Waste and Recycling Management Plan

Proposed Warehouses 3A, 3C & 3D

Lot 3, Oakdale Central

Report Number 610.16099-R2

15 June 2016

Goodman Limited

Level 17

60 Castlereagh Street

Sydney NSW 2000

Version: Revision 3

Waste and Recycling Management Plan

Proposed Warehouses 3A, 3C & 3D

Lot 3, Oakdale Central

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
610.16099-R2	Revision 3	15 June 2016	Tanya Henley	Alan Dyer	Alan Dyer
610.16099-R2	Revision 2	15 June 2016	Tanya Henley	Alan Dyer	Alan Dyer
610.16099-R2	Revision 1	3 June 2016	Tanya Henley	Alan Dyer	Alan Dyer
610.16099-R2	Revision 0	18 February 2016	I-hui Waung	Tanya Henley	Alan Dyer

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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Goodman Limited (Goodman) to prepare a Waste and Recycling Management Plan (WMP) in support of a Development Application (DA) to Fairfield City Council (Council) for the construction and operation of a proposed warehouse facility to be located at Lot 3A, 3C and 3D of the Oakdale Central site.

Waste components of Lot 3B will be addressed through separate DA application.

Further details of the development have been provided in **Section 4** of this document. The following report has been prepared based upon DA architectural drawings issued on 15 June 2016.

1.1 Scope

This WMP applies to the construction and on-going operation of the proposed development.

The provisions contained in the WMP must be implemented at all stages of the development, and may be subject to review upon expansion or changes in operational procedures.

- See **Section 5** for the Construction WMP.
- See **Section 6** for the Operational WMP.

1.2 Objectives

The principal objective of this WMP is to identify all potential wastes likely to be generated at the site during the construction and operational phases of the proposed development, including a description of how waste would be handled, processed and disposed of (or re-used/recycled), in accordance with Council requirements.

The specific objectives of this WMP are as follows:

- To encourage the minimisation of waste production and maximisation of resource recovery.
- To ensure the appropriate management of contaminated/hazardous waste.
- To identify procedures for waste management.
- To assist in ensuring that any environmental impacts during the operational life of development comply with Council's development consent conditions and other relevant regulatory authorities.

2 BETTER PRACTICE FOR WASTE MANAGEMENT AND RECYCLING

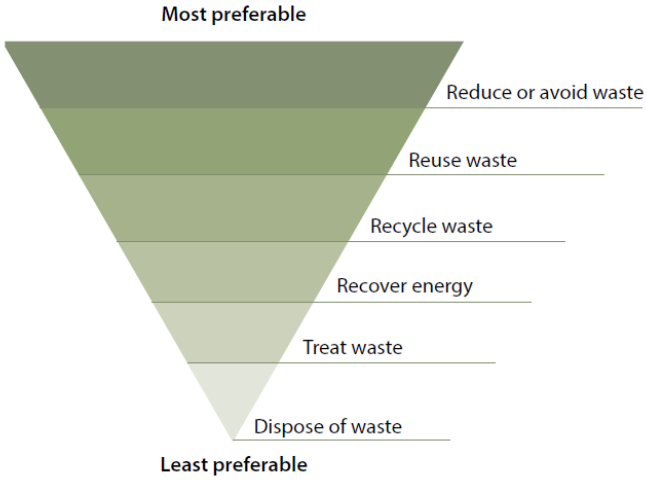
2.1 Waste Management Hierarchy

Where appropriate, this WMP aims to meet the principles of the waste management hierarchy, by promoting waste as a resource through the following in order of preference:

- Waste avoidance through prevention or reduction of waste generation. Waste avoidance is best achieved through better design and purchasing choices.
- Waste reuse, without substantially changing the form of waste.
- Waste recycling through the treatment of waste that is no longer usable in its current form to produce new products.
- Energy recovery through thermal treatment of residual waste materials and from green waste processing.
- Waste disposal, in a manner that causes the least harm to the natural environment.

The waste hierarchy (**Figure 1**) shows a classification of waste management options in order of their environmental impacts, as established under the Waste Avoidance and Resource Recovery Act 2001.

Figure 1 Waste Hierarchy



Source: NSW Waste Avoidance and Resource Recovery Strategy 2014-21 (EPA 2014)

2.2 Benefits of Implementing Better Practice

- Enhanced social and environmental reputation of an organisation.
- Reduced costs associated with waste disposal.
- Benefits to all stakeholders and the wider community.
- Improved environmental outcomes.

3 WASTE LEGISLATION AND GUIDANCE

The legislation and guidance outlined in **Table 1** below should be referred to during the demolition, construction and operational phases of the development.

Table 1 Waste Legislation and Guidance

Legislation	Objectives
Waste Avoidance and Resource Recovery Act 2001	To promote extended producer responsibility in place of industry waste reduction plans. Specific objectives include: • To encourage efficient use of resources. • To minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste. • To ensure that industry shares with the community the responsibility for reducing and dealing with waste. • To ensure the efficient funding of waste and resource management planning, programs and service delivery.
Protection of the Environment Operations Act (POEO) 1997 & Amendment Act 2011	Administered by the NSW Environmental Protection Authority (EPA) to enable the Government to establish instruments for setting environmental standards, goals, protocols and guidelines. *Important Note: The owner of a premises, the employer or any person carrying on the activity which causes a pollution incident is to immediately notify the relevant authorities when material harm to the environment is caused or threatened.* A list of each relevant authority is provided in the POEO Amendment Act and will be noted in the site's incident register.
POEO (Waste) Regulation 2014	Contains provisions relating to the waste levy, waste tracking, management requirements for certain waste types, payment schemes for councils, consumer packaging recycling and other miscellaneous provisions.
EPA's Waste Classification Guidelines (Part 1) 2014	To assist waste generators to effectively classify, manage, treat and dispose of waste to ensure the environmental and human health risks associated with waste are managed appropriately and in accordance with the POEO Act and is associated regulations.
Fairfield Citywide Development Control Plan (DCP) 2013	Section 2.5.6 of the DCP contains general provisions for new developments in Council's Local Government Area (LGA) involving demolition/construction.
Building Code of Australia (BCA) and relevant Australian Standards (AS)	The BCA (and AS) have the aim of achieving nationally consistent, minimum necessary standards of relevant health and safety, amenity and sustainability objectives efficiently.
EPA's Waste Avoidance and Resource Recovery (WARR) Strategy 2014-21	A key component of the State Government's vision for the environmental and economic future of the state that will be supported financially by the *Waste Less, Recycle More* funding initiative providing long-term targets for 6 key result areas including reduced illegal dumping.
EPA's Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities 2012	The EPA's Better Practice Guidelines (2012) encourage efficient waste minimisation and resource recovery for commercial and industrial facilities and is used as a benchmark document when assessing waste production rates within Australia and details a range of waste management provisions.

4 PROJECT DESCRIPTION

The site is located on Old Wallgrove Road, Horsley Park (**Figure 3**) and formally identified as Lot 21 on DP 1173181. The proponent intends to construct a warehouse/office building complex with associated external hardstand, car-parking areas and internal vehicle roads. There are three complexes in total, comprising "Warehouse 3A", "Warehouse 3B", "Warehouse 3C" and "Warehouse 3D", which form part of the overall "Oakdale Central" development of the Oakdale Industrial Estate. This WMP addresses Lot 3A, Lot 3C and Lot 3D only.

The following building schedule for Lot 3A, 3C and 3D is proposed:

- Warehouse 3A: to be divided into 2 warehouses – Warehouse 3A-1 and 3A-2
- Warehouse 3C: to be divided into 3 warehouses – Warehouse 3C-1 to 3C-3
- Warehouse 3D: 1 warehouse – Warehouse 3D-1

The site is currently an unoccupied, "greenfield" site.

Each of the warehouse complexes (**Figure 4**) will comprise:

- Warehouse building/s to accommodate industrial manufacturing facilities, a dangerous goods store, a temperature control store, a workshop, a pallet storage area and office areas;
- external loading docks;
- external, ground-level car parking area, and
- grassed verges.

A breakdown of the development area schedule is provided below.

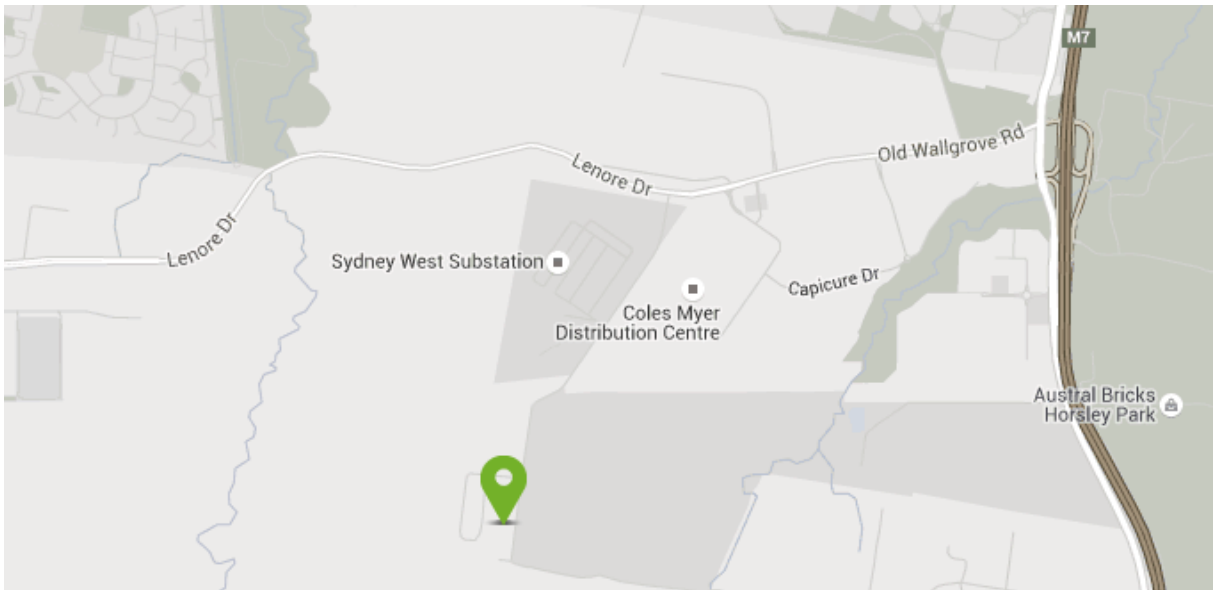
Figure 2 Site Area Schedule

Lot 3A		
Site Area	16,016	sqm
Warehouse 1	3,825	sqm
Office 1	550	sqm
Warehouse 2	2,680	sqm
Office 2	272	sqm
Total Building Area	7,327	sqm
Awning	725	sqm
Site Cover (exc. awning)	44	%
Floor Space Ratio	0.44	: 1
Hardstand Area	4,164	sqm
Light Duty Area	1,900	sqm
Carparking	66	

Lot 3C		
Site Area	55,622	sqm
Warehouse 1	11,000	sqm
Amenities - G	-	sqm
Office - L1	500	sqm
Dock Office (upper level)	30	sqm
Warehouse 2	9,690	sqm
Office 2	500	sqm
Warehouse 3	9,690	sqm
Office 3	500	sqm
Total Building Area	31,910	sqm
Awning	1,760	sqm
Site Cover (exc. awning)	57	%
Floor Space Ratio	0.57	: 1
Hardstand Area	13,445	sqm
Light Duty Area	4,843	sqm
Carparking	183	
Provisional Spaces	8	

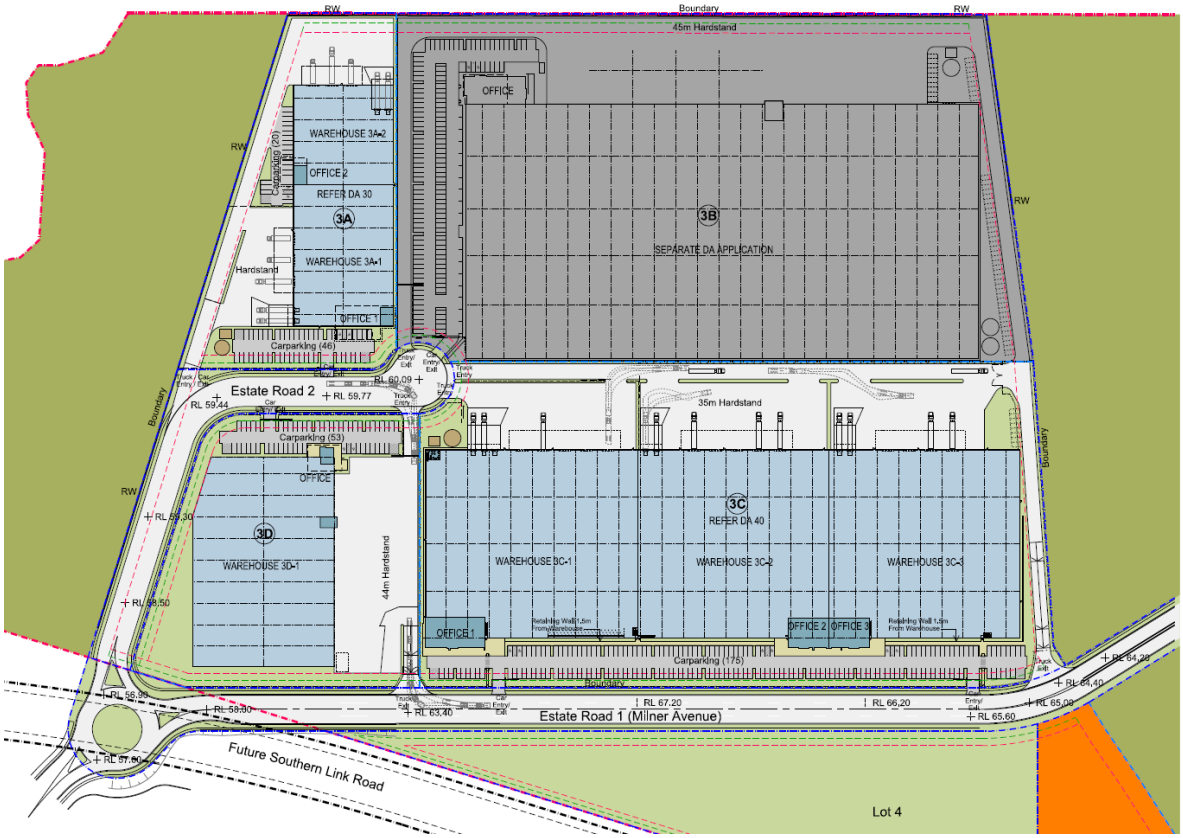
Lot 3D		
Site Area	18,795	sqm
Warehouse	7,935	sqm
Office	300	sqm
Dock Office (1 level)	50	sqm
Total Building Area	8,285	sqm
Awning	468	sqm
Site Cover (exc. awning)	44	%
Floor Space Ratio	0.44	: 1
Hardstand Area	5,235	sqm
Light Duty Area	1,505	sqm
Carparking	53	

Figure 3 Site Location



Source: http://au.goodman.com/property/properties-for-lease/oakdale-industrial-estate

Figure 4 Proposed Building Layout Plan



Source: SBA Architects (15 June 2016)

5 CONSTRUCTION WASTE MANAGEMENT

Demolition and construction stages of developments have the greatest potential for waste minimisation.

Waste avoidance, appropriate segregation and reuse / recycling of wastes can help realise significant cost savings.

Key site preparation and construction activities at the site include:

- earthworks to allow installation of building slabs, services and ground level features (e.g. car park, loading docks, internal roads);
- site infrastructure development;
- construction of new buildings, structures and roofing; and
- landscaping and refurbishment works.

5.1 Targets for Resource Recovery

The performance of each development contributes to overall NSW State recycling targets, which for the construction and demolition (C&D) sector, is 75% (increasing to 80% by the year 2021) of total C&D waste recycled (see NSW WARR Strategy 2014-21).

Waste minimisation measures that can be implemented to assist in achieving this resource recovery target are provided in the following sections. Waste audits will determine the actual percentage of wastes that were recycled and disposed of at landfill during the development.

5.2 Waste Streams and Classifications

The site preparation and construction phases of the development will generate the following broad waste streams:

- green waste from site clearing activities;
- excavation material (including potentially contaminated soils);
- construction wastes;
- plant maintenance waste;
- packaging waste;
- work compound (on-site employee) waste, and
- waste water. (Waste water is not quantified in this WMP.)

Potential waste types along with their waste classification are provided **Table 2**.

For further information on how to determine a waste's classification refer to the EPA (2014) *Waste Classification Guidelines*.

Table 2 Potential Waste Generation with Classifications

Waste Types	NSW Classification	Waste Avoidance	Reuse and Recycling Potential / Disposal Method
Site Preparation and Construction			
Green waste / vegetation and significant trees	General solid (non-putrescible) waste	Re-locate trees and shrubs on-site were practical and feasible or sell for use off-site	Mulch for reuse on-site or compost off-site for recycling and use as fertiliser

Waste Types	NSW Classification	Waste Avoidance	Reuse and Recycling Potential / Disposal Method
Excavated material (soil, VEMN, EMN)	General solid (non-putrescible) waste	Avoid excessive excavations	Reuse topsoil on-site where possible or reuse for similar projects. Sandstone may be incorporated in design or sold.
Sediment fencing, geotextile materials	General solid (non-putrescible) waste	Implement to required standards	Reuse at other sites where possible or disposal to landfill
Concrete (solids and washouts) and asphalt	General solid (non-putrescible) waste	Retain existing pavement were possible in design, planned work staging to avoid excessive waste	Reuse on-site where possible or recycle off-site as filling, levelling materials or as road base
Plasterboard / gyprock	General solid (non-putrescible) waste	Minimise oversupply	Off-site recycling or disposal
Plant Maintenance			
Tyres	Special waste	Check tyres air pressure is suitable for works	Off-site recycling or disposal
Empty oil and other drums / tins (e.g. fuel, chemicals, paints, spill clean ups)	Hazardous waste if the containers were previously used to store Dangerous Goods (Class 1, 3, 4, 5 or 8) and from which residues have not been removed by washing or vacuuming. General solid (non-putrescible) waste if the containers have been cleaned by washing or vacuuming.	Staged work planning to avoid wastage, minimise oversupply	Transport to comply with the transport of Dangerous Goods Code applies in preparation for off-site recycling or disposal at licensed facility. (Note: Discharge to sewer subject to Trade Waste Agreement with Sydney Water)[1]
Batteries	Hazardous waste	Use of rechargeable alternatives where practical	Off-site recycling
Packaging			
Packaging materials, including wood, plastic (including stretch wrap or LLPE), cardboard and metals	General solid (non-putrescible) waste	Ordering materials in bulk and ordering from suppliers using minimal or recyclable packaging	Return to suppliers for reuse or off-site recycling
Wooden crates	General solid (non-putrescible) waste	Careful storage for reuse	Reused for similar projects, returned to suppliers, or off-site recycling
Work Compound and Associated Offices			
Recyclable beverage containers (glass and plastic bottles, aluminium cans), tin cans	General solid (non-putrescible) waste	Ordering supplies in bulk packaging where practical, careful segregation for recycling	Co-mingled recycling at off-site licensed facility
Clean paper and cardboard	General solid (non-putrescible) waste	Careful segregation and storage for recycling	Paper and cardboard recycling at off-site licensed facility
General domestic waste generated by workers (soiled paper and cardboard, food stuffs, polystyrene)	General solid (non-putrescible) waste mixed with putrescible waste	Ordering supplies using minimal packaging, ordering materials as required to avoid excessive waste	Post-collection treatment of residual waste and/or disposal at landfill
Pump-out waste and septage (sewage)	Liquid (trade) waste	-	Off-site disposal at licensed facility or disposal direct to sewer where arranged with Sydney Water.

Note 1: Source: http://www.environment.nsw.gov.au/waste/envguidlns/index.htm

5.3 Waste Generation Rates

The Building Contractor will need to record the types and quantities (including the volume in cubic metres and weight in tonnes) of wastes produced during the site preparation and construction stages of the development, and on this basis, the numbers and capacity of skips/bins can be determined.

A guide/estimate of the potential waste percentages is provided based on "rule of thumb" waste generation rates for construction projects, as indicated in **Table 3** and **4**. These figures have been referenced from a number of sources including the Inner Sydney Waste Board's Waste Planning Guide for Development Applications (1998) and (in lieu of suitable Australia references) the UK's WRAP composition and conversion factors. Conservative estimates have been made where indicative waste compositions were not available.

Table 3 Assumed Waste Generation Rates - Earthworks

Waste Material	Estimated Waste %	Volume/Weight Ratios (tonnes per m^3)
Soil / Rubble	100%	1.25 tonnes per m^3

Source: Victoria's Ecorecycle Waste Wise Events toolkit

Table 4 Guideline to Waste Generation Rates for Construction

Material	Estimated Waste %	Conversion Factors (tonnes per m^3)
Hard Material (i.e. bricks, tiles)	32%	1.20
Timber	24%	0.34
Plastics	15%	0.25
Cement sheet	9%	0.50
Gypsum material	6%	0.20
Metals	6%	0.42
Paper/Cardboard	4%	0.40
Green waste	3%	0.15
Soil	1%	1.20
Other (chemicals / paint)	0.3%	0.30

Source: UK WRAP 2014

The above guidelines will be applied as appropriate to redevelopment of buildings and structures. Estimated waste compositions will depend on the type of construction work undertaken. Explanation in the text has been provided where estimated waste compositions differ from the guidelines provided above.

The UK Department for Environment, Food and Rural Affairs (DEFRA) and the UK Building Research Establishment (BRE) have developed a number of benchmark indicators to help determine approximate tonnages of waste produced during various construction projects including civil engineering and commercial retail works. The benchmarks include Environmental Performance Indicators (EPI) which measure the volume (m^3) of waste produced per 100 m^2.

The EPI indicators provided in **Table 5** have been used for the purposes of this WMP to estimate the amounts of construction wastes generated by the development.

Table 5 Environmental Performance Indicators (EPI) for Construction

Project Type	Average Waste Produced (m^3/100m^2 floor area)
Industrial Buildings	14.0
Commercial Offices	20.4
Civil Engineering	28.1

Source: UK BRE's www.smartwaste.co.uk

5.4 Estimation of Waste Volumes/Tonnages

5.4.1 Excavation Works

The volume and corresponding weight of excavated materials resulting from the proposed development site (**Table 6**) has been estimated based on the approximate area of the site and a nominal excavation depth of 2 m.

Excavated soils and/or rock may be re-used on the site, or used on similar sites, as fill material, provided no contamination is present and with approval from the EPA.

If sandstone is present, sandstone rock may be sold or used in the design of the building.

Table 6 Estimated Waste Generation - Excavation Activities

Earthworks	Estimated Area (m^2)	Estimated Depth (m)	Estimated Volume (m^3)	Estimated Tonnes Generated
Lot 3A	7,327	2	14,654	18,318
Lot 3C	31,940		63,880	79,850
Lot 3D	8,285		16,570	20,713

5.4.2 Construction of New Buildings

The estimated waste volumes and tonnes for each development area are presented in **Table 7**, **Table 8** and **Table 9**. The waste arisings are based on the EPI estimates presented in **Table 5**, an assumed percentage split of materials for the construction of a warehouse building using waste generation rates from **Table 4** as a guide, and building areas provided in the site plan.

Table 7 Estimated Waste Volumes and Materials - Lot 3A Development

Material	Assumed Split	Waste (m^3)	Conversion Factor	Total Waste (tonnes)
Hard Material (i.e. bricks, tiles)	40%	922	1.20	1,106
Timber	16%	369	0.34	125
Plastics	7%	161	0.25	40
Cement sheet	10%	230	0.50	115
Gypsum material	14%	323	0.20	65
Metals	8%	184	0.42	77
Paper/Cardboard	2%	46	0.40	18
Green waste	2%	46	0.15	7
Soil	0%	0	1.20	0
Other (chemicals / paint)	1%	23	0.30	7
Total	**100%**	**2,304[1]**	**-**	**1,561[1]**

Note 1: Totals may not add up due to rounding.

Table 8 Estimated Waste Volumes and Materials - Lot 3C Development

Material	Assumed Split	Waste (m^3)	Conversion Factor	Total Waste (tonnes)
Hard Material (i.e. bricks, tiles)	40%	3,130	1.20	3,756
Timber	16%	1,252	0.34	426
Plastics	7%	548	0.25	137
Cement sheet	10%	782	0.50	391
Gypsum material	14%	1,095	0.20	219
Metals	8%	626	0.42	263
Paper/Cardboard	2%	156	0.40	63
Green waste	2%	156	0.15	23
Soil	0%	0	1.20	0
Other (chemicals / paint)	1%	78	0.30	23
Total	**100%**	**7,825[1]**	**-**	**5,301[1]**

Note 1: Totals may not add up due to rounding.

Table 9 Estimated Waste Volumes and Materials - Lot 3D Development

Material	Assumed Split	Waste (m^3)	Conversion Factor	Total Waste (tonnes)
Hard Material (i.e. bricks, tiles)	40%	936	1.20	1,123
Timber	16%	374	0.34	127
Plastics	7%	164	0.25	41
Cement sheet	10%	234	0.50	117
Gypsum material	14%	328	0.20	66
Metals	8%	187	0.42	79
Paper/Cardboard	2%	47	0.40	19
Green waste	2%	47	0.15	7
Soil	0%	0	1.20	0
Other (chemicals / paint)	1%	23	0.30	7
Total	**100%**	**2,340[1]**	**-**	**1,586**

Note 1: Totals may not add up due to rounding.

Total estimated construction waste volumes and tonnages for the three warehouses come to 12,469 m^3 and 8,448 tonnes respectively.

It is estimated that over 70% of the estimated construction waste arisings from Lot 3A, Lot 3C and Lot 3D could be re-used (on-site or at another development) or recycled off-site. As previously outlined, the NSW target for C&D waste recycling is 75% (increasing to 80% by 2021-22)[1].

It is noted that all waste generation rates are approximate only.

[1] NSW Waste and Avoidance Resource Recovery Strategy 2014-21

5.5 Waste Avoidance

The Building Contractor will identify opportunities for waste avoidance by:

- applying practical building designs and construction techniques;
- appropriate sorting and segregation of site preparation and construction wastes to ensure efficient recycling of wastes;
- selecting construction materials taking into consideration to their long lifespan and potential for reuse;
- ordering materials to size and ordering pre-cut and prefabricated materials;
- reuse of formwork;
- planned work staging;
- use of naturally ventilating buildings to reduce ductwork;
- use of prefabricated components for internal fit outs;
- reducing packaging waste on-site by returning packaging to suppliers where possible and practicable, purchasing in bulk, requesting cardboard or metal drums rather than plastics, requesting metal straps rather than shrink wrap and using returnable packaging such as pallets and reels;
- careful on-site storage and source separation;
- subcontractors informed of site waste management procedures; and
- co-ordination and sequencing of various trades.

The Building Contractor, in consultation with Goodman, will advise on material selection for the reduction of embodied energy and resource depletion. This includes:

- the use of recycled concrete and steel;
- the reduction of PVC use;
- the use of low VOC (volatile organic compounds) paints, floor coverings and adhesives;
- the use of low formaldehyde wood products and post-consumer reused timber or Forest Stewardship Council (FSC) certified timber where possible;
- the use of fittings and furnishings that have been recycled, are made from or incorporate recycled materials, and have been certified as sustainable or environmentally friendly by a recognised third party certification scheme; and
- the use of building materials, fittings and furnishings including structural framing, roofing and façade cladding chosen with consideration to their longevity, adaptation, disassembly, reuse and recycling potential.

5.6 Re-use, Recycling and Disposal

Effective management of construction materials and C&D waste, including options for reuse and recycling where applicable and practicable, will be conducted. Only wastes that cannot be cost effectively reused or recycled are to be sent to landfill or appropriate disposal facilities.

Refer to **Table 2** for an outline of the potential reuse, recycling and disposal methods for potential waste streams generated by the development.

The following specific procedures will also be implemented:

- waste concrete, tiles (where applicable) and bricks will be re-used / recycled off-site;

- steel off-cuts will be recycled off-site and all other metals will be recycled where economically viable;
- waste framing timber will be reused on-site or recycled off-site;
- waste oil will be recycled or disposed of in an appropriate manner;
- all used crates will be stored for reuse unless damaged;
- all waste glass that can be economically recycling will be;
- all solid waste timber, brick, concrete, rock that cannot be reused or recycled will be taken to an appropriate facility for treatment to recover further resources or for disposal to landfill in an approved manner;
- all asbestos, hazardous and/or intractable wastes are to be disposed of in accordance with WorkCover NSW and EPA requirements;
- provision for the collection of batteries and other recyclable resources will be provided on site to enable off-site recycling;
- beverage container recycling should be provided on-site or these items sorted for recycling at an appropriately licensed facility; and
- all waste and recycling will be disposed of via a council approved system.

5.7 Waste Storage and Servicing

5.7.1 Waste Segregation

The construction site will be managed ensuring effective source separation and appropriate collection of waste during site preparation and construction works to minimise waste and maximise the potential for materials to be re-used and recycled.

For construction stages, consider minimum dedicated skips/bins/stockpiles for these materials:

- timber/wood;
- plasterboard/gyprock;
- concrete;
- bricks;
- steel/scrap metal;
- general waste; and
- other waste (i.e. for the collection of materials that may be re-used on future developments).

Where limited room is available for segregation of waste materials, consultation with recycling facilities will be undertaken to determine which materials can be disposed of within the same skip and still be easily sorted post collection.

Separate receptacles for the safe disposal of hazardous waste types (e.g. batteries) will also be provided. Specialised bins for cigarette butts should also be provided to ensure these do not become a potential source of fire if thrown in bins / skips or litter washed into stormwater drains.

5.7.2 Space and Siting Requirements

Waste storage areas will be accessible and allow sufficient space for storage and servicing requirements. The storage areas will also be flexible in order to cater for change of use throughout the development. Where space is restricted, dedicated stockpile areas are to be delineated on the site, with regular transfers to dedicated skip bins for sorting.

The positions of the designated waste holding areas on site will change according to building works and the progression of the development, but must consider visual amenity, OH&S and accessibility in their selection. Appropriate siting of waste stockpile locations will take into account slope and drainage factors to avoid contamination of stormwater drains during rain events.

All waste placed in skips or bins for disposal or recycling shall be adequately contained to ensure that the waste does not fall, blow, wash or otherwise escape from the site. Waste containers and storage areas are to be kept clean and in a good state of repair. Stockpiles of materials will be managed in accordance with relevant EPA guidelines.

5.7.3 Servicing and Transport

The frequency of the waste removal will, in most cases, be dictated by the volume of material being deposited into each of the dedicated skips. Skips/bins are to be checked on a daily basis by the Site Manager to ensure that no overflow occurs. If skips/bins are reaching capacity, removal and replacement should be organised for the next 24 hours. All skips/bins leaving the site will be covered with a suitable tarpaulin to ensure that the spillage of wastes from the skips whilst in transit is eliminated.

All waste collection for construction works are to be conducted between 7am and 7pm Monday to Friday, and between 7am and 1pm on Saturdays, or as per Council requirements. All site generated building waste collected in the skips and/or bins will leave the site and be deposited in the approved and appropriately licensed recycling centre, transfer station or landfill site.

5.7.4 Contaminated / Hazardous Waste

During the site preparation and construction phases of the development, there must be a commitment to engage qualified and certified contractors to remove all contaminated/hazardous materials (e.g. asbestos) and dispose of all contaminated/hazardous waste at an appropriately licenced facility, where applicable. In the event that any contaminated or hazardous materials are unexpectedly uncovered during excavation works, the Site Manager is to stop work immediately and contact the relevant hazardous waste contractor prior to further works being undertaken in the area.

Where contaminated materials are identified, the following broad measures may need to be followed:

- Any suspicious material/soil will be stockpiled on bunded, strong, impermeable plastic sheeting, protected from erosion and with seepage retained.
- Waste shall be classified prior to off-site disposal to landfill (unless material testing is below validation criteria in which case it may be retained on-site in back filled excavations).
- All analysis certificates and disposal receipts shall be retained and documented for submission to Council. Waste tracking (i.e. documentation of soil volumes, number of truck movement, disposal locality) should be undertaken by a qualified consultant.
- Appropriate measures (e.g. suitable PPE) should be undertaken during excavation works to control human exposure to hazardous/contaminated materials, where required.

5.7.5 Liquid Waste Management

Liquid waste is often produced from the washing down of plant and apparatus. Any liquid wastes or dangerous goods wastes generated by the development (e.g. due to damage or leakage of containment) will be disposed of by a suitably qualified contractor to an appropriately licensed disposal facility. Wash-down of equipment, plant and machinery and concrete delivery trucks will take place off-site or on-site within a specified and appropriately bunded wash-down bay. There may be a local sewer that this waste water can be connected to; alternatively, this could be transferred into a localised waste water treatment facility or plant.

Waste water storage tanks (where applicable) will be carefully monitored to ensure overflow does not occur and no liquid wastes or wash down waters will be disposed of via the stormwater drainage system. Any refuelling activities will be undertaken off-site or at on-site designated areas with appropriate spill containment measures to avoid overspill to sensitive areas.

5.7.6 Spills Management

Spills on the worksite are most likely to involve fuel, hydraulic oil or engine oil spilled from plant items, and paints and solvents.

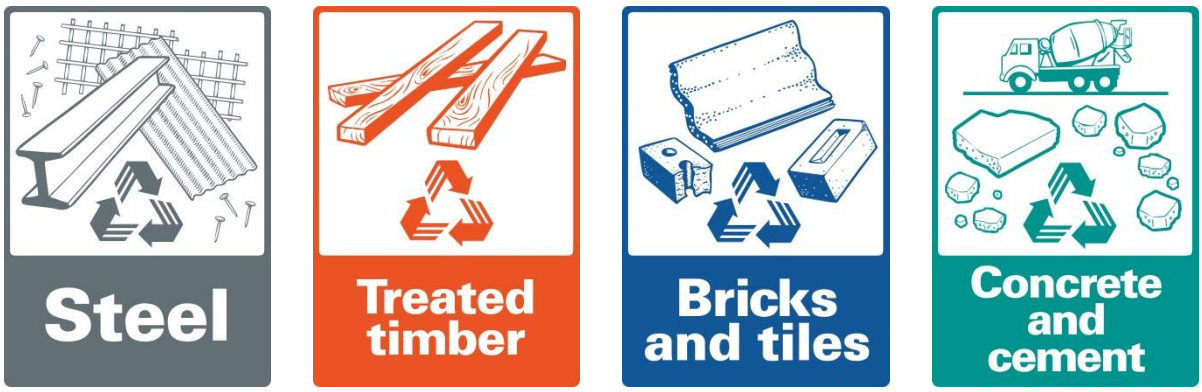
If a spillage occurs, immediately identify the spilled materials, notify the Site Manager and contain the spill (if safe to do so) as soon as possible. Containment measures for spillages will be provided at appropriate locations and in close proximity to staff car park areas, dangerous goods stores areas and main site work areas (e.g. a spill kit containing non-combustible absorbent material). Material Safety Data Sheets (MSDS) will also be located nearby spill kit areas for advice on spillage clean-up and disposal.

5.8 Signage

Standard signage will be posted in all storage/waste collection areas and all skips/drums/bins are required to be labelled correctly and clearly to identify materials stored within.

Refer to the EPA's website under 'waste tools' for construction and demolition waste and recycling signs.

Figure 5 Australian Standard Signs



Source: http://www.epa.nsw.gov.au/wastetools/signs-posters-symbols.htm

5.9 Training and Awareness

All staff (including sub-contractors and labourers) employed during the construction phase of the development must undergo induction training regarding waste management for the site.

Induction training is to cover, as a minimum, an outline of the WMP including:

- legal obligations;
- emergency response procedures on site;
- waste storage locations and separation of waste;
- litter management in transit and on site;
- the implications of poor waste management practices;
- correct use of general purpose spill kit; and
- responsibility and reporting (including identification of personnel responsible for waste management and individual responsibilities).

It is the responsibility of the Contractor or site operative to notify Council of the appointment of waste removal, transport or disposal contractors.

5.10 Monitoring and Reporting

The following measures will be undertaken to improve construction waste management and to provide more reliable waste generation figures:

1. Compare projected waste quantities with actual waste quantities produced.
2. Conduct waste audits of current projects (where feasible).
3. Note waste generated and disposal methods.
4. Look at past waste disposal receipts.
5. Record this information to track waste avoidance, reuse and recycling performance and to help in waste estimations for future waste management plans.

Records of waste volumes recycled, reused or contractor removed are to be maintained. Additionally, dockets/receipts verifying recycling and/or disposal in accordance with the WMP must be kept and presented to Council when required.

Daily visual inspections of waste storage areas will be undertaken by site personnel and inspection checklists/logs recorded for reporting to the Site Manager on a weekly basis or as required. These inspections will be used to identify and rectify any resource and waste management issues.

Waste audits are to be carried out by the Building Contractor to gauge the effectiveness and efficiency of waste segregation procedures and recycling/reuse initiatives. Where audits show that the above procedures are not carried out effectively, additional staff training will be undertaken and signage re-examined.

5.11 Incident Response

Likely incidents to occur during the construction phase of the development may involve fuel or chemical spills, seepage or mishandling of hazardous waste, or unlicensed discharge of pollutants to the environment.

All environmental incidents are to be dealt with promptly to minimise potential impacts. An incident register must be maintained on-site at all times and include the contact details of the 24 hour EPA Pollution line.

5.12 Roles and Responsibilities

All personnel have a responsibility for their own environmental performance and compliance with all legislation. It will be the responsibility of the Building Contractor to implement the WMP, and an employee and subcontractor responsibility to ensure that they comply with the guideline at all times.

Where possible, an Environmental Management Representative (EMR) should be appointed for the development. Suggested roles and responsibilities are provided in **Table 10**.

Table 10 Building Contractor - Suggested Roles and Responsibilities

Construction Site Manager	• Ensuring plant and equipment are well maintained. • Ordering only the required amount of materials. • Keeping materials segregated to maximise reuse and recycling. • Ultimately responsible for routinely check waste sorting and storage areas for cleanliness, hygiene and OH&S issues, contaminated waste materials, and also ensuring that all monitoring and audit results are well documented and carried out as specified in the WMP.
Environmental Management Representative (EMR) or equivalent role	• Approaching and establishing the local commercial reuse of materials where reuse on-site is not practical. • Establishing separate skips and recycling bins for effective waste segregation and recycling purposes. • Ensuring staff and contractors are aware of site requirements. • Provision of training of the requirements of the WMP and specific waste management strategies adopted for the development. • Contaminated waste management and approval of off-site waste transport, disposal locations and checking licensing requirements. • Approval of off-site waste disposal locations and checking licensing requirements. • Assessment of suspicious potentially contaminated materials, hazardous materials and liquid wastes. • Monitoring, inspection and reporting requirements.

Daily visual inspections of waste storage areas may be delegated to other on-site staff. All subcontractors will be responsible for ensuring that their work complies with the WMP through the site induction and contract engagement process.

It is the responsibility of the Building Contractor or site operative to notify the Principal Certifying Authority (Council) of the appointment of waste removal, transport or disposal contractors.

6 OPERATIONAL WASTE MANAGEMENT

Ineffective waste management for commercial premises can lead to environmental pollution, offensive odours, litter, attraction of vermin and occupational safety and hygiene problems.

Effective waste management reduces costs through the reuse of resources and minimisation of fees associated with removal, transportation and disposal of waste, and improves environmental outcomes locally, regionally and globally. Effective waste management is achieved through the implementation of a WMP for the operational life of the development.

6.1 Targets for Resource Recovery

The performance of each development contributes to overall NSW State recycling targets, which for the commercial and industrial (C&I) sector, represents 57% (increasing to 70% by the year 2021) of total residential waste recycled (see NSW WARR Strategy 2014-21).

Implementation of Council's DCP and waste collection requirements will help to facilitate effective recycling as necessary for achieving this resource recovery target.

6.2 Waste Streams and Classifications

The operation of Warehouses 3A, 3C and 3D is expected to generate the following broad waste streams:

- domestic wastes (i.e. general waste and co-mingled recycling);
- packaging wastes (cardboard, paper, plastic, timber/ pallets, polystyrene);
- office wastes;
- garden organics from landscaped areas;
- bulky waste items such as furniture and e-waste;
- amenity wastes; and
- stores, plant and general maintenance wastes.

Potential waste types along with their waste classification are provided in **Table 11**.

For further information on how to determine a waste's classification, refer to the EPA (2014) *Waste Classification Guidelines.*

Table 11 Potential Waste Generation with Classifications

Waste Types	NSW Classification	Proposed Reuse / Recycling / Disposal Method
General Operations		
General garbage (including non-recyclable plastics)	General solid (putrescible and non-putrescible) waste	Disposal at landfill
Recyclable beverage containers (glass and plastic bottles, aluminium cans), tin cans	General solid (non-putrescible) waste	Co-mingled recycling at off-site licensed facility
Clean office paper	General solid (non-putrescible) waste	Paper recycling at off-site licensed facility
Cardboard / Bulk Cardboard	General solid (non-putrescible) waste	Cardboard recycling at off-site licensed facility
Plastic packaging materials (including stretch wrap, polystyrene)	General solid (non-putrescible) waste	Baled and sent for off-site recycling
Wooden crates / pallets / timber	General solid (non-putrescible) waste	Reused for similar projects, returned to suppliers, or off-site recycling

Waste Types	NSW Classification	Proposed Reuse / Recycling / Disposal Method
E-waste, batteries, printer toners and ink cartridges	Hazardous waste	Off-site recycling (free disposal box / bags and pickup service exists for printer toners and ink cartridges)
Wastewater from amenities and kitchens	Liquid waste	Disposal to sewerage
Sanitary waste	General solid (putrescible) waste	Contractor disposal at licensed facility
Maintenance		
Spent smoke detectors[1]	General solid (non-putrescible) waste OR Hazardous waste (some commercial varieties)	Disposal to landfill OR off-site disposal at licensed facility
Light bulbs / fluorescent tubes	Hazardous waste	Off-site recycling
Cleaning chemicals, laundry chemicals (bleach etc.), solvents, area wash downs, empty oil / paint drums / chemical containers	Hazardous waste if containers used to store Dangerous Goods (Class 1, 3, 4, 5 or 8) and residues have not been removed by washing or vacuuming. General solid (non-putrescible) waste if containers cleaned by washing or vacuuming	Transport to comply with the transport of Dangerous Goods Code applies in preparation for off-site recycling or disposal at licensed facility. (Note: Discharge to sewer subject to Trade Waste Agreement with Sydney Water)[1]
Air-conditioning parts and filters	General solid (non-putrescible) waste	Disposal to landfill
Garden organics / green waste (lawn mowing, tree branches, hedge cuttings, leaves etc.)	General solid (non-putrescible) waste	Option to reuse on site as mulch or to organise collection. Alternatively, contractor/gardener removal for recycling at licensed facility.

Source: http://www.environment.nsw.gov.au/waste/envguidlns/index.htm

Note 1: The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) require that when more than 10 smoke alarms (particularly americium-241 sources) are collected for bulk disposal they must be treated as radioactive waste and the requirements of the National Health and Medical Research Council's *Code of practice for the near-surface disposal of radioactive waste in Australia (1992)* must be met. Contact ARPANSA for more information. http://www.arpansa.gov.au/radiationprotection/factsheets/is_smokedetector.cfm

6.3 Estimated Waste Generation

Approximate waste generation rates provided by EPA data are used to calculate the anticipated waste amounts for the proposed development and are presented in **Table 12**.

Table 12 Guideline Waste Generation Rates

Type of Premises	Facility Area	General Waste Generation	Recycling Generation[1]
Warehouse	Industrial Storage	30 L/100 m^2/day	30 L/100 m^2/day
Offices	Offices	10 L/100 m^2/day	10 L/100 m^2/day

Source: EPA's Better Practice Guidelines for Waste Management and Recycling in C&I Facilities (2012).

Note 1. Recyclable waste generation includes paper and cardboard waste, as well as mixed recyclables (bottles, cans etc.)

The approximate volumes have been converted into tonnes by applying conversation rates taken from Victoria's Ecorecycle Waste Wise Events toolkit for 'garbage' (0.15 tonnes per 1000 L) and 'co-mingled containers' (0.063 tonnes per 1000 L).

Table 13 Anticipated Operational Waste Generation Rates (L/day)[1]

Complex	Area Type	Garbage Average L/day	Recycling Average L/day	Garbage Average L/wk	Recycling Average L/wk
Warehouse 3A-1	Warehouse	1,148	1,148	5,738	5,738
	Office	55	55	275	275
Warehouse 3A-2	Warehouse	804	804	4,020	4,020
	Office	27	27	136	136
Warehouses 3A	**Volume**	**1,976**	**1,976**	**9,878**	**9,878**
	Tonnes	**0.3**	**0.1**	**1.5**	**0.6**
Warehouse 3C-1	Warehouse	3,300	3,300	16,500	16,500
	Office	53	53	265	265
Warehouse 3C-2	Warehouse	2,907	2,907	14,535	14,535
	Office	50	50	250	250
Warehouse 3C-3	Warehouse	2,907	2,907	14,535	14,535
	Office	50	50	250	250
Warehouses 3C	**Volume**	**9,267**	**9,267**	**46,335**	**46,335**
	Tonnes	**1.4**	**0.6**	**7.0**	**2.9**
Warehouse 3D-1	Warehouse	2,381	2,381	11,903	11,903
	Office	35	35	175	175
Warehouses 3D	**Volume**	**2,416**	**2,416**	**12,078**	**12,078**
	Tonnes	**0.4**	**0.2**	**1.8**	**0.8**

Note 1. All waste generation rates are approximate.

The waste volumes generated will be influenced by the employee's attitude to segregation, recycling and disposal, and the adequacy of signage and education provided for the employees and residents.

6.4 General Waste and Recycling Storage

6.4.1 Bins Types and Number

Typical capacities for lidded, front-lift bins range from 1,500 L, 3,000 L and 4,000 L (corresponding to bin sizes of 1.5 m^3, 3 m^3 and 4 m^3.

Based on a frequency of waste collection from warehouses once a week and on waste volumes estimated in **Section 6**, **Table 14** provides an estimate of the number of bins that would be needed to service the general and recyclable waste generated by the facility over a 5-day working week.

Table 14 Estimated Number of Bins for Warehouses 3A, 3C and 3D

Warehouse	Bin Capacity		
	1,500 L	3,000 L	4,000 L
Warehouse 3A-1	8	4	4
Warehouse 3A-2	6	4	2
Warehouse 3C-1	24	12	10
Warehouse 3C-2	20	10	8
Warehouse 3C-3	20	10	8
Warehouse 3D-1	18	8	6

The use of a compactor for Warehouse 3C to compact the general waste could substantially reduce the number of bins required for storing waste from Warehouse 3C (**Table 15**).

Table 15 Estimated Number of Bins for Warehouses 3C with Compaction

Bin Capacity	No compaction	Compaction Ratio	
	1:1	2:1	4:1
1,500 L	64	47	39
3,000 L	32	24	20
4,000 L	26	18	15

Note: The actual number of bins required for compacted waste will depend on the size and shape of compacted waste produced by the compactor, as well as the extent of packing achieved within bins.

A twice-weekly collection frequency will allow the number of bins to be halved.

Depending on contractual arrangements organised with the site manager employed, management of garden organics waste arising from the maintenance of the landscaped areas will either be the responsibility of the landscaping contractor or of Management.

6.4.2 Waste and Recycling Storage Area

Waste and recycling storage areas will incorporate a number of measures to ensure best practice waste management:

- Storage areas shall be located on a smooth, impervious ground surface.
- Storage areas should allow ready access by waste collection vehicles;
- Storage areas should be under cover (e.g. awning).
- Surface water should not collect at the storage areas.
- Vermin management measures should be implemented at and around each storage area.
- Location of storage areas should not impede movements of vehicles using/servicing the facility, nor create blind-spots for vehicular traffic;
- Clear and easy to read signs and warning signs should be displayed as appropriate to identify the areas as waste and recycling storage areas.

6.5 General Waste and Recycling Transfer and Servicing

Cleaners/employees will transfer general and recyclable waste from warehouse and office areas to the lidded front-lift bins (or compaction room, if compaction units are employed) via 240 L mobile garbage bins (MGB). Where compaction units are employed, compaction room operators shall be responsible for transferring waste from the compactor bin to the lidded front-lift bins.

Recyclable waste should be transferred from warehouse and office areas to lidded front-lift bins, which are clearly marked for storing recyclable waste, in the waste storage areas.

Separate, clearly labelled MGBs should be used for general waste and recyclable waste.

6.6 Bulky / Hazardous Waste Management

Sufficient space will be provided within the development for the storage of large and/or bulky items (eg. broken pallets, broken storage units and e-waste (recyclable electronic equipment, including televisions, batteries, fluorescent tubes and smoke detectors)) that cannot be disposed of in the general or recyclable waste stream.

Space will also be allocated to store reusable items such as crates so that storage in a public place is avoided.

Management may consider organising a skip on a monthly basis or as required to remove bulky waste items, or engage a contractor to collect and transport these items for reuse, recycling or disposal at an EPA licensed facility.

A suitably licensed e-waste recycling contractor will be engaged to collect and recycle all e-waste items generated at the facility.

6.7 Signage

Education and communication must be regular and ongoing to overcome the transient nature of contractors and visiting staff members. The main signage aspects to consider are:

- general waste (garbage) and recycling bins and storage areas must be clearly and correctly labelled / indicated at all times;
- waste storage areas must have clear signage instructing cleaners and tenants how to correctly separate (if required);
- the location of, and directions to, waste storage areas must be well signposted;
- all hazards or potential dangers associated with the waste facilities should be clearly identified, especially those linked to compaction or other waste handling equipment; and
- emergency contact information should be displayed in case there are any issues with the waste and recycling systems/services in the building.

All signage should conform to the relevant Australian Standard and the NSW EPA's standard recycling signs. The design and use of safety signs for waste rooms and enclosures should comply with AS 1319 Safety signs for the occupational environment. Australian Standards are available from the SAI Global Limited website (www.saiglobal.com).

6.8 Communication Strategies

Waste management initiatives and management measures should be clearly communicated to building managers, owners, tenants and cleaners. Benefits of providing this communication include:

- improved satisfaction with services;
- increased ability and willingness to participate in recycling;
- improved amenity and safety;
- improved knowledge and awareness through standardisation of services;
- increased awareness or achievement of environmental goals and targets;
- reduced contamination of recyclables stream;
- increased recovery of recyclables and organics (where implemented) material; and
- greater contribution to state-wide targets for waste reduction and resource recovery.

To realise the above benefits, the following communication strategies should be considered:

- use consistent signage and colour coding throughout the development;
- ensure all staff are trained in correct waste separation and management procedures;
- provide directional signage to show location of and routes to waste storage areas;
- co-mingled and general waste bins should be clearly labelled to ensure no cross contamination;
- general garbage and co-mingled recycling bins should be colour-coded with clear labels identifying the type of waste that may be disposed of in each bin, where applicable;
- any employees / contractors should adhere to the WMP for compliance, in consultation with Management; and
- repair signs and labels promptly to avoid breakdown of communications.

The full set of signage can be found on the EPA's website.[2]

6.9 Contract Clauses

Waste collection contracts and cleaning contracts should include clauses relating to waste servicing requirements. Lease agreements should also outline and enforce proper use of waste facilities.

Refer to Appendix H of the EPA's *Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities* (2012) for example clauses.

6.10 Monitoring and Reporting

Visual assessment of bins prior to collection should be undertaken by Management within the first few months of the warehouses being occupied to ensure the waste management system is sufficient for the developments' needs, and on a half-yearly basis to ensure employees are disposing of waste and recycling correctly.

Where visual audits show that recycling is not carried out effectively, signage should be re-examined.

[2] http://www.epa.nsw.gov.au/wastetools/signs-posters-symbols.htm

6.11 Roles and Responsibilities

It should be the responsibility of Management to implement the WMP and a responsibility of the employees and building caretakers/cleaners to ensure that they comply with the guideline at all times.

Management should routinely check waste sorting and storage areas for cleanliness, hygiene and OH&S issues, and also ensure all monitoring and audit results are well documented and carried out as specified in the WMP.

An outline of waste management responsibilities are presented in **Table 16**.

Table 16 Waste Management Responsibility Allocation

Responsible Person	General Tasks
Building Management	Ensure the WMP is implemented throughout the operational life of the facility.
	Review and update the WMP on a regular basis (e.g. annually) to ensure the WMP remains applicable.
	Undertake liaison and management of contractor collections.
	Perform a visual waste inspection of bin fullness once warehouses are operational.
	Manage any complaints and non-compliances reported through waste audits etc.
	Perform inspections of all waste storage areas on a regular basis for cleanliness.
	Organise cleaning and maintenance requirements for waste storage areas and bins as required.
	Ensure effective signage, communication and education is provided to alert new tenants/cleaners about the provisions of this WMP.
	Monitor and maintain signage to ensure it remains clean, clear and applicable.
	Ultimately responsible for the management of all waste management equipment, cleaning requirements, waste transfer and collection arrangements.
Cleaners / Caretaker / Employees	Monitor bins to ensure no overfilling occurs.
	Ensure waste and recycling storage areas are kept tidy.
	Ensure segregation between general waste and recycling.
	Transfer of waste to the waste storage area as required.
	Cleaning of all bins and waste and recycling area as required.
Gardening Contractor	Placing all garden organics into an appropriately labelled bin for recycling or reuse as organic mulch on landscaped gardens.
	Removal of any large garden organics waste materials which are too large to be recycled via contractor collections (if applicable).