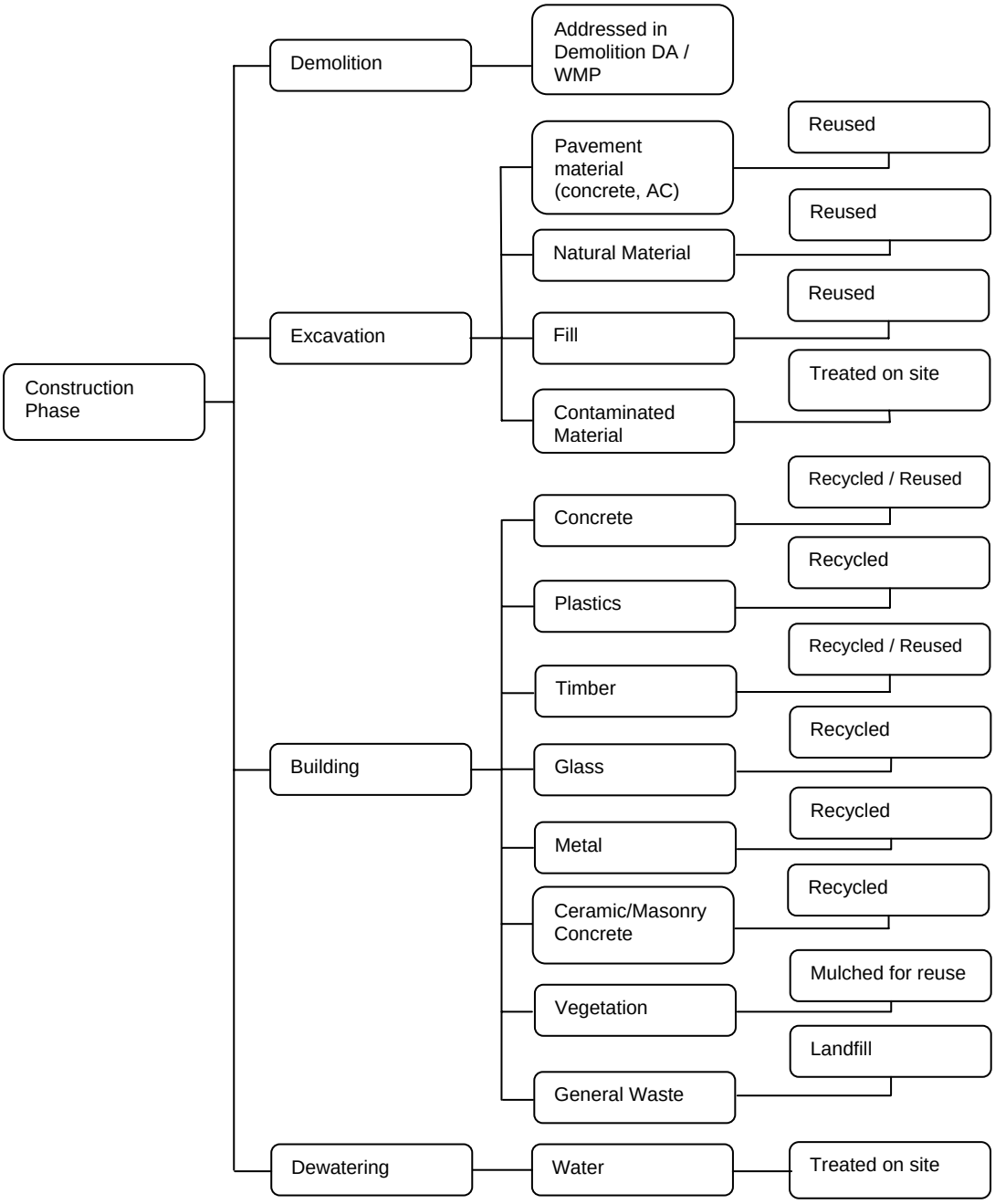


Figure 2: Overview of major waste streams expected from the project

4.1 Demolition

Demolition of the structures on the site is covered under a separate Planning Application (Demolition of Existing Structures, East Darling Harbour) which was approved by the Minister for Planning in November 2007 (07_0077).

Waste management during demolition was detailed under this Planning Application in terms of types waste generated and the management strategies. Emphasis was on reuse and recycling.

4.2 Excavation

Bulk excavation is addressed in the WMP for the Bulk Excavation and Basement Car Parking Planning Application (MP10_0023). Excavation for other areas of the site will be addressed in subsequent Planning Applications WMPs.

The material to be excavated includes:

- VENM (Virgin Excavated Natural Material) - Sandstone bedrock and natural marine sediments excavated as part of bulk earthworks.
- General Fill (not requiring treatment) - Based on investigation reports, fill material is anticipated to include a mixture of clay, gravel, sand, crushed rock, ash, timber and steel, that does not contain significant levels of contamination. This material will be assessed against re-use criteria established in future Human Health and Ecological Risk Assessments, which will be reviewed by an accredited Site Auditor.
- Impacted Fill Requiring Treatment - Based on investigation reports, some fill material is impacted with contamination that would require pre-treatment, prior to on-site re-use or potential off-site disposal.

Suitable material will be reused elsewhere within the Barangaroo South site, including use as filling material within the site of the proposed Headland Park and surrounding Public Domains. Prior to reuse the material would be assessed and verified against:

- Appropriate engineering properties and criteria verifying the material suitable for engineering placement in filling zones; and
- Human Health and Ecological Risk Assessment (HHERA) Site Specific Target Criteria (SSTC) verifying that the material does not pose unacceptable risk to Human Health or the environment.

Material that meets the remedial and engineering requirements will be taken directly to the site of the proposed Headland Park and the Public Domain locations upon excavation.

Material that does not meet the remedial and engineering acceptance criteria will be separated and treated onsite. Where treatment results in the material meeting the acceptance criteria, the material will subsequently be taken to the site of the proposed Headland Park and the associated Public Domains for filling.

Material failing the acceptance criteria following treatment will be taken off site for disposal in accordance with the DECCW's liquid and non liquid waste guidelines.

For the purposes of this WMP, concrete and asphalt concrete (AC) paving material have also been considered as excavated material and demolished paving material will be crushed and reused where possible, on or offsite.

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 Building / Construction

The goal for construction waste management is primarily the reduction of waste generated. Waste reduction is the responsibility of all on site, as it relates to materials procurement, handling, storage and use. Waste generated during construction will be reused, recycled or 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 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 could be recovered during construction is likely to be off cuts and discards of concrete, reinforcement (steel), timber, plasterboard, bricks and blocks.

All groundwater from the dewatering process will be collected and treated on site to a suitable standard and then properly disposed of on-site to sewer or stormwater, following approval by appropriate authorities and obtaining any required licenses or permits for treatment and discharge.

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.

4.4 Goals / Targets

4.4.1 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 targets for construction waste are:

- Greater than 90% reduction of construction and demolition waste to landfill; and

Lend Lease has formed a strategic partnership with DATS Environmental Services and Benedict Recycling to provide the highest standards in integrated waste management and recycling solutions for construction waste throughout the delivery phase of the Barangaroo South development.

4.4.2 Green Star Credit

In order to qualify for the Man-7 credit, Waste Management, under the Green Star Office Rating Tool (V3) up to two points will be sought. To obtain these points the contractor must:

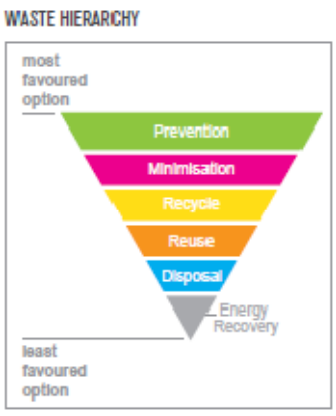
- Implement a Construction Waste Management Plan (CWMP), retain waste records and quarterly reports to the building owner; and
- A percentage (by mass) of all demolition and construction waste is reused or recycled as follows:
  - One point for 60% of the waste; and
  - Two points for 80% of the waste.

4.5 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 detailed. This will be documented in the Construction Waste Management Plan (CWMP) for the project.



4.5.1 Waste Management Hierarchy

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

4.5.2 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;
- Returning packaging to suppliers or bring unpacked goods to site;
- Purchasing in bulk;
- Requesting metal straps rather than shrink wrap;
- Using returnable packaging such as delivery and storage pallets and reels;
- Educating site workers in avoidance procedures;
- Ensuring that subcontractors use new purchasing guidelines;
- Materials will be 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 will be established to protect products from damage due to weathering or moisture.

4.5.3 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 off-site recycling facility.

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.

4.5.4 Training

A waste education program will be established on-site to provide a better understanding of the development from a sustainability and environmental perspective. This facility would be made available to both the local and broader community as well as the project workforce.

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.

4.5.5 Waste Utilisation on Alternate Sites

If possible it is desirable to co-ordinate with other construction jobs occurring at the time. Waste from Barangaroo South 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.

4.5.6 Good Housekeeping

Litter management will be implemented on site to reduce air borne litter and litter entering the stormwater system.

4.5.7 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.

Documents to assist in the monitoring and reporting process are provided in Appendix B. These include Waste Tracking Forms for demolition and construction as 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.

4.5.8 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.

4.5.9 Transportation of Waste

Transportation of construction waste is discussed in the Construction Traffic Management Plans for the individual Planning Applications.

5 Operational Waste

5.1 Site Wide Waste Strategy

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 South project and this WMP. The Barangaroo South integrated waste strategy is based on the principles of reduce, reuse, recycle and recover. It is designed to deliver the following outcomes for operational waste;

- Greater than 80% diversion of operational waste to landfill
- 'Closed loop' return of usable soil and energy from waste processing

These targets involve various third parties and authorities, and will need partnerships and commitments to work with and toward these targets. These ambitions 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.

These strategies are discussed in the following sections.

5.1.1 Sustainable Consumption and Waste Minimisation

Education plays a critical role in achieving the awareness and participation in responsible waste practices that underpins any successful waste management program. This will involve education and awareness raising programs targeted at the site's occupants including residents, commercial and retail tenants, building managers, hotel operators and visitors and tourists, as well as interested off-site groups such as surrounding businesses, schools and community groups.

Site waste management services can be provided to help in the implementation of waste reduction strategies and in implementation of best practice waste management approaches.

Site-wide waste monitoring and information systems can be used to collect and disseminate information on quantities of waste generated, to provide the information needed to drive continuous improvement in waste reduction. Site-wide procurement strategies may be established to assist tenants in selecting products which will generate minimal amounts of waste as well as promoting those which can be recycled at the end of their life, or are biodegradable and compostable.

Arup research shows that these initiatives should target to reduce the volume of waste generated by up to 20% from business as usual.

5.1.2 Source Segregation, Storage And Collection

Maximising the source segregation of recyclable waste includes providing adequate access, spatial provision and easy to understand labelling.

A site wide approach to collection of segregated waste streams can be applied with a consistent application of branding to ensure the system is easy to use.

An awareness raising and education program will be implemented to inform occupants in the waste segregation system. A 'What to do with…' website can be established for Barangaroo South to provide advice on where to direct less common waste streams.

The waste streams can be monitored for levels of contamination and regular reporting will alert the tenant representatives to where active intervention might be required to address contamination issues. Collections will be arranged for hazardous waste, electrical waste and other selected types of waste throughout the year to encourage an optimal outcome for disposal of all types of waste.

Within the development, internal waste collection and storage systems will be designed to generally meet occupant requirements and to encourage waste segregation. Staff and cleaners will be trained in the use of the site waste management system and equipment, including compactors, to optimise waste storage. Waste streams will be stored in centralised locations within building basements with regular collections minimising the volumes of waste storage on-site.

An approved waste manager/operator will coordinate site-wide collection of all waste streams from the Barangaroo South development. It is intended that all occupants make use of the site waste collection service to maximise efficiency (minimising waste truck movements) and to facilitate that waste collected from the site is transported to optimal treatment facilities.

Monitoring and reporting of the type and quantity of waste generated in the precinct can be an integral component of a continual improvement strategy. A site-wide communication strategy will enable information to be communicated to the community. This can include information systems within homes and businesses to encourage best practice waste management by individuals and organisations where appropriate.

5.1.3 Resource Recovery – Recyclables

The segregated waste streams will be typically transported to specialist facilities to maximise recovery of recyclable waste products. Recyclables will be sorted and recovered through a Materials Recycling Facility (MRF). It is anticipated that 90-95% of comingled recyclables can be recovered through this process. Some of waste streams recovered through this process include:

- Paper and cardboard
- Glass
- Metals
- Plastics

5.1.4 Resource Recovery - Mixed Waste

All residual mixed waste from Barangaroo South can be transported to an approved waste manager/operator's Mixed Waste Processing Facility where it will be subject to treatment via biological (or other equivalent) processes.

The processing technology is typically a combination of simple mechanical separation techniques, followed by further mechanical separation and biological treatment and is designed to divert around 70% of municipal solid waste (MSW) from landfill by recovering as much recyclable material as possible from the waste stream, and transforming organic waste into gas for electricity generation.

Recovery of recyclable and compostable products from commercial, retail and other land uses is anticipated to deliver in excess of 80% diversion from landfill. By-products of the process include water, which can be reused in the treatment process, and organic products that can be used for agriculture and landscaping. Further details will be provided in future relevant project Applications once the approved waste manager/operator is appointed.

5.1.5 Green Waste

Green waste from vegetation and landscaping will be typically be mulched.

5.2 Waste Estimation

Waste volumes for the Concept Plan have been estimated as presented in the table below.

All waste estimates are based on the waste generation rates for commercial and retail development provided in the CoS Waste Policy.

Public domain waste will be a function of the size and use of the public spaces as well as the commercial and retail functions located at ground level. An estimate of public domain waste generation will be formulated as the design develops and detailed in relevant future Project Applications.

Table 1 Approximate waste generation rates

Land Use	Residual and Organics Generation	Residual & Organics (kg/day)	Recyclables Generation	Total Recyc. (kg/day)	Total (kg/day)
Commercial	10 L/100m^2/ day	4300	10 L/100m^2/day	4300	8600
Residential	1.2 kg/unit/day	950	0.5 kg/unit/day	400	1350
Retail	Varies	5850	Varies	3550	9400
Hotel	Varies	1950	Varies	190	2150
Total	Varies	13000	Varies	8400	21400

The indicative GFAs that have been utilised to generate the approximations for generation of residual and organic and recyclable waste are shown in Table 2 below;

Table 2 Indicative area schedule

Area schedule summary	Current GFA
	Sqm
Commercial	327,900
Residential	99,763 (794 units)
Tourism (Hotel & Serviced apartments)	33,000 (200 hotel rooms, 45 serviced apartments)
Retail	33,777
Total Summary	**464,040**

5.1 Waste Management and Storage

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 South. Green Star requirements on waste management and waste storage have also been addressed (see Section 3).

Wherever possible recyclables and general waste are planned to be stored in separate areas to prevent waste streams being inadvertently mixed.

The details of waste storage areas and any compactors / chutes etc will be provided in the WMPs for subsequent Planning Applications where relevant.

Final space, access and amenity requirements will be subject to further design development.

5.2 Waste Management Responsibility

5.2.1 Residential Waste Management

The following waste management measures can be adopted for the residential buildings at Barangaroo South. The exact arrangements will be subject to further design development and future Project Applications:

- Occupants from each unit will place their general waste down a waste chute which will enable waste to be collected in waste storage rooms within the basement general waste storage rooms;
- Occupants will place their recyclables within recycling bins provided within storage areas on each floor. These recyclables will be collected by building management and transported via lifts to basement storage on a daily basis;
- Waste chutes may be provided – the details of these will be provided in the Planning Applications for individual buildings. They may consist of a general waste chute typically on each lift core, or a single general waste chute;
- A compactor for the general waste will be provided;
- Waste will be stored in bins in the basement; and
- For the purposes of this assessment, waste & recyclables collection has been assumed to be by City of Sydney or an approved waste manager/operator (operating under a precinct waste management agreement) occurring three times per week. This is the current collection frequency in this part of the city as advised to Arup by City of Sydney.

The final management requirements will be subject to design development.

5.2.2 Commercial, Hotel, Retail and Public Domain Waste Management

The following is likely to be adopted for retail, hotel, commercial and public domain waste management:

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

The final management requirements will be subject to design development.

5.2.3 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 and/or owners corporation;

- Removal of waste from retail to the waste storage areas is the responsibility of building management and tenants;
- Recyclables are to be moved to the Basement waste storage areas typically via the goods lifts;
- Labelling of the bins will be the responsibility of the building manager and/or owners corporation. 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; and
- If truck access is limited, loading dock areas have provision for some bins to be moved by building management or owners corporation (for a short period) prior to collection by an approved waste manager/operator.
- The final allocation of responsibilities will be subject to design development.

5.2.4 Waste Storage Design

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.

These provisions include:

- The floor of the waste storage rooms are to be constructed of concrete of at least 75mm thickness and graded and drained to the sewerage system as approved by Sydney Water Corporation. The walls of the waste storage rooms will be constructed of approved solid impervious material and shall be cement rendered internally to a smooth even surface covered at all intersections. The storage area will be constructed and finished to prevent absorption of liquids and odours, and will be easily cleanable;
- The waste storage rooms will be fitted with close fitting and self-closing doors openable from within the room. A sign will be erected in a prominent position clearly stating that the doors must be kept closed at all times when not in use;
- As food services will be present within the development, a refrigerated waste storage room/s will be provided;
- When metal containers are used, the storage room(s) will be fitted with a bump rail constructed of a durable impervious material, installed around and at least 50mm clear of walls, and galvanised steel protection plates will be installed around door openings;
- An artificial light source controllable from a switch located both outside and inside the room should be provided;
- The waste storage rooms will be supplied with an approved system of natural or mechanical exhaust ventilation;
- The waste storage rooms will be constructed in a manner as to prevent the entry of vermin;
- Smoke detectors will be fitted in accordance with AS1670 Automatic Fire Detection and Alarm Systems and connected to the fire indication system of the development;
- Adequate lighting will be provided to ensure safe access to the area at night;

- Signs provided on how to use the waste management system (i.e. segregation of wastes for recycling), as well as appropriate safety signage. The different recycling and waste bins will be clearly identified and signed appropriately; and
- All waste management facilities will be compliant with the Building Code of Australia (BCA) and all relevant Australian Standards.

In addition, the requirements for recyclables storage as specified in the Green Star rating tool/s have been addressed for the storage of waste.

Sizing of recyclables storage for both retail and residential will follow the requirements in Mat 1 'Recycling Waste Storage' in the Green Star Office Design Manual (V3) and the Green Star Multi Unit Residential tool (V1).

Storage of wet waste (typically compostable materials and the like) from commercial, retail or residential users will be subject to further design development and will be detailed, where relevant, in future Project Applications.

The final waste storage design requirements will be subject to design development.

5.2.5 Compactors

It is likely that compactors will be provided for:

- Residential general waste; and
- Commercial and retail waste: for the general waste and the cardboard/paper recycling.

The final number, type and arrangement and location will be subject to design development. Details will be provided in subsequent Planning Applications.

5.2.6 Waste Chutes

The design of the any waste chutes in the proposed buildings (subject to subsequent Planning Applications) will be designed generally to the specifications included within Appendix G of the CoS Waste Policy.

It is anticipated at this stage that waste chutes will be provided in the residential buildings only.

The final waste chute arrangements will be subject to design development.

6 Conclusion

The purpose of this Waste Management Plan is to inform and accompany the Concept Plan Amendment (MP06_0162 MOD4) 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.

Arup conclude that the development scheme presented in the proposed Concept Plan Amendment (Modification 4) will not result in any significant additional impacts beyond those reasonably understood and expected to have been contemplated in the Approved Concept Plan (as modified).

Appendix A

Waste Tracking Form (Demolition & 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					