

Lake Macquarie

Development Control Guidelines

Demolition (Deconstruction)
Waste Management



8 Demolition (Deconstruction) Waste Management

8.1	Demolition (Deconstruction) Waste Management Plan (WMP).....	271
8.1.1	<i>How to prepare the demolition waste management plan (WMP)</i>	271
8.1.2	<i>Demolition waste management checklist (all development types)</i>	272
8.1.3	<i>Demolition waste management plan (all development types).....</i>	275
8.2	Waste Aspects of the Development Control Plan (for Demolition/Deconstruction in All Zones).....	276
8.2.1	<i>General objectives for demolition/deconstruction.....</i>	276
8.2.2	<i>Controls for demolition/deconstruction.....</i>	277
8.2.3	<i>Guidance for demolition/deconstruction in all zones</i>	278
8.2.4	<i>Environment Protection Zones – guidance for demolition/deconstruction</i>	279
8.2.5	<i>Tourist and visitor accommodation – objectives and controls for demolition</i>	279
8.2.6	<i>Rural construction site waste management requirements under the Rural Housing Code</i>	280
8.3	Demolition (Deconstruction) Waste Management – Information to Assist with Planning.....	281
8.3.1	<i>Waste types and volumes from demolition/deconstruction</i>	281
8.3.2	<i>Avoid, reuse and recycle demolition waste.....</i>	283
8.3.3	<i>Methods for waste management during deconstruction</i>	289
8.3.4	<i>Demolition waste storage areas</i>	289
8.3.5	<i>Placing a waste storage/recycling container in a public place</i>	289
8.3.6	<i>Waste collection and removal.....</i>	290
8.3.7	<i>Waste management information guide for contractors.....</i>	290

8.1 Demolition (Deconstruction) Waste Management Plan (WMP)

Where the development involves demolition works, a Demolition Waste Management Plan (WMP) must be completed and submitted with a Development Application in accordance with the relevant controls and guidance for each Zone and land use in DCP and WMG.

Completing the relevant sections of this Plan will assist in identifying the type of waste that will be generated and in advising Council how you intend to reuse, recycle or dispose of the waste.

The information provided through this form and development proposal plans will be assessed against the objectives and controls within the DCP and WMG, which aim to reduce the amount of demolition waste to landfill and promote waste avoidance, reuse and recycling.

8.1.1 How to prepare the demolition waste management plan (WMP)

1. Complete the WMP checklist in section 8.2.2 as thoroughly as possible.
2. Complete the WMP form in section 8.2.3 as thoroughly as possible.
3. The checklist and form can be modified to include additional information if necessary.
4. Prepare design and/or landscape drawings that confirm the dwelling's compliance with the controls in the DCP, guidance, and as prompted by the checklist and form.
5. After designing the waste management system, prepare a summary document to provide contractors that explains what the intended WMP is for the demolition works (e.g. where waste and skips should be stored and collected).
6. Compile all of the above documentation into one Waste Management Plan PDF file (other than the Landscape and Floor Plans which can be separate) and lodge it as an attachment to your Development Application.

Three types of WMPs are required for many developments. These are Demolition WMP, Construction WMP and Operational WMP. See Section 9.1 for more information on preparing a Construction WMP and Sections 2.1-7.1 for information on Operational WMPs by property type.

Where approval for all stages of a development proposal will be sought at the same time, then all WMPs should be collated into one comprehensive WMP document and lodged as an attachment to the Development Application.

Tips for Preparing the Demolition Waste Management Plan

1. List and estimate demolition waste types and volumes
2. Design and identify:
 - ways to avoid, reuse and recycle demolition wastes
3. Identify:
 - waste management equipment, bin sizes and collection frequency
 - waste collection service providers
 - destination scrapyards, recyclers, composters and landfills
4. Design:
 - waste storage areas for demolition stages
 - bin collection points, if waste collection is not direct from the storage area
 - routes between waste storage and collection points
 - routes between demolition work spaces and waste storage areas
5. Collate demolition waste management information to be provided to the demolition team.

8.1.2 Demolition waste management checklist (all development types)

Checklist – Demolition Waste Management				
Site Address and Lot/Plan(s):				
Applicant Information				
Applicant's Name:				
Applicant's Address:				
Applicant's Phone / Mobile:				
Applicant's Email:				
Applicant's Authorisation:				
<p>Diversion of any demolition waste to reuse, recycling or composting is maximised.</p> <p>Plans showing demolition stages waste storage areas; waste collection points and waste collection vehicle access are provided in this application and will be provided to all stakeholders in the demolition process.</p> <p>The checklist has been completed accurately and in full.</p> <p>The details provided on this form represent the applicant's genuine intentions for managing wastes related specifically to this project.</p>				
Signature of Applicant or Authorised Agent:				Date:
Demolition/deconstruction proposal – outline				
Number and scale of Buildings/Structures to be demolished/deconstructed: ___ 1 bedroom dwelling(s) ___ 2 bedroom dwelling(s) ___ 3 bedroom dwelling(s) ___ 4+ bedroom dwellings ___ garage/shed(s) ___ carport/veranda(s) ___ m fencing ___ m ² paving/driveway ___ m ³ trees ___ conduit/piping ___ Other:				
Demolition/deconstruction – checklist				
	YES	NOT YET	NO	N/A
Waste Types				
All types of wastes to be generated are listed, including floors, walls, roofing, structures, fencing, paving, doors and windows, internal fittings, conduit and wiring.				
Avoidance, Reuse and Recycling				
All wastes that can be reused or recycled are identified.				
Have maximised beneficial reuse of infrastructure, buildings and materials on site.				
Have maximised diversion of any demolition waste to reuse, recycling or composting.				
All native vegetation proposed for demolition will be integrated with landscaping, reused and retained on site for chipping and spreading as mulch, with timber structures used as log piles or perches to house reptiles, mammals, insects and birds. (A detailed control only required in Environment Protection Zones (zones E2, E3 and E4) but encouraged in other zones.)				
Second-hand and recycled content resources will be used for construction where possible and where this visually integrates with the natural landscape character and dwelling form. (A detailed control only required in Environment Protection Zones (zones E2, E3 and E4) but encouraged in other zones.)				
Proposals for offsite reuse meet NSW Resource Recovery Orders and Exemptions.				
The name of a licenced facility (to which the respective demolition waste could be sent for reuse, recycling or disposal) is included in the plan.				

Demolition/deconstruction – checklist	YES	NOT YET	NO	N/A
Any recycling and green waste bins on site prior to demolition are noted in the demolition plan to be returned to Council’s contractors (contacted Council on 4921 0333).				
Waste Storage Areas				
Reusable resources and waste can be appropriately and effectively stored.				
Reusable resources and waste can be appropriately, effectively and safely removed from site without adverse impacts on local amenity.				
The waste storage area(s) for demolition waste are shown on the demolition plans.				
Waste management plan(s) demonstrate that sufficient area is allocated for separate storage and collection of site occupants’ wastes and demolition wastes.				
Waste can be placed in the bins without moving bins around.				
Sufficient area is allocated for separate storage and collection of problem wastes (such as light bulbs, batteries, gas bottles, oils, cooking oils and paint).				
For staged demolitions, waste management for each stage is shown in plans and described in the demolition waste management plan.				
All waste management plans show the appropriately located, sized and suitably screened waste storage locations related to the demolition sequencing of the development. Waste will be contained within the demolition site in a suitably screened area of least 3.5m ² and 1.2 metres high.				
The waste storage area is located conveniently for demolition work team to use it.				
The routes for movement of waste between work site and waste storage area are obstruction-free.				
Waste Collection and Removal				
The routes for movement of bins and waste between storage and collection points are obstruction-free (if waste is moved between the waste storage area(s) and collection point(s)).				
Waste bin collection point(s) is provided that are accessible for waste collection vehicles. There are no obstructions to turning or reversing, pulling up vehicles and lifting bins.				
All waste management plans show access and turning space provisions for waste collection vehicles through each demolition stage.				
Access will not be compromised by demolition-related activities vehicles or other consequences of demolition staging.				
All waste not being reused on site will be removed during, or at the completion of, the demolition stage.				
No waste will be left on site unless it is part of valid reuse on site, which is integral to and in place in the design, or is a few spares for use in future maintenance repairs, or has valid reuse for another authorised use of the property.				
In order to manage noise levels, collection of waste from the demolition site will only occur during hours approved for demolition work.				
Waste Management Information for Stakeholders				
All Waste Management Plans will be provided to any relevant person involved in the demolition, including project managers, builders, contractors, sub-contractors and architects.				

Demolition Waste Management Plan Completion	YES	NOT YET	NO	N/A
Comments regarding any deviation from the waste management controls and guidance:				
Waste Management Plan checklist and coversheet has been completed and signed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
List of Items for Reuse				
<i>e.g. The following buildings, building components and infrastructure will be reused on site (avoiding waste) - Examples provided in pre-filled text, remove what does not apply and/or add others that do apply:</i> <i>fill (VENM, ENM), aggregates</i> <i>roofing</i> <i>timber</i> <i>bricks, pavers</i> <i>windows, doors</i> <i>pipes and conduit</i> <i>water tanks</i> <i>fencing and gates</i>				
The following demolition wastes will be reused on site for integration into the design, or retained for future maintenance repairs, or other valid reuse on the property - <i>Examples provided in pre-filled text, remove what does not apply and/or add others that do apply:</i> <i>e.g. fill (VENM, ENM), aggregates</i> <i>roofing</i> <i>timber</i> <i>bricks, pavers</i> <i>windows, doors</i> <i>pipes and conduit</i> <i>water tanks</i>				

8.1.3 Demolition waste management plan (all development types)

DEMOLITION (DECONSTRUCTION) WASTE MANAGEMENT PLAN

Waste Type:	Waste amounts (m ³ or Tonnes)	Reuse on site Specify proposed on site reuse methods and waste volume.	Reuse or recycling offsite Specify recycling collection service provider and recycling facility destination	Disposal to licenced landfill Specify waste collection service provider and landfill destination
Excavation material				
Green waste				
Furniture and equipment				
Fittings and furnishings				
Water supply, sewage, gas and electrical pipes, conduit, wires and meters				
Fencing and gates				
Concrete				
Bricks				
Tiles				
Asphalt				
Timber – clean				
Timber – treated/painted				
Timber –composite				
Plasterboard				
Metals (please specify)				
Plate glass / windows				
Plastic (please specify)				
Containers (recyclable)				
Food waste				
Other waste (please specify)				

Any Council kerbside recycling and green waste bins on site belong to Council’s contractor. Contact Council 4921 0333 to arrange removal.

8.2 Waste Aspects of the Development Control Plan (for Demolition/Deconstruction in All Zones)

Under the Lake Macquarie Local Environment Plan (LEP), demolition requires development consent, except where other legislation allows it as exempt development.

2.7 Demolition requires development consent

The demolition of a building or work may be carried out only with development consent.

Note.

If the demolition of a building or work is identified in an applicable environmental planning instrument, such as this Plan or [State Environmental Planning Policy \(Exempt and Complying Development Codes\) 2008](#), as exempt development, the Act enables it to be carried out without development consent.

The Lake Macquarie Development Control Plan (DCP) sets out broad objectives and controls for Demolition. These occur in the DCP in Parts 2 (Rural zones), 3 (Residential zones), 4 (Business zones), 5 (Industrial, Business Park and Infrastructure Zones), 6 (Recreation and Tourist zones) and 7 (Environment Protection Zones).

The broad objectives and controls relevant to demolition are summarised below in:

- 2.1.1 (objectives)
- 2.1.2 (controls)

The controls specified in the DCP require that all demolition waste management be in accordance with Section 8 of the Waste Management Guidelines. In order for the demolition waste management to be in accordance with these guidelines, some guidance should be met.

The guidance is outlined in:

- 2.1.3 for all zones
- 2.1.4 for Environment Protection Zones (zones E2, E3 and E4)s (for which there is additional guidance)

8.2.1 General objectives for demolition/deconstruction

The source of the information applicable to this section is highlighted in the chart below:

Document	Controls By Zone	Subdivisions	Specific Land Uses	Events
DCP	Objectives and controls by zone – see DCP Parts 2-7	Aims and Controls - see DCP Part 8	Objectives and controls for specific land uses (additional to controls by zone) - see DCP Parts 9.1-9.19	DCP Parts 2 - 7
WMG	Guidance by zones – see WMG (all Sections 2-7)	Guidance - see WMG Section 7	Guidance for specific land uses, such as Aged Care, not covered in DCP Part 9	Guidance - see WMG Section 6

The Objectives defined in the Lake Macquarie City Council Development Control Plan for demolition are:

- a. *To reduce demolition waste by maximising beneficial reuse of infrastructure, buildings and materials on site.*
- b. *To enable maximum diversion of demolition waste to reuse, recycling or composting.*
- c. *To ensure that waste management is planned across all demolition stages so that reusable resources and waste can be appropriately and effectively stored and removed safely from site without adverse impacts on local amenity*

8.2.2 Controls for demolition/deconstruction

The source of the information applicable to this section is highlighted in the chart below:

Document	Controls By Zone	Subdivisions	Specific Land Uses	Events
DCP	Objectives and controls by zone – see DCP Parts 2-7	Aims and Controls - see DCP Part 8	Objectives and controls for specific land uses (additional to controls by zone) - see DCP Parts 9.1-9.19	DCP Parts 2 - 7
WMG	Guidance by zones – see WMG (all Sections 2-7)	Guidance - see WMG Section 7	Guidance for specific land uses, such as Aged Care, not covered in DCP Part 9	Guidance - see WMG Section 6

The Controls defined in the Lake Macquarie City Council Development Control Plan for demolition are:

1. Applications must provide a completed Demolition Waste Management Plan (WMP) (where there are demolition works) in accordance with Section 8 of the Lake Macquarie City Council Waste Management Guidelines. This applies unless the development is one of the following types:

- permitted without consent in this zone;
- drainage;
- earthworks;
- roads;
- signs;
- stormwater management facilities; or
- utility installations.

In addition, the applicant does not need to provide a construction WMP if the development is within the following zones and one of the following uses:

<p>In a Rural Zone (Zones RU2 (Rural landscape), RU3 (Forestry), RU4 (Primary production small lots) or RU6 (Transition) and is:</p> <ul style="list-style-type: none"> • Agriculture (other than intensive agriculture and aquaculture) • Roadside stalls 	<p>In an Industrial, Business Park or Infrastructure Zone (Zones IN1 (General Industrial), IN2 (Light Industrial), IN4 (Working Waterfront), B7 (Business Park), SP1 (Special Activities) or SP2 (Infrastructure) and is:</p> <ul style="list-style-type: none"> • Agriculture (other than intensive agriculture and aquaculture) • Rail lines
<p>In a Business Zone (Zones B1 (Neighbourhood centre), B2 (Local centre), B3 (Commercial Core), or B4 (Mixed Use) and is:</p> <ul style="list-style-type: none"> • Advertising structures • Building or business identification signs • Environmental protection works • Waterbodies (artificial or natural) • Watercourses • Wetland 	

These plans must be provided to any relevant person involved in the demolition, including project managers, builders, contractors, sub-contractors and architects.

2. The Demolition WMP must describe how the proposal avoids creating waste and how it maximises the reuse and recycling of demolition materials.

3. The following must be shown on scaled plans to be submitted with the development application for demolition and construction stages:

- a. waste storage area(s) with bins and equipment shown to scale;
- b. waste collection area(s) with bins shown to scale (if different from storage areas);
- c. waste carting route(s) from buildings to waste storage area(s);

- d. bin carting route(s) from waste storage to collection point(s) (if different from storage areas); and
- e. the waste collection vehicle route, swept path and clearances (only for developments proposing on-site collection).

8.2.3 Guidance for demolition/deconstruction in all zones

The source of the information applicable to this section is highlighted in the chart below:

Document	Controls By Zone	Subdivisions	Specific Land Uses	Events
DCP	Objectives and controls by zone – see DCP Parts 2-7	Aims and Controls - see DCP Part 8	Objectives and controls for specific land uses (additional to controls by zone) - see DCP Parts 9.1-9.19	DCP Parts 2 - 7
WMG	Guidance by zones – see WMG (all Sections 2-7)	Guidance - see WMG Section 7	Guidance for specific land uses, such as Aged Care, not covered in DCP Part 9	Guidance - see WMG Section 6

Applicants that must provide a completed Demolition WMP should provide a demolition waste management plan that is in accordance with the following guidance:

1. The demolition waste management plan must demonstrate that sufficient area is allocated for separate storage and collection of site occupants' wastes and demolition wastes, including wastes requiring separation for special management (such as light bulbs). For staged demolitions, this must clearly show waste management for each stage.

All waste management plans must show:

- a. the appropriately located, sized and suitably screened waste storage locations related to the demolition sequencing of the development. The screened area is at least 3.5m² and 1.2 metres high;
 - b. all waste not being reused on site is removed during, or at the completion of, the demolition stage;
 - c. unobstructed access paths for waste carting routes if waste is moved between the waste storage area(s) and collection point(s); and
 - d. access and turning space provisions for waste collection vehicles through each demolition stage, ensuring that access will not be compromised by demolition-related activities vehicles or other consequences of demolition staging.
2. No waste should be left on site unless it:
 - a. can genuinely be reused on site, in which case the materials to be reused is included in the design;
 - b. will be used as replacement or spare parts for future maintenance; or
 - c. can be reused on another authorised part of the property.
 3. In order to manage noise levels, collection of waste from the demolition site must only occur during hours approved for demolition work.
 4. The Demolition WMP is provided to and adhered to by any relevant person involved in the demolition, including project managers, builders, contractors, sub-contractors and architects.

8.2.4 Environment Protection Zones – guidance for demolition/deconstruction

The source of the information applicable to this section is highlighted in the chart below:

Document	Controls By Zone	Subdivisions	Specific Land Uses	Events
DCP	Objectives and controls by zone – see DCP Parts 2-7	Aims and Controls - see DCP Part 8	Objectives and controls for specific land uses (additional to controls by zone) - see DCP Parts 9.1-9.19	DCP Parts 2 - 7
WMG	Guidance by zones – see WMG (all Sections 2-7)	Guidance - see WMG Section 7	Guidance for specific land uses, such as Aged Care, not covered in DCP Part 9	Guidance - see WMG Section 6

In addition to that applicable in all zones, in Environment Protection Zones (zones E2, E3 and E4)s applicants that must provide a completed Demolition Waste Management Plan must provide a demolition waste management plan that is in accordance with the following detailed Objective and Controls:

Objectives (from the DCP in addition to objectives a to c in 8.2.1)

- d. To appropriately manage the retention of existing vegetation and vegetation to be removed.*

Controls (in addition to guidance 1 to 4 in 8.2.3 above)

5. All native vegetation proposed for demolition shall be integrated with landscaping, reused and retained on site for chipping and spreading as mulch, with timber structures used as log piles or perches to house reptiles, mammals, insects and birds.
6. Second-hand and recycled content resources should be used for construction where possible and where this visually integrates with the natural landscape character and dwelling form.

8.2.5 Tourist and visitor accommodation – objectives and controls for demolition

The source of the information applicable to this section is highlighted in the chart below:

Document	Controls By Zone	Subdivisions	Specific Land Uses	Events
DCP	Objectives and controls by zone – see DCP Parts 2-7	Aims and Controls - see DCP Part 8	Objectives and controls for specific land uses (additional to controls by zone) - see DCP Parts 9.1-9.19	DCP Parts 2 - 7
WMG	Guidance by zones – see WMG (all Sections 2-7)	Guidance - see WMG Section 7	Guidance for specific land uses, such as Aged Care, not covered in DCP Part 9	Guidance - see WMG Section 6

As per DCP Part 9.18 Tourist and Visitor Accommodation, the following are additional requirements. Where there is a conflict with the zone requirements, these land use requirements apply:

Objectives (only those from the DCP relevant to waste)

- c. To ensure tourist accommodation and resorts are designed and constructed using principles of sustainable waste avoidance, resource reuse and recycling.*
- d. To appropriately manage the retention of existing vegetation and vegetation to be removed.*

Controls (only those from the DCP relevant to waste)

5. All native vegetation proposed for demolition shall be integrated with landscaping, reused and retained on site for chipping and spreading as mulch, with timber structures used as log piles or perches to house reptiles, mammals, insects and birds.
6. Second-hand and recycled content resources from demolition should be used for construction where possible and where this visually integrates with the natural landscape character and dwelling form.

8.2.6 Rural construction site waste management requirements under the Rural Housing Code

The source of the information applicable to this section is highlighted in the chart below:

Document	Controls By Zone	Subdivisions	Specific Land Uses	Events
DCP	Objectives and controls by zone – see DCP Parts 2-7	Aims and Controls - see DCP Part 8	Objectives and controls for specific land uses (additional to controls by zone) - see DCP Parts 9.1-9.19	DCP Parts 2 - 7
WMG	Guidance by zones – see WMG (all Sections 2-7)	Guidance - see WMG Section 7	Guidance for specific land uses, such as Aged Care, not covered in DCP Part 9	Guidance - see WMG Section 6
SEPP	SEPP (Exempt and Complying Development Codes) 2008 - Part 3A Rural Housing Code / Schedule 6			

Note that demolition for development of dwelling houses in Rural Zones (zones RU2, RU4 and RU6) also may come under *State Environment Planning Policies (SEPP) for the Rural Housing Code* and Schedule 6 “Garbage receptacle” and “Maintenance of site” and other components of *SEPP (Exempt and Complying Development Codes) 2008*.

SEPP (Exempt and Complying Development Codes) 2008 – Schedule 6

Note: For a helpful reference, the following has been extracted from SEPP (Exempt and Complying Development Codes) 2008. Check that the text is current by referring to the SEPP document original.

State Environment Planning Policies (SEPP) (Exempt and Complying Development Codes) 2008 under Schedule 6 requires the following handling of waste:

Part 1 Conditions applying before works commence

3. Garbage receptacle:

- (1) A garbage receptacle is provided at the work site before works begin and is maintained until the works are completed.*
- (2) The garbage receptacle must have a tight fitting lid and be suitable for the reception of food scraps and papers.*

Part 2 Conditions applying during the works

Note. The [Protection of the Environment Operations Act 1997](#) and the [Protection of the Environment Operations \(Noise Control\) Regulation 2008](#) contain provisions relating to noise.

7. Hours for construction:

Construction may only be carried out between 7.00am and 5.00pm on Monday to Saturday and no construction is to be carried out at any time on a Sunday or a public holiday.

9. Maintenance of site:

- (2) Waste materials (including excavation, demolition and construction waste materials) is managed on the site and then disposed of at a waste management facility.*
- (4) During construction:*
 - (a) all vehicles entering or leaving the site must have their loads covered; and*
 - (b) all vehicles, before leaving the site, is cleaned of dirt, sand and other materials, to avoid tracking these materials onto public roads.*
- (5) At the completion of the works, the work site is left clear of waste and debris.*

8.3 Demolition (Deconstruction) Waste Management – Information to Assist with Planning

8.3.1 Waste types and volumes from demolition/deconstruction

Deconstruction (or careful demolition) is the stage with the greatest potential for waste minimisation. In most cases, a minimum of 80 per cent should be able to be reused or recycled.

Assess what is on the site and list these on the demolition waste management plan. This may include:

- reusable buildings;
- furnishings and fittings;
- services (such as fire safety, water, electricity, gas, sewerage, drainage, air-conditioning and lifts);
- structural materials (such as roof, floor, columns, frames, bracing, walls, footings and basements);
- secondary materials (such as ceilings, wall panels and floor coverings);
- outbuildings, sheds, verandas, gazebos, carports and garages;
- fencing, pathways, driveway, letterbox and garden edging; and
- shrubs, trees, branches, mulch and lawn.

The Department of Environment, Climate Change and Water NSW publication “*House Deconstruction Information Booklet*” (July 2010) provides useful information on the benefits and methods of selective and full house deconstruction.

Table 22 below extracted from this publication provides an approximation of the tonnages of materials that could be recovered from a variety of building types, although this varies with house size and quality of components.

Table 22 - Typical composition of houses for deconstruction

Material type	Tonnages by House Type			
	Full Brick (T)	Brick Veneer (T)	Weatherboard (T)	Asbestos fibro (T)
Fittings	1.5	1.5	1	1
Roof tiles	8	12	5	5
Plasterboard	1	2.5	2	2
Timber	6.9	9.6	7.2	5.3
Concrete, bricks	180	120	50	20
Asbestos	(check is 0)	(check is 0)	(check is 0)	1.80
Total	197	146	65	35

Recoverable and potentially reusable fittings include doors, windows, cabinets, air conditioners, heaters, pipes, light fittings, sinks, basins and taps.

Recyclable materials that may have particularly high market value include copper wiring and pipes and steel products are usually reusable or recyclable.

Recycling the heaviest materials – brick, concrete and tiles – saves the most money, as waste disposal charges are usually calculated by weight.

All deconstruction and demolition should be planned and undertaken safely and systematically as per Australian Standard AS 2601 – 2001.

The main exceptions to recyclability of resources are:

- asbestos contamination (until site must be cleared of asbestos);
- remains after a building fire (contaminated by burnt chemical residues and perhaps asbestos);
- timber components treated with Copper Chrome Arsenate (CCA);
- lead paint; and
- Poly-Chlorinated Biphenyls (PCBs).

Other hazardous wastes from the demolition of buildings may include:

- fluorescent lamps that contain mercury;
- old fluorescent light ballasts that may contain Poly-Chlorinated Biphenyls (PCBs);
- cable insulation, thermal insulation including fibreglass, felt, foam and cork (may contain PCBs);
- old oil-based paints and some old floor finishes could contain PCBs;
- old adhesives and adhesive tapes could contain PCBs;
- old electrical equipment including voltage regulators, switches, bushings and electromagnets, transformers and capacitors may contain PCBs;
- old oil used in motors and hydraulic systems may contain PCBs;
- old refrigerators and air conditioning equipment with refrigerants made using CFCs;
- batteries – lead acid, lithium and mercury;
- solvents and solvent-borne paints;
- roof and wall claddings, pipe insulation, some vinyl flooring, textured ceilings and roofing membrane sheets containing asbestos fibres; or
- flashings, paint, bath and basin wastes that may contain lead.

When cleaning up, materials, such as cement, sand, paint and other liquids and solvents, must not be released into the stormwater or sewerage disposal systems. This should be included in the demolition WMP information for handover to demolition contractors.

Asbestos

A useful resource for advice on demolition of fire-damaged buildings with asbestos contamination was published by NSW Environment Protection Authority (January 2015) Guidance Material: Asbestos and Fire-damaged Buildings.

If asbestos waste is found contaminating demolition (or other) waste, the draft protocol is outlined in the NSW Environment Protection Authority 2014 Draft protocol for managing asbestos during resource recovery of construction and demolition waste.

Lead Paint

During deconstruction or demolition, areas where there is lead-based paint must be managed safely. When lead paint deteriorates or during works, lead dust may be formed that can be inhaled or ingested, leading to health problems from lead poisoning. More information is available from NSW EPA at www.epa.nsw.gov.au/pesticides/lead-safety.htm.

Solvents and Paints in Solvents

Look for opportunities to use leftover paint where this is appropriate. Paints should be properly disposed of with hazardous chemicals handling. However, dry paint tins (from which the solvent has evaporated and there is only a residue of paint) can be recycled in recyclables (like glass, plastic containers, paper and cardboard).

Poly-Chlorinated Biphenyls (PCBs)

Poly-Chlorinated Biphenyls (PCBs) may be present in products and materials produced before the 1986 PCB ban in Australia. More information is available from USA EPA website <https://www.epa.gov/pcbs/learn-about-polychlorinated-biphenyls-pcbs>.

Absorption, inhalation and ingestion should be avoided and items containing PCBs should be treated as hazardous waste, not included in waste to normal landfill, nor reused, nor recycled, nor burnt, nor composted.

8.3.2 Avoid, reuse and recycle demolition waste

Avoid creating demolition waste

The first question that should be considered is whether it is possible to reuse whole or part of existing buildings and infrastructure. This will save demolition and reconstruction costs and resources.

The WMP should identify where waste avoidance will be achieved.

Some ideas for waste avoidance are outlined in Table 23.

Table 23 - Waste avoidance potential

MATERIALS ON-SITE	AVOIDANCE
Concrete	Retain existing driveways, paths, footings, slabs etc.
Bricks	Retain existing walls, buildings and fences
Roof-tile	Retain existing roofs or colour treatments/cleaning
Hardwood beams	Leave in place and re-clad
Other timber	Leave in place
Doors, windows, fittings	Design as an architectural feature of new development
Synthetic and recycled rubber (e.g. under carpets)	Protect/cover and reuse
Significant trees	Design into new development
Green waste	Leave landscaping in place and protect from damage
Overburden	Avoid excessive excavations

Reuse on site

Some demolition wastes can be reused on site. This is encouraged where there is a bona fide benefit or reuse and no harm caused (i.e. the application is not an excuse to bury or store waste on site).

The WMP should identify where waste reuse will be achieved.

If the demolition materials do not leave the site, they do not become classified as waste under *NSW Protection of the Environment Operations (POEO) Act 1997*. However, on-site use still must comply with environmental and health legislation considerations.

Any materials applied in or on the land must not pollute the land. Section 142A of the *Protection of the Environment Operations (POEO) Act 1997* specifies an offence if land is polluted by anything that:

- (a) results in actual or potential harm to the health or safety of human beings, animals or other terrestrial life or ecosystems;
- (b) results in actual or potential loss or property damage, that is not trivial; or
- (c) is of a prescribed nature, description or class.

Resources used on site should not contaminate land. Contamination of land in the *NSW Contaminated Land Management Act 1997* is defined as “the presence in, on or under the land of a substance at a concentration above the concentration at which the substance is normally present in, on or under (respectively) land in the same locality, being a presence that presents a risk of harm to human health or any other aspect of the environment”.

If resources are brought from another site or supplier (and the waste resource is to be used in the ground, on the ground surface or as retaining wall), then the qualities of the waste resource must meet the requirements in the Resource Recovery Exemptions and Orders published on NSW Environment Protection Authority's (EPA) website at <http://www.epa.nsw.gov.au/wasteregulation/recovery-exemptions.htm>.

Resource Recovery Orders spell out requirements in relation to generating the waste and Resource Recovery Exemptions outline the conditions that must be met before the waste resource can be applied to land.

Some examples of Resource Recovery Exemptions and Orders that may be relevant to demolition:

- cement fibre board;
- compost;
- excavated natural material;
- mulch;
- pasteurised garden organics;
- plasterboard; and
- recovered asphalt pavement.

Application can also be made to EPA for a Resource Recovery Exemption and Order for other materials. The EPA has published guidelines to applying for a Resource Recovery Exemption – see <http://www.epa.nsw.gov.au/wasteregulation/apply-exemption.htm>

If the resource is reused on a structure, such as reusing windows or doors, then this is not application to land and does not need to meet any such requirements. Reused components, as with new components, need to meet building quality and safety requirements.

Some ideas for effective reuse as part of the design include those listed in Table 24.

Table 24 - Sustainable house deconstruction

From Willoughby City Council – “Sustainable House Deconstruction” fact sheet (with updates):

Item	Reuse or sell	Recycle	Dispose
Wood (lumber, timber, flooring)	Timbers, large dimension lumber, plywood, flooring, moulding, lumber longer than 3m	Unpainted and untreated wood unfit for reuse, offcuts	Painted, treated or rotting timber
Windows and doors	Windows and doors in good condition	Metal frames, screens, unpainted or untreated wood, plate glass	Unusable painted or treated wood
Cabinets	Entire cabinets (replace doors in poor condition)	Untreated or unpainted wood	Painted or finished wood
Plumbing products	Sinks, tubs, taps, PVC pipes in good condition	Metal pipes, toilets (porcelain and metal), taps with lead content	PVC and other plastic piping unfit for reuse, toilet seats
Plasterboard	Plasterboard in good condition	All other uncontaminated plasterboard	Contaminated (asbestos or lead), rotten plasterboard
Electrical products	All if in good working order (including light fittings, heaters, air conditioners) [inspect and tag]	Metals (fixtures, conduits), wiring, ceramic and plastic	Ceramic and plastic parts
Bricks and concrete	Any bricks that are in good order and not too contaminated with mortar	All bricks and concrete	Do not dispose – all can be recovered
Non-wood floor covering (carpets, tiles, etc.)	All good condition flooring if removed intact	All flooring types other than vinyl	Vinyl, stained or heavily soiled carpets
Roofing materials (tiles, sheet steel)	All products if in good condition	Metal materials, terracotta and concrete tiles	Not applicable

Bricks:

- Bricks with a suitable flat face can be used for paving. Mixed colours can make stunningly effective designs, or bricks can be used along pathway and garden bed edging;
- Chipped and damaged bricks can be converted to half bricks for ends of rows, or turned to face 90 degrees in walls to show the good face, as part of a distinctive pattern;
- Aerated bricks can be carved for sculptural shapes; and
- Extruded bricks (with the holes) are lightweight compared to bricks with indented frogs and thus extruded bricks are most useful for wall construction. However if they have concrete mortar (as opposed to the old lime mortar) attached, the time to clean them may make it more effective to use them for backfill of retaining walls, or sent for crushing. Old lime mortar is easily cleaned from bricks for brick reuse.

Where demolition works require plant removal, native plants should be transplanted on site where feasible.

Any green waste, other than weeds, should be retained on site, where possible, for use as:

- mulch or compost; and
- natural timber structures integrated into the landscaping including native animal (small mammal, reptile, bird, bee and insect) housing.

Some useful information on native animal habitat design can be found at

www.wires.org.au/wildlife-info/wildlife-factsheets.

Other fittings that can be reused include:

- timber – hardwood flooring, weatherboard, laminated beams, truss joists, treated and untreated framing, timbers/posts, New Zealand native timber components;
- thermal insulation – fibreglass, wool and polyester insulation, polystyrene sheets;
- plumbing fixtures – baths, sinks, toilets, taps, service equipment, hot water heaters;
- electrical fittings – light fittings, switches, thermostats;
- linings and finishings – architraves, skirtings, wood panelling, specialty wood fittings, joinery;
- doors and windows – metal and timber doors, mechanical closures, aluminium windows, steel windows, sealed glass units, unframed glass mirrors, store fronts, skylights, glass from windows and doors, timber and metal from frames;
- PVC and metal spouting; and
- staircases.

Reuse or recycle offsite

If the existing buildings and/or site infrastructure have to be removed, then with careful on-site sorting, protective storage and by staging work programs it is possible to reuse or recycle many materials offsite.

Builders should not simply knock down a building and dispose of all waste materials to landfill. Instead, a number of colour-coded or clearly labelled bins on-site, or on an ordered retrieval program, should be used to reduce the need for waste disposal to landfill.

Where on-site space is a constraint, direct loading to waste collection vehicles may be appropriate, or there are businesses that take mixed waste offsite and sort it to extract recyclables. However, the mixing of the wastes together could cross-contaminate and damage otherwise reusable waste resources, so this method could have lower resource recovery yields.

The National Built Environment Rating System (NABERS) provides a way to rate and compare a building on the amount of waste generated and recycled.

The Green Building Council of Australia (GBCA) Green Star best practice environmental rating tools also provide a way to rate and compare the sustainability attributes of buildings. The Green Star Construction and Demolition Waste Reporting criteria apply to projects seeking certification.

Materials that can generally be recycled from deconstruction/demolition sites include:

- asphalt paving;
- concrete;
- masonry – concrete blocks and decorative concrete, paving stones, bricks and terracotta tiles;
- metals – structural steel, steel roofing, metal flashings and spouting, zinc roofing, reinforcing steel from concrete, interior metal wall studs, cast iron grates, aluminium fixtures, copper pipes and wiring, metal and wire fencing, lead metal, electrical wiring and some fittings, and plumbing fixtures such as taps;
- wool carpet; and
- plastics – high-density polyethylene water pipes, PVC, polystyrene (resin codes 1–6).

The Commonwealth Government coordinated a Waste Wise program with the construction industry between 1995 and 2001 to examine how much waste could be diverted to recycling and reuse. The program demonstrated that high levels of waste diversion to recycling and reuse are possible, as per Table 25.

Table 25 - Waste diversion achievable

Company	Percentage of waste diverted from landfill	Project(s)
Barclay Mowlem Construction	80 per cent	Total waste in 2000
Bovis Lend Lease	98 per cent	State Office Block site in Sydney in 1997
Bovis Lend Lease	87 per cent (280,790 m ³)	Total waste in 2001
Fletcher Construction	43 per cent	Dandenong Police and Court Buildings, saving 55 per cent of the company's waste removal costs
John Holland Group	83 per cent (8,851,000 kg)	Total waste generated on all its sites in 2001
Multiplex Constructions	60 per cent	Site waste at the Homebush Bay Olympic Stadium site between April and August 1997
Multiplex Constructions	87 per cent (1,250 tonnes)	Waste from the Campbelltown Hospital site in 2001
Project Coordination (Australia)	68 per cent (240 tonnes)	Waste material generated at the Canberra Hospital Pathology Building Refurbishment and the Calvary Hospital Redevelopment
Thiess	94 per cent (32,641 cu m)	Waste generated at the Royal Prince Alfred Hospital site in 2001 - resulting in waste removal cost savings of around 40 per cent.

Source: Australian Bureau of Statistics, www.abs.gov.au, accessed December 2016

There are financial benefits for separating waste to achieve a reduction in the amounts of waste needing to be disposed. There is usually a substantial saving on disposal costs if materials are sent to a recycler instead.

To maximise the value of the recyclable material and maximise the savings possible from the demolition, work with recyclers to identify potential contaminants and minimise damage to the waste resource. The recycler will need to:

- consider the Resource Recovery Order and Exemption requirements (if applicable) when the waste is going to be applied to land;
- maximise the recoverable proportion of the waste resource with an affordable cost-effective level of processing;
- minimise the residual waste they have to send to landfill; and
- maximise the price that they can get in selling the waste resource, which is usually affected by the quality, cleanliness and lack of contamination of the waste resource.

Ensure that the contaminating types of wastes are not included in the load sent to the recycler. For example, for timber recycling, check if the following wood products can be recycled by the recycling business, as for many businesses these are contamination to their product stream:

- plywood, MDF, particleboard or other manufactured wood products;
- wood treated with CCA (copper chrome arsenate) or creosote, blue H2 wood, or red H3 wood;
- painted or laminated wood; and
- locks, corner brackets, hinges and other metal fittings.

CASE STUDY

COUNTRY DEMOLISHER RECYCLES 95 PER CENT

An Orange demolition contractor, commissioned to demolish a 7,300m² site in the city's business centre, was able to recycle 95 per cent of its waste with only 5 per cent general waste going to landfill.

The following waste minimisation initiatives were used:

- Materials were separated and stock-piled on-site,
- Daily site meetings kept staff up to date with the process, generating enthusiasm and interest in recycling and reducing waste to landfill,
- Recycled hard material, such as concrete and bricks, was reused on site as the base for the new car park, with a saving of \$100,000 in tip and cartage fees,
- A large public sale was conducted on-site, reducing the need for cartage, recovering some of the cost of the demolition and allowing materials to be reused.

In reducing the amount of waste going to landfill by 95 per cent, the demolition contractor was able to save \$80,000 in tip fees and \$20,000 in cartage.

“This successful experience has increased people's attitude to recycling a thousand per cent”

There are many providers of reuse or recycling services available in the Hunter and Central Coast regions as well as those based in Sydney.

The name of the recycling facilities to which the demolition wastes will be sent for recycling is required in the Demolition Waste Management Plan. Where the deconstruction/demolition contractors have not yet been selected, an updated Plan will need to be submitted and approved prior to issuing of a Construction Certificate. Sources that will help in identifying recyclers and scrap merchants include:

- recycling businesses listed in Planet Ark's Business Recycling database online at www.businessrecycling.com.au;
- online searches and Yellow Pages under such search phrases as Recyclers, Scrap Yards, Second-hand, Demolition or by specific waste types;
- housing Industry Association (HIA), Master Builders Association (MBA), Property Council of Australia, Building Industry Association, Hunter Planners Network, Frames and Trusses Association, Association of Wall and Ceiling Industries, Waste Management Association Australia (WMAA), or other demolition, deconstruction, construction and waste industry associations;
- Better Building Partnerships (www.betterbuildingspartnership.com.au) refurbishment waste case studies and Strip Out Waste Guidelines and City Switch Green Office (www.cityswitch.net.au);
- manufacturers and suppliers of building products (who may take back offcuts and demolition waste, or know of recyclers);
- EPA-licensed recyclers can be found in the EPA public register at: <http://www.epa.nsw.gov.au/wasteregulation/licensing.htm>; and
- Lake Macquarie City Council Demolition and Construction Waste Recycling Guide.

As a generator of waste, the owner and developer have a legal responsibility to ensure that the destination and handling of the waste meets legal requirements. The person managing the waste must make sure that the waste will not be illegally dumped or end up at a recycling facility or landfill that does not have lawful authority to operate. The NSW *Protection of the Environment Operations Act 1997* details these responsibilities and related offences, with penalties including large fines. Providing false information about waste may result in imprisonment. Generators of waste should be able to prove that duty of care was taken to check licences and request delivery receipts.

8.3.3 Methods for waste management during deconstruction

A useful guide to deconstruction waste management methods is:

- jobsite sorting – from <https://www.wbdg.org/resources/construction-waste-management> “Whole Building Design Guide” by the National Institute of Building Sciences.

Rather than setting a waste minimisation goal (such as 80 per cent) and relying on the demolition/deconstruction contractor's own initiative to achieve that goal, better outcomes can be achieved by using a Waste Management Plan. The contractor should also be required to:

- have regular employee meetings to ensure adherence to the demolition WMP and to minimise contamination of recycling streams; and
- identify the amount of savings achieved by not landfilling waste – an incentive to maximise recycling.

The contract with the demolition/deconstruction contractor should be clear about who has the vested rights to profits from the sale of waste materials and fittings and who pays for waste disposal of contaminated and residual garbage loads.

An option for demolition recycling is to deliver commingled debris in skips or truckloads to a recycler that accepts commingled construction and demolition waste for recycling. At the recycling premises, concrete and masonry rubble are separated out for crushing into crushed aggregate products. The remaining debris is either spread whole for sorting and recycling, or typically crushed or shredded, then conveyed along a pick line for sorting and recycling. The quality of the recovered resources will usually not have as high a value as it can have higher contamination rates.

The alternative is to separate wastes on site where the deconstruction is occurring, or undertake a mix of on site separation and commingled separation. The key to effective on-site separation is to place bins where it is a path of least resistance to the workforce. The workers also need to be trained and monitored to ensure compliance with separation to prevent contamination.

The building's construction type, project schedule and value of the recoverable resources are key factors in determining what and how salvage for reuse and/or recycling can be accomplished.

Prior to demolition, salvage as much useable material and components as the schedule will allow.

Crushing aggregate and shredding materials, such as timber, can be done on-site with mobile equipment. This can provide aggregate or mulch for on-site use, or be valuable in reducing the bulky volumes to require less trucks to haul the waste away.

Heritage timbers, antique style decorations and general hardwoods can have good resale value material that justify the time required for a more delicate removal process.

8.3.4 Demolition waste storage areas

The waste storage area should be a minimum of 3.5m² with a minimum screen height of 1.2 metres. A number of bin locations may be needed, depending on the deconstruction stage.

Waste collection vehicles may be loaded directly on site, depending on the volumes and nature of the deconstruction stage.

No litter or waste should be allowed to escape from the waste storage area.

8.3.5 Placing a waste storage/recycling container in a public place

Some sites with constrained space may require the lease of public space for waste bin storage. When considering this solution, factors to consider include safety, numbers and types of containers and the location of containers. An application must be made under the Lake Macquarie City Council Local Approvals Policy – Management of Waste – Place a waste storage container on a road – available from <https://www.lakemac.com.au/development/local-approvals-policy> .

8.3.6 Waste collection and removal

It is critical to ensure that waste collection vehicle access to site is well planned in order to safely and effectively remove separated waste materials from the deconstruction site.

Deconstruction is usually a systematic reversal of the construction process. This facilitates careful, uncontaminated and undamaged resource recovery. It also means that each stage is removing matching materials – such as all of the plasterboard from the property – all at once, which means that this can easily be collected in one stage and then removed from site for recycling.

A useful resource is *A Guide to Deconstruction*, by the Deconstruction Institute, USA, January 2003 (accessed from the City of Fairmont, West Virginia web page www.fairmontwv.gov). Some useful tips include:

- ensure all wastes have been considered in the planning stage, so that an additional bin or waste collection service is not unexpectedly required;
- identify where the workers, equipment and vehicles will enter and leave the site to ensure safety;
- ensure car parking does not conflict with waste storage or collection route planning;
- consider the weight of the waste collection vehicles if they can drive on the surfaces or will bog;
- ensure the waste collection vehicle will have enough room to turn around and if they can enter and leave the site in a forward direction;
- consider how much overhead space is allowed and whether this is sufficient for lifting that type of waste into the bin and lifting the bin contents into the waste collection vehicle;
- protect the waste storage locations from the weather and damp or dusty ground to ensure a quality product and from anyone that may steal valuable resources;
- ensure hazardous wastes are not stored where there may be a conflict with another activity on site to avoid an incident. This includes keeping hazardous materials away from worker rest areas and collection points and swept path for other wastes;
- minimise the distance – and roughness of the terrain – over which the waste needs to be moved from the deconstruction site, as this saves time and therefore money, including planning sequential or multiple locations throughout the deconstruction stages; and
- ensure that the wastes do not have to be moved twice – do not place it in the way of the next stage of work if it will not be removed by then.

8.3.7 Waste management information guide for contractors

A waste system information guide should be provided to demolition/deconstruction contractors. The guide should outline:

- the approved waste service system and how to use it;
- approved locations for bin storage; and
- options within the approval for alternative waste service solutions.

A property plan should show where the waste storage areas are located and if a particular collection point is necessary other than directly from the waste storage area, then also that collection point.