Frasers Greencliff

Frasers Central Park

Block 2

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Appendices

1 Introduction

1.1 Purpose of Waste Management Statement

This Waste Management Statement (WMS) is prepared to address all relevant issues associated with obtaining approval for the Block 2 Frasers Central Park Project Application (PA) under Part 3A of the Environmental Planning and Assessment Act (EP&A Act).

Block 2 is part of the mixed-use development proposed at the Frasers Central Park site in Chippendale, Sydney NSW. The WMS identifies waste sources during demolition, construction and operation and proposes measures to manage waste in a way that satisfies all legislative requirements.

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

In summary the key purposes of the Waste Management Statement 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;
- Increase economic feasibility of the project through effective waste separation, recycling and re-use measures; and,
- Develop management requirements for construction and operation.

A plan detailing the basement layout and operational waste storage areas proposed is included as Appendix A.

1.2 Assumptions and Limitations

The principles outlined in this WMS will be incorporated into the building design and submitted with the Project Application (PA) for Block 2.

All figures and calculations are based on building layouts as contained on architectural drawings of Block 2 basement; *One Central Park East Basement PA Basement 1 – parking Layout A-PA-OA-046 Rev F*, the *FB2 Apartment mix and area summary Rev L*, the *Colliers KE markup 020211* (for retail) and latest figures for Level 3 (*General correspondence Buchan-GCOR 000006*).

Waste generation estimations have been made using industry estimates and 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 are required to be designed and constructed in accordance with City of Sydney requirements in the Waste Policy, the Building Code of Australia (BCA), and Australian standards.

2 Project Description

2.1 Project proposal

The Frasers Central Park project will be a sustainably designed and operated mixed use development on the site formerly occupied by the Carlton and United Breweries (CUB) at Chippendale, approximately 2 km to the south of the Sydney CBD. The site represents a significant addition to the urban environment in this location, located close by to the University of Sydney, existing residential and commercial zones, the Central Railway station and the CBD.

Block 2 is proposed as a 34 storey mixed use building. Block 2 will include 16,055 m^2 of net saleable area (NSA) retail space above a 5-level basement car park. Two towers will be built above the retail floors with 623 residential apartments currently proposed. The Towers will consist of a West Tower with 240 apartments and an East Tower with 383 apartments.

Block 5A and 5B are proposed as adjoining towers. Block 5A is proposed with 9 storeys and would contain 155 apartments. Block 5B is proposed with 19 storeys and would contain 230 apartments. Block 5 is predominantly residential apartments with 1436 m^2 of retail on lower ground and ground levels.

Block 5C is located in the south east corner of the Frasers Broadway site. It is proposed as predominantly residential building with approximately 413 residential apartments. The building consists of two sections (one at 21 storeys and one at 25 storeys) served by a common core.

This WMS applies to Block 2 only.

3 Legislative Requirements

3.1 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

Due to concerns about waste management practices and increasing volumes of waste, the NSW government introduced the Waste Avoidance and Resource Recovery Act 2001, superseding the Waste Minimisation and Management Act 1995 following its five year review.

The object of the Waste Avoidance and Resource Recovery Act 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).

The Waste Management Statement relates to a new development in NSW and is 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 2007 (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.

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

3.2 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 NSW Waste Avoidance and Resource Recovery Strategy 2003. The Waste Policy is the guiding document for many of the waste initiatives and requirements for the Frasers Broadway development.

Key requirements of the CoS Waste Policy include:

- A requirement that each floor is to have sufficient waste storage area to accommodate one day's waste. The centralised collection area is to have sufficient storage area to accommodate all waste generated within the facility between collections;
- All businesses must have written evidence, held on site, of a valid and current contract with a licensed collector for waste and recycling collection and disposal; and,
- All businesses are encouraged to include in their waste contracts provisions that allow for the collection and recycling of significant waste streams.
- Numerous other requirements are specified within the Waste Policy and have been addressed within this Waste Management Statement where required.

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. Those streams shaded grey will be expected to be significant in volume.

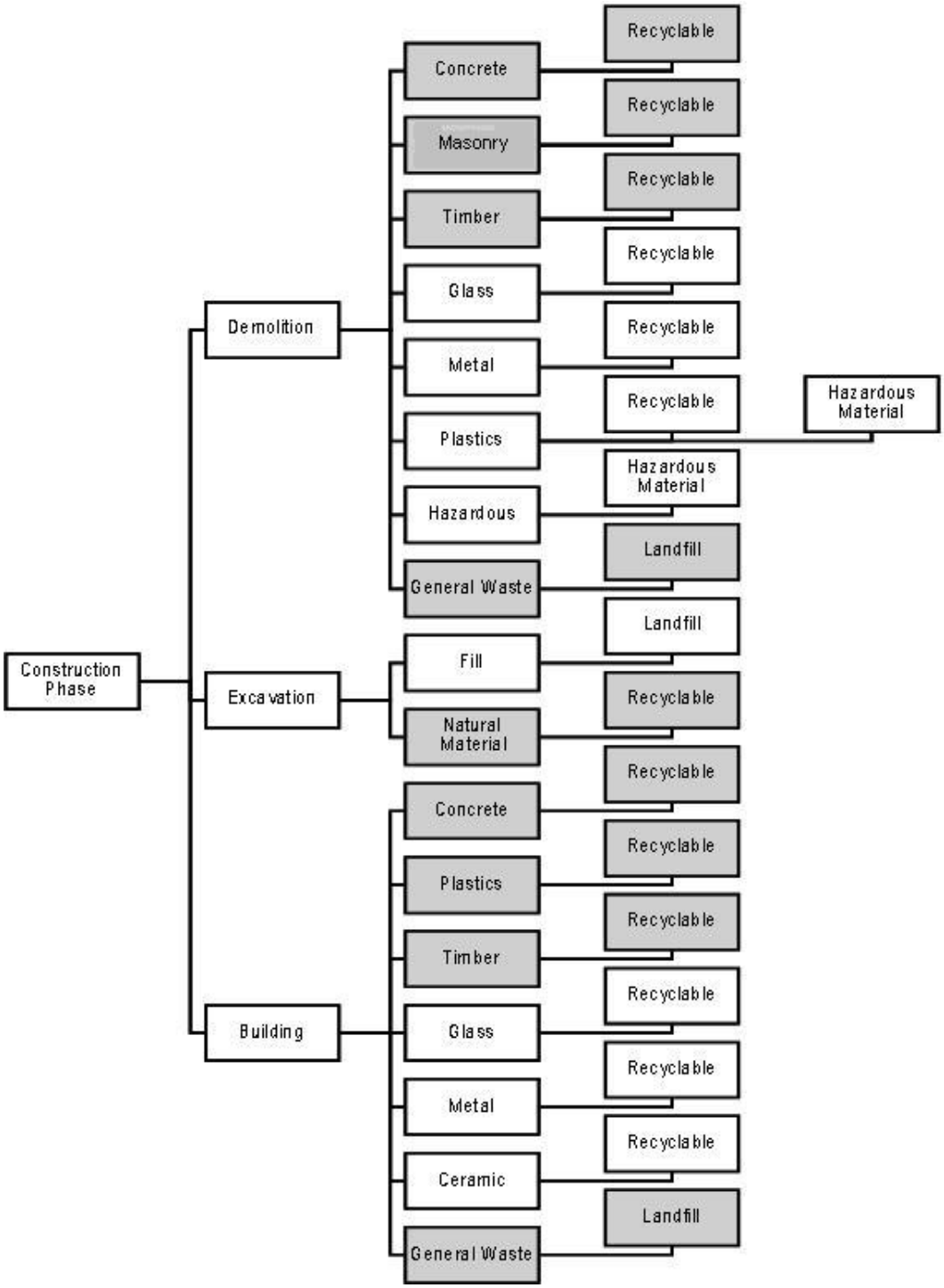


Figure 1 - Overview of major waste streams expected from the project

4.1 Demolition

Demolition of the site has already been approved.

4.2 Building

The goal for building 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.

4.2.1 Green Star Credit

Block 2 is comprised of both retail and residential uses and each eligible building class is assessed separately. Therefore two Green Star assessments are required, for both the Multi Unit Residential v1 and Retail Centre v1. For each building class, two submissions are required: a submission for a 'Design' Certified Rating; and a submission for an 'As Built' Certified Rating (in operation).

Man-7

For both Multi-Unit Residential and Retail Centre, the Man-7 credit stipulates initiatives relating to Waste Management. The following is therefore required;

The contractor will provide and implement a comprehensive waste management plan to reuse and/or recycle at least 80% of all waste by weight.

The Contractor shall comply with the following requirements:

- Provide information and contribute to the above mentioned Contractor's requirements for the implementation of a comprehensive waste management plan.
- Retain waste records and quarterly reports to the building owner.
- Reuse and/or recycle at least 80% of all waste by weight.
- Ensure participation in waste minimisation training by Sub-Contractors, which should be provided by the Contractor.
- Ensure Sub-Contractors comply with the Contractor's waste minimisation plan to reduce on-site waste to landfill.
- The Contractor must keep records from each sub-contractor to demonstrate the actual percentage of waste recycled by weight. These must be reported to the Principle quarterly.
- Note1: Asbestos or other hazardous materials that legally must be withheld from general construction waste and will not be included in the calculation for the total waste by mass.
- Note2: Project waste includes demolition and construction waste, but not soil or contaminated waste, as those would normally be excluded from the general waste stream.

Note3: The collection of waste for recycling should come from all construction, demolition and land clearing activities.

Mat-1

For both Multi-Unit Residential and Retail Centre, the Mat-1 credit stipulates initiatives relating to Recycling Waste Storage. Recycling bins are to be provided on each floor, and this Waste Management Statement describes the recycling storage space provided in the basement level, and has found recycling waste storage to be adequate to meet requirements of the Multi Unit Residential tool.

- Under guidance of the Retail Centre tool, with the Block 2 total GFA greater than 10,000m^2 a recyclables storage area totalling at least 0.25% GFA is required under the Green Star rating tool[1].
- The recyclables storage area proposed for the development meets the requirements for sizing under the credit as shown in the table below:

Block 2	**GFA (m^2)**	**Storage required by Green Star (m^2)**	**Recycling storage in LG Basement (m^2)**
Retail (ex supermarket)	13,104	33	42

Additional initiatives for Mat-1 are as follows:

For Residential

The Contractor shall comply with the following requirements:

- A dedicated storage area will be provided for the separation, collection and recycling of waste and 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.
- Facilities are provided for on-site disposal and re-use of compost and green waste.
- Space provided in common areas for the collection of over-sized household items to facilitate re-use within the building and must be large enough to contain a 2m3 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.

For Retail

The Contractor shall comply with the following requirements:

- Provide a dedicated storage area for the separation and collection of recyclables from tenancies and common areas is provided 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).

[1] Method of estimation taken from Green Star Office v3

- 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.
- Note1: The recycling storage area shall accommodate the storage equipment for the following recyclables, as a minimum:
    - Cardboard;
    - Glass;
    - Plastics -Mixed Containers;
    - Plastics -Soft Plastics;
    - Plastics -Polystyrene;
    - Metals;
    - Used cooking oil; and
    - Organic (compost) materials.
- Note 2: The area for holding items for re-use that arise out of tenancy fitouts must be, as a minimum:
    - Large enough to contain a $2m^3$ cage;
    - Clearly labelled for items for re-use; and
    - Its existence and location must be communicated to tenants.

Mat-8

Finally the Retail Centre tool has one additional credit Mat-8 which relates to a Waste Management and Recycling Plan.

The Contractor shall comply with the following requirements:

- 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).
- Note1: This plan applies to both general and recyclable waste generated from the communal areas and from the tenancies. Tenancies include all 'minors', and 'mini-majors' that share waste facilities and/or loading dock with the base building and minors.
- The Waste and Recycling Management Plan shall address both the owner and the tenants' general and recyclable waste. The plan must either:
    - Set explicit annual operational waste reduction targets, for reduction in the amount (by weight) of the retail centre's overall operational waste;

  OR
    - Provide a plan to audit the operational waste stream for setting such targets.
- The Waste and Recycling Management Plan must describe, at a minimum:
    - Collection areas for tenants and customers;
    - Waste and recycling streams segregated within the retail centre;
    - Transfer of material to common storage area (amenity and access);
    - Communal storage areas (access, amenity, and pollution prevention);
    - Frequency of collection;
    - Guidelines for tenant packaging;

- Signage and educational initiatives geared towards tenants and customers; and
- Monitoring and reporting requirements, minimum quarterly.

4.3 Construction Waste Management Measures

Waste collection during construction is expected to be simpler than during demolition due to the staged nature of construction and the use of known quantities of uncontaminated materials. The majority of recyclable material that could be recovered during construction is likely to be off cuts and discards of glass, piping, timber, steel, flooring, tiles and plasterboard and packaging waste such as cardboard and plastics.

The main goal in construction 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 following waste management measures will be implemented during construction:

- Waste that cannot be reused or recycled will be disposed in a licensed landfill;
- All documentation of materials disposed, including landfill receipts, contracts and waste plans, will be kept and maintained;
- Appropriate storage arrangements will be established to protect products from damage due weathering or moisture;
- Prefabricated materials such as frames and trusses will be purchased where possible;
- 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;
- Packaging will be minimised for materials and supplies;
- Arrangements will be made with recycling contractors to provide clearly marked bins for material separation;
- Sub-contractors will be made aware of the placement of the bins and their responsibility to separate materials;
- Litter management will be implemented on site to reduce air borne litter and litter entering the storm water system.

5 Operational Waste

5.1 Waste Estimation

Waste volumes for Blocks 2 have been estimated in order to determine the waste storage area and waste storage bins which will be required.

All waste estimates are based on the waste generation rates for commercial (including office, retail, food outlets etc) and multi-unit residential 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 and from the ACT Development Control Code[2] for bin sizes greater than 1100L.

5.1.1 Bin Sizes

Bin Capacity (L)	Plan Area Bin (m2)
240	0.43
660	0.96
1100	1.58
1500	1.87
3000	2.77
4500	3.28

5.1.2 Block 2 GFA's and No Units

Description	GFA (m2)	No units	CoS Waste Policy Source
Retail	13,104	-	Retail generation rates
Residential West Tower	-	240	Multi unit dwellings
Residential EastTower	-	383	Multi unit dwellings

Waste Estimation for Block 2 is described in the tables below. All estimates are based on the applicable waste generation rates in the CoS Waste Policy. Waste generation is calculated from applicable GFAs for retail and numbers of dwelling units for residential development.

The specific make up of retail uses is not confirmed and below is a best estimate of the uses to be proposed.

[2] ACT Development Control Code for Best Practice Waste Management in the ACT Sep 1999

5.1.3 Block 2 Retail General Waste Estimation

Description	Type	GFA (m^2)	Generation rate[i]	General Waste (L/day)
Basement	Fresh food	1,216	240 L/100m^2	2918
Basement (Supermarket)[ii]	Fresh Food	1,964	240 L/100m^2	0
Ground floor	Retail	2,202	50 L/100m^2	1101
Level 1	Retail	2,170	50 L/100m^2	1085
Retail terrace	Retail	818	0	0
Level 2	Foodcourt	1,084	10 L/1.5m^2	7227
Level 3	Restaurants	2,602	10 L/1.5m^2	17347
Level 4	Recreation facility	2,107	40L/100m^2	843
Level 5	Recreation facility	905	40L/100m^2	362
Total		**13,104**		**30,883**

[i] Retail generation rates comprise of a combination of rates supplied in the CoS Waste Policy for Greengrocer, Takeaway, Retail other than food over 100m², Retail other than food less than 100m2, Restaurant and Showroom.

[ii] Totals for the supermarket are not included in the waste estimation due to independent waste storage and handling by the supermarket.

5.1.4 Block 2 Retail Recyclables Estimation

Description	Type	GFA (m^2)	Generation rate[i]	Recyclables (L/day)
Basement	Fresh food	1,216	120 L/100m^2	1459
Basement (Supermarket)[ii]	Fresh Food	1,964	120 L/100m^2	0
Ground floor	Retail	2,202	50 L/100m^2	1101
Level 1	Retail	2,170	50 L/100m^2	1085
Retail terrace	Retail	818	0	0
Level 2	Foodcourt	1,084	2 L/1.5m^2	1445
Level 3	Restaurants	2,602	2 L/1.5m^2	3469
Level 4	Recreation facility	2,107	10L/100m^2	211
Level 5	Recreation facility	905	10L/100m^2	91
Total		**13,104**		**8,861**

[i] Retail generation rates comprise of a combination of rates supplied in the CoS Waste Policy for Greengrocer, Takeaway, Retail other than food over 100m², Retail other than food less than 100m^2, Restaurant and Showroom.

[ii] Totals for the supermarket are not included in the waste estimation due to independent waste storage and handling by the supermarket .

As shown in the tables above;

Retail uses within Block 2 consist of a large number of types and is estimated to generate general waste of 30,883 L/day and recyclables of 8,861 L/day.

To determine the requirements for waste storage for retail between east and west areas, a split of 50/50 on waste between west and east waste storage has been estimated except for Level 2 foodcourt which is a 80/20 split between east and west.

Waste source	General Waste (L/day)	Recycled Waste (L/day)
Block 2 Retail East	17,609	4,864
Block 2 Retail West	13,273	3,997

5.1.5 Block 2 Residential General Waste Estimation

Description	Location	Generation rate	General Waste (L/day)
Residential Units	East Tower	80 L/ unit /week	4,377
Residential Units	West Tower	80 L/ unit /week	2,743
Total			**7,120**

The residential waste generation rate of 80L/unit/week has been used as included in the CoS Waste Policy.

5.1.6 Block 2 Residential Recyclables Estimation

Description	Location	Generation rate	General Waste (L/day)
Residential Units	East Tower	40L/ unit /week	2,189
Residential Units	West Tower	40L/ unit /week	1,371
Total			**3,560**

The residential recycling generation rate of 40L/unit/week has been used as suggested by the City of Sydney.

As shown in the tables above;

Residential apartments in Block 2 are expected to generate a total of 7,120 L of general waste per day and 3,560 L per day of recyclables per day.

5.2 Waste Management

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 been followed in determining waste management and storage requirements for Block 2. Green Star requirements on waste management and waste storage have also been addressed (see Section 4.2.1).

Waste storage has been planned so that residential waste and commercial wastes are stored separately. Also wherever possible recyclables and general waste are planned to be stored in separate rooms to ensure waste streams are not inadvertently mixed.

The location of waste storage rooms and waste chutes are highlighted on the basement plan in Appendix A.

5.2.1 Residential Waste Management

The following residential waste management measures will be adopted for Block 2:

Residential general waste and residential recyclables are all to be stored in separate rooms (see Section 5.3);

Residential floors each have one general waste chute. Occupants will place their general waste down these chutes enabling waste to be collected in waste storage rooms within the basement;

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;

Waste will be stored in 240L or 660L bins;

Waste collection is assumed to be by council collection with waste removed 3 times per week.

5.2.2 Retail Waste Management

The following management measures for retail waste will be adopted for Block 2:

General waste generation will be large, requiring the use of a large single unit compactor (Room 2.5);

Waste generated from the supermarket has not been included in waste storage requirements, waste storage will occur within the floor area designated for the supermarket;

Retail recyclables to be stored in a dedicated retail recycling waste storage room (Room 2.6);

Waste collection is assumed to be by private contractor with waste removed every day.

Note that a conservative approach should be adopted by management and allow for some additional waste capacity in the event of waste collection failure on a particular day.

5.3 Waste Storage Requirements

The following table outlines a suggested method for waste storage within the proposed basement waste storage areas. The proposed storage rooms are of a suitable size.

Note that the storage is based on the compaction of all general waste and all paper and cardboard recycling at a ratio of 2:1 (including use of a cardboard bailer where feasible), and waste collection every 3 days for residential and every day for retail.

Waste Storage Requirement				
Room Name	**Floor Area**	**Volume of waste to be stored (L)**	**Storage bins proposed**	**Min area required** [ii]
EAST TOWER				
East Retail Recycle Waste	42 m^2	4,864	3x660L paper 2x660L plastic 1x660L glass 1x660L metal Share 240L bins for retailers	18m^2
East Retail Waste Storage	53 m^2	17,609	1x660L compactor 14 x 660L	31m^2
Zone of Green Waste Bins	20m^2	-	1 x 240L tipper + IVC 6x240L 1x2m^3 cage	Approx 15 m^2 for green waste storage and some composting
East Residential Recycle Waste	27 m^2	6,587	7x660L paper 2x660L plastic 1x660L glass 1x660L metal	22m^2
East Residential Waste Storage	41 m^2 (29 m^2 + 12m^2)	6,566	1x660L rotary compactor 6x660L 6x240L	23m^2
Storage Room	16m^2		Bulky Goods Storage	8m^2 required per unit block (CoS)
WEST TOWER				
Bin Wash[i]	15m^2	-	-	-
West Retail Recycle Waste	40 m^2	3,997	1x660L compactor (paper and card) 2x660L paper 2x660L plastic 1x660L glass 1x660L metal Share 240L bins for retailers	16m^2

West Retail Waste Storage	41 m^2	13,273	1x660L compactor 11x660L	26m^2
West Residential Recycle Waste	40 m^2	4,113	4x660L paper 1x660L plastic 1x660L glass 1x660L metal	14m^2
West Residential Waste Storage	40 m^2	4,115	1x660L rotary compactor 7x660L	17m^2

[i]Dedicated bin wash facilities are provided in the West Tower. Bin wash is for occasional usage by management. On occasion where large numbers of bins require cleaning an external contractor will be employed to remove and clean bins.

[ii]Approximate minimum area required equals plan area of required bins x 2. Standard bin sizes are given in Section 5.1. Additional space will be needed for outlet of waste chutes, additional compaction equipment, and spare bins if necessary.

5.3.1 Waste Management Responsibility

The following measures outline the responsibilities associated with waste management at the Frasers Broadway development:

- The responsibility for cleaning the waste storage area and waste chutes will be on the building manager;
- Removal of waste from Block 2 commercial premises to the waste storage rooms is the responsibility of building management;
- Recyclables are to be moved to the common basement storage via the goods lifts;
- Green waste is to be able to be stored on the basement level. Capacity for storage of green waste in the basement is to be made on occasions when onsite treatment cannot accommodate all green waste;
- 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;
- Pick up of the large single unit compactor proposed for retail general waste is required by a purpose built truck, with the entire metal storage unit removed and replaced on each pick up;
- 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.

- On occasion where large numbers of bins require cleaning an external contractor will be employed to remove and clean bins.

5.3.2 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) need to be followed for Waste Storage Design.

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 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 prevention system of the building;
- 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;
- 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 for Block 2.

Sizing of recyclables storage for both commercial and residential has been checked against the requirements in Mat 1'Recycling Waste Storage' in the Green Star Office Design Manual (V3).

5.3.3 Compactors

Potential options for compactors are detailed below.

Residential – A rotary compactor able to house a number of 660 L general waste bins will be procured and installed beneath the waste chute of the East and West towers. A rotary compactor is required to be used on all general waste received in these basement waste storage rooms. A typical floor space take for a rotary compactor is in the order of 3m by 3m, which has been allowed for in the Block 2 residential general waste room design.

No compaction of recyclables is proposed.

Retail - A single unit compactor/s able to compact within 660 L general waste bins is required for each of the East Retail and West retail general waste storage areas. These compactors are required to be used on all general waste received in the general waste storage room/s. Rotary carousel compactors are not currently proposed as waste does not arrive into retail waste rooms via a garbage chute.

No compaction of recyclables is proposed.

Additional details

A multi-bin carousel compactor is designed to be used for residential waste arriving via a waste chute. The carousel can contain up to 8x240L bins, or lesser combinations of larger bins can be used (up to 1500L).

The floor area required for a multi-bin compactor is approximately 3m by 3m, with additional space for storage of extra bins.

A single large unit compactor (between $19m^3$ and $40m^3$) could be used to reduce the volume of general waste requiring storage. This is particularly relevant to the commercial general waste storage room in Block 2. For this waste a unit of $19m^3$ could be used. Units of this type are collected and replaced every day by a private waste contractor.

A large single unit compactor is not proposed for Block 2 due to access and logistical limitations.

5.3.4 Waste Chutes

The design of the waste chutes for use in Block 2 (location indicated on basement plan in Appendix A) will be designed to the specifications included within Appendix G of the CoS Waste Policy, with the exception that waste chutes will be constructed with a slight offset at its base to ensure the velocity of waste entering bins is not excessive. This contradicts measure 1.3 from Appendix G of the CoS Waste Code that states; 'Chutes must be vertical without bends or 'offsets' and not be reduced in diameter'.

An offset in waste chutes of less than 45 degrees is not seen as an issue in the opinion of the waste chute manufacturer Wastech engineering.

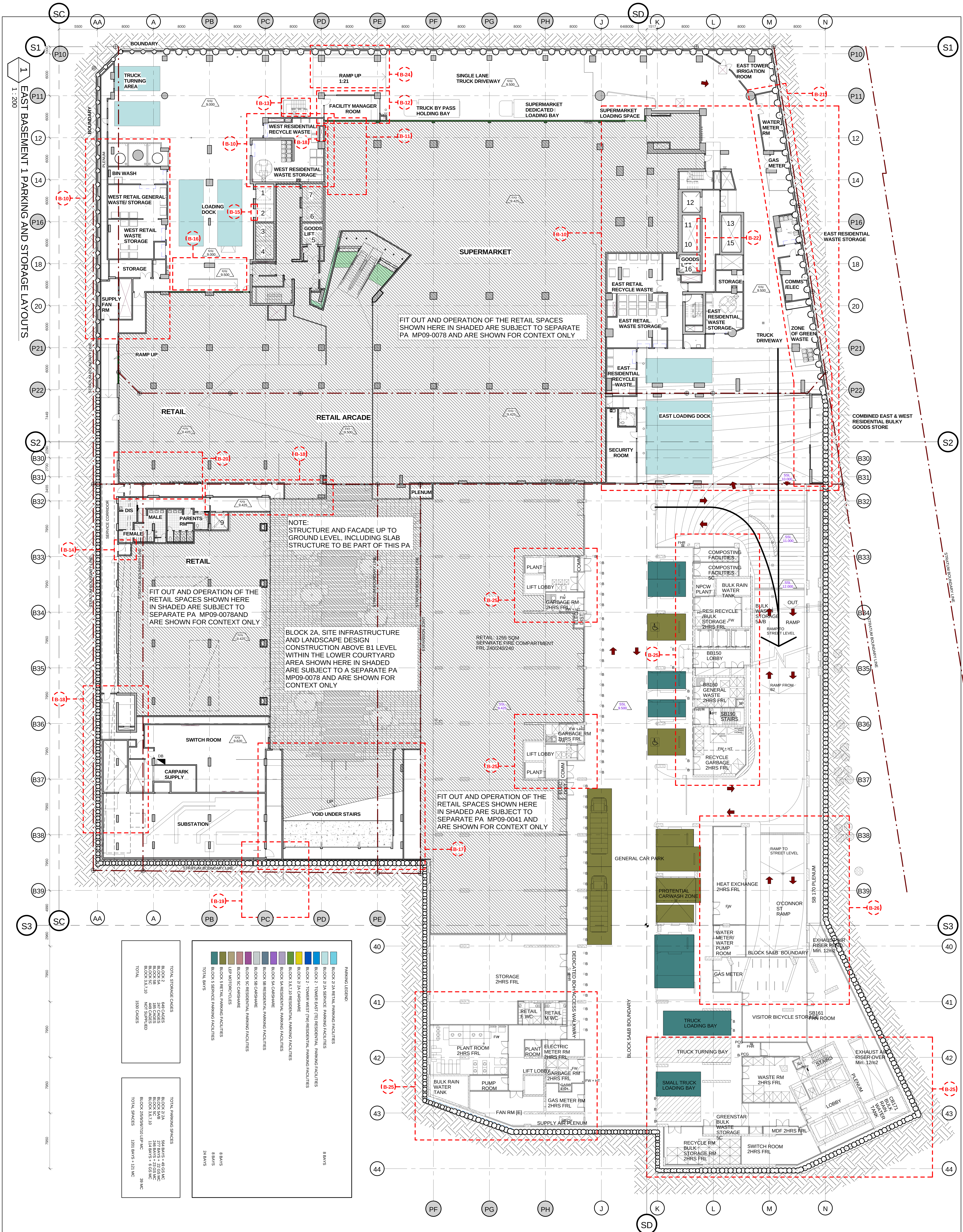
5.4 Green waste

Green waste from Block 2 is proposed to be treated onsite, with this proposal addressed in the green waste consultant report in Appendix B.

Space for the storage and potential treatment of green waste in the basement area is included in Section 5.3.

Appendix A

Waste storage areas in common basement



EAST BASEMENT 1 PARKING AND STORAGE LAYOUTS
1 : 200
SUPERMARKET
RETAIL ARCADE
RETAIL
RAMP UP 1:21
SINGLE LANE TRUCK DRIVEWAY
FACILITY MANAGER ROOM
TRUCK BY PASS HOLDING BAY
SUPERMARKET DEDICATED LOADING BAY
SUPERMARKET LOADING SPACE
EAST TOWER IRRIGATION ROOM
TRUCK TURNING AREA
WEST RESIDENTIAL RECYCLE WASTE
WEST RESIDENTIAL WASTE STORAGE
BIN WASH
WEST RETAIL GENERAL WASTE/ STORAGE
WEST RETAIL WASTE STORAGE
LOADING DOCK
STORAGE
SUPPLY FAN RM
GOODS LIFT
EAST RETAIL RECYCLE WASTE
EAST RETAIL WASTE STORAGE
EAST RESIDENTIAL WASTE STORAGE
EAST RESIDENTIAL RECYCLE WASTE
TRUCK DRIVEWAY
EAST LOADING DOCK
SECURITY ROOM
COMBINED EAST & WEST RESIDENTIAL BULKY GOODS STORE
FIT OUT AND OPERATION OF THE RETAIL SPACES SHOWN HERE IN SHADED ARE SUBJECT TO SEPARATE PA MP09-0078 AND ARE SHOWN FOR CONTEXT ONLY
NOTE: STRUCTURE AND FACADE UP TO GROUND LEVEL, INCLUDING SLAB STRUCTURE TO BE PART OF THIS PA
BLOCK 2A, SITE INFRASTRUCTURE AND LANDSCAPE DESIGN CONSTRUCTION ABOVE B1 LEVEL WITHIN THE LOWER COURTYARD AREA SHOWN HERE IN SHADED ARE SUBJECT TO A SEPARATE PA MP09-0078 AND ARE SHOWN FOR CONTEXT ONLY
FIT OUT AND OPERATION OF THE RETAIL SPACES SHOWN HERE IN SHADED ARE SUBJECT TO SEPARATE PA MP09-0041 AND ARE SHOWN FOR CONTEXT ONLY
RETAIL: 1255 SQM SEPARATE FIRE COMPARTMENT FRL 240/240/240
SWITCH ROOM
CARPARK SUPPLY
SUBSTATION
VOID UNDER STAIRS
GENERAL CAR PARK
PROTENTIAL CARWASH ZONE
HEAT EXCHANGE 2HRS FRL
O'CONNOR ST RAMP
SB 170 PLENUM
BLOCK 5A&B BOUNDARY
DEDICATED BOH ACCESS WALKWAY
STORAGE 2HRS FRL
VISITOR BICYCLE STORAGE
TRUCK LOADING BAY
TRUCK TURNING BAY
SMALL TRUCK LOADING BAY
WASTE RM 2HRS FRL
GREENSTAR BULK WASTE STORAGE
RECYCLE RM BULK STORAGE RM 2HRS FRL
SWITCH ROOM 2HRS FRL
MDF 2HRS FRL
LOBBY
PLANT ROOM 2HRS FRL
BULK RAIN WATER TANK
PUMP ROOM
FAN RM (E)
SUPPLY AIR PLENUM
GAS METER RM 2HRS FRL
LIFT LOBBY
GARBAGE RM 2HRS FRL
PLANT
PARKING LEGEND:
BLOCK 2/ 2A RETAIL PARKING FACILITIES
BLOCK 2/ 2A SERVICE PARKING FACILITIES
BLOCK 2 - TOWER EAST (TE) RESIDENTIAL PARKING FACILITIES
BLOCK 2 - TOWER WEST (TW) RESIDENTIAL PARKING FACILITIES
BLOCK 2/ 2A CARSHARE
BLOCK 3,6,7,10 RESIDENTIAL PARKING FACILITIES
BLOCK 5A RESIDENTIAL PARKING FACILITIES
BLOCK 5A CARSHARE
BLOCK 5B RESIDENTIAL PARKING FACILITIES
BLOCK 5B CARSHARE
BLOCK 5C RESIDENTIAL PARKING FACILITIES
BLOCK 5C CARSHARE
LEP MOTORCYCLES
BLOCK 5 RETAIL PARKING FACILITIES
BLOCK 5 SERVICE PARKING FACILITIES
TOTAL BAYS
TOTAL STORAGE CAGES
TOTAL PARKING SPACES

Client: FRASERS PROPERTY

L11, 488 KENT ST. SYDNEY NSW 2000
Tel. 61 2 8823 8800
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Architect: PTW Architects

Project: ONE CENTRAL PARK EAST BASEMENT PA

Title: BASEMENT 1 - PARKING LAYOUT

Scale: 1 : 200 @B1

Plot Date: 7/07/2011 12:06:13 PM

Job No: 209.065

Dwg No: A-PA-OA-046

Revision: F

Status: AMENDED PLANNING APPLICATION

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Appendix B

Green waste consultant report

1 Introduction

Arup understands that Frasers Broadway has ambitious sustainability intentions for the potential reuse of green waste generated from the site.

Arup is advising on the potential for treatment and reuse of green waste from Blocks 2 and 5 during the operational phase of the development, including potential of options such as vermiculture, small scale composting and larger scale In Vessel Composting (IVC).

The options for green waste treatment and use on site are closely tied to the proposed green waste management for Blocks 2 and 5 and the potential green waste generation from the site.

2 Proposed green waste management for Blocks 2 and 5

The main elements of the proposed green waste management strategy are;

- The main green waste handling area is proposed as L29 of Block 2 or the basement of Block 2. Level 29 of Block 2 is an area served by direct access to lifts (for importation of green waste from other levels) and general waste chutes to the basement level (for potential use for green waste in negotiation with building management), as well as a green waste chute from L34 to L29. If space requirements exclude significant green waste treatment on L29, green waste treatment in the basement level of Block 2 is the preferred option.

- While L34 of Block 2 East Tower includes a significant area of green space it is not directly served by lift access and therefore is not a good location as a main green waste handling and treatment area. A green waste chute from L34 to L29 of the Block 2 East Tower is proposed, to allow L34 green waste to be transported to L29.

- Green waste from lower floors and from green facade, landscaping area and courtyards are to be transported via lift to the L29 green waste handling / treatment area.

- While green waste is to be treated on site and reused wherever possible, some allowance for green waste or treated green waste to be transported offsite from time to time is required. This may be needed for times of large green waste generation on the site, or for particularly hard to treat waste (such as woody green waste). Green waste in these situations can be transported to the basement level waste storage areas for later removal by a green waste contractor. There is adequate space for a small number of bins to be stored in the Block 2 waste storage areas for use in green waste storage and disposal.

3 Estimation of green waste volumes

The estimated green waste generation from the site is based on the proposed green space areas for Blocks 2 and 5, with the green waste generation rate based on a Californian government estimate for biomass generation for lawns[1] and prior urban landscaping projects. A general estimate of this kind is required as a detailed planting schedule and detail of proposed green space management for Frasers is not currently available.

The amount of green space proposed for Blocks 2 and 5 are significant, while there are few areas at ground level available for planting out, the development has been proposed with many other spaces such as roof terraces, green facades, landscape plantings and courtyards.

All calculations are based on basement layouts as contained on architectural drawings of Block 2 (*Plan B1 DDA-BASE 1009-0 Lower Ground Rev 2*) and Block 5 (*Plan Lower Ground Level B1 A-OA-046(U)*) and the *FB2 Green wall schedule, FB2 Planter Box Schedule A* and the Landscape areas shown in *100527_PA_BLK5_BASIX_landscape*.

The total proposed green space area and estimated green waste generation for Blocks 2 and 5 are shown below;

Block	Green space (m^2)	Green waste (kg/day)*
Block 2		
FB2 Planter Box Schedule		
East Tower	2394	9.59
West Tower	1168	4.68
FB2 Greenwall Panel Schedule	1213	4.86
Total Block 2	*4775*	*19.13*
Block 5		
Hard scape^	2602	10.42
Soft scape	1557	6.24
Total Block 5	*4159*	*16.66*
Total Blocks 2 and 5	**8935**	**35.8**

*Green waste generation rate assumed 300pounds/1000sqft
^ Green waste generation rate assumed half that of soft scape
Note that green waste from any rooftop or courtyard areas of Block 2 are not included in this estimate

A green waste generation rate of 36 kilograms of waste per day equates to approximately one 120L green waste bin per day. In practice the green waste stream will not be constant with some days or weeks generating much more green waste than others. It is recommended that a number of green waste bins (up to 6 x 240L bins) be made available for green waste storage on L29 of Block 2 in the vicinity of the green waste treatment.

While an estimate of green waste generation is given in the table above, prior to installation of any green waste treatment technology onsite it is recommended that a green waste audit of the operational development be undertaken. While the areas of green space in the design are known, the generation rate of green waste is uncertain and will depend on planting types and frequency of maintenance of green areas. It is possible some planted areas will require minimal or no green waste removal while others may generate significant green waste. Onsite treatment options can be more confidently sized once a green waste generation rate is known.

[1] California Government 18 Aug 2010, www.calrecycle.ca.gov

4 Potential green waste technologies

4.1 Vermiculture

Vermiculture involves the stabilisation of compostable organics under controlled conditions by earth worms. The vermiculture unit, or worm farm, is fed with organic materials such as residual food organics and garden organics, which are loaded into the vermiculture unit where they are processed by worms.

Worms convert the fresh materials into vermicast, a brown soil-like material that is produced after organic materials have passed through the digestive system of a worm. Vermicast is high in nutrients and can be used as a valuable soil conditioner.[2]

Potential vermiculture systems for installation in Block 2 include stackable trays; batch-flow containers; and continuous flow containers.

Example vermiculture units (*UNSW Recycled Organics Unit* 2002)[3]

Vermi-Converter 2000 – Vital Earth Company

Worm Wigwam – EPM Inc.

Eliminator 1200 – Pad Engineering

4.1.1 Feedstock

In the case of Frasers Broadway, vermiculture would involve primarily green waste which would require 'bulking' by the use of some shredded paper or cardboard material. This paper and cardboard can be easily obtained by diverting a small amount of Frasers paper and cardboard recycling stream.

The mixture of materials to be fed into the vermiculture unit, or 'feedstock' may also require the addition of water, as worms require a moist environment. The unit will operate most effectively with a mixed waste stream rather than with purely green waste.

Materials that are very high in nutrients, such as seafood and dairy products, are not recommended for vermiculture processing in any significant proportion. These materials can cause problems such as anaerobic (low oxygen) conditions that result in worm death.

4.1.2 Management

Effective vermiculture management requires that significant time is taken to ensure the preparation of feedstock (shredding and mixing and correct composition), the reliable performance of the unit and prevention of any health and environmental issues (such as excessive odour, leaking leachate or spilled green wastes. Management requires regular monitoring of moisture levels in the unit, regular removal of processed material and addition of feedstock at a certain rate.

[2] UNSW 2002, Best Practice Guidelines on managing onsite vermiculture technologies
[3] UNSW 2002, Best Practice Guidelines on managing onsite vermiculture technologies

Vermiculture units are not 'set and forget', the management of the unit requires that the application rate of feedstock is not exceeded as this can result in buildup of organic material in the unit, which may decompose and lead to anaerobic conditions and worm death.

The maximum sustainable processing capacity for a vermiculture unit based on green waste is given below (reproduced from *Recycled Organics Unit UNSW 2002*)

Vermiculture feedstock rate

Maximum sustainable processing capacity	Components	Composition by weight (%)	Composition by weight (kg)	Comment
5.8 kg/m^2/wk or 30L/m^2/wk	Green waste, lawn clippings, non woody waste	70	4.0	No bulking agent required
	Water	30	1.8	
Total		100	5.8	

The maximum application rate of feedstock is 5.8 kg per m^2 (surface area at top of vermiculture unit) per week. Based on an application rate of 52kg of feedstock per day (see Section 3) a vermiculture unit/s for Frasers Block 2 would require 33m^2 of surface area. A vermiculture unit/s for Block 2 and 5 combined would require 62m^2 of surface area.

4.2 Composting

The biological process of composting generates a temperature of 55-65ºC, allowing for the breakdown of organic waste under the action of aerobic microbes. In a mechanical composting system very little energy is required even if the machine is installed outdoors as the organics create the heat.

Composting is the simplest of green waste treatment options, and with proper management it will generate a consistent supply of rich organic material that could be used onsite as a soil conditioner and fertiliser.

A composting unit is likely to be the most feasible option for the development due to the relatively small management required compared to vermiculture and its appropriate scale to the volume of green waste to be generated.

The most commonly used methods of composting such as mechanically turned windrows and piles are not considered feasible for the site as they are suited to use in large open spaces.

A storage unit in the form of a rotating drum is another composting option however it requires further decomposition of waste following treatment via either windrows or piles, which makes in unfeasible for the site.

In vessel composting options are likely to be the only feasible composting options for use on L29 of Block 2 or within a waste storage area of the Block 2 basement due to the ability to keep waste contained and odour and vectors low.

4.2.1 In Vessel Composting

In vessel composting (IVC) is not as common as traditional methods due to its high capital cost and the requirement to closely manage feedstocks. It is one of the few options available for urban uses however as problems such as vermin, leachate and odours can be easily controlled. It is an automated system with very fast composting (7 – 14 days) with uniform temperature throughout the contents of the unit. The system in most cases operates by being enclosed and having mechanical aeration that can be varied with temperature, oxygen and carbon feedback signals.

For the estimated green waste stream from Blocks 2 and 5 of around 250 kg/wk a horizontal IVC of approximately 6m^3 is suggested. An example product is the SustecoAB T120 system, dimensions 3.82m x 1.08m x 1.55m high which is rated to take feedstock of between 300 to 500 kg/week[4]. The total land take for a system of this type would be in the order of 20m^2.

SustecoAB T240 'Bighanna' IVC system[5]

4.2.2 Vertical Composting Unit

Vertical Composting Units (VCUs) are produced by a number of companies and vary in size and application. The Royal Botanic Gardens in Sydney has one of the few VCUs in Australia, with the VCU suited to a high volume and relatively high frequency use.

Vertical Composting Unit (VCU) sizes are commonly 5m^3, 12m^3 or 25m^3, based on similar units in Australia and overseas. A VCU unit may have more merit for use if it were it to be used in conjuction with larger areas of the Fraser development area, including green waste from the parklands for example. However if a broader application was chosen it would be better logistically to install a VCU within the open space area of the parklands, where the majority of green waste would be produced, rather than install a VCU on L29 of Block 2.

The total space required for a 5m^3 VCU unit is approximately 26m^2. This space requirement is composed of a direct footprint of 4m^2 and a footprint for organics storage, a loading area and curing bays.[6] A VCU is of most use in treating large volumes of compostable material where other options would have difficulties. All else being equal a horizontal IVC would appear more appropriate than a VCU due to its easier installation and probable lower cost.

[4] SustecoAB 190810 www.bighanna.co.au
[5] SustecoAB 190810 www.bighanna.co.au
[6] Flinders Bioremediation June 2004, VCU Feasibility Study

5 Recommendations

Green waste treatment onsite is the preferred option as it lessens waste transport, meets the goals of reuse and recycling and will provide for a steady stream of organic mulch and soil conditioner for use on the green spaces on the Frasers Broadway site.

A horizontal In Vessel Composting (IVC) unit is generally recommended as the most feasible green waste treatment option for the site. It is preferred due to the irregular input of the green waste stream from the development which would make management of vermiculture difficult. It is also of a scale more in keeping with the moderate levels of green waste to be generated, whereas a technology such as a VCU would be oversized for the purpose and vermiculture undersized.

A composting unit open to the air in an elevated position on L29 is not advised. An enclosed composting unit is recommended to minimise safety and environmental hazards.

The benefit in green waste treatment onsite is lessened to some degree however by the good green waste treatment options available offsite. For example the City of Sydney has a call out service for residences in its local government area, with green waste transported to the Eastern Creek Waste & Recycling Centre where it is processed into a range of mulches, soil conditioners and composts for the horticultural industry.

Where green waste cannot be easily treated onsite this waste should be stored and disposed of to a suitable green waste facility. There is adequate room to place storage bins for occasional use for green waste within the basement waste storage areas of Block 2.