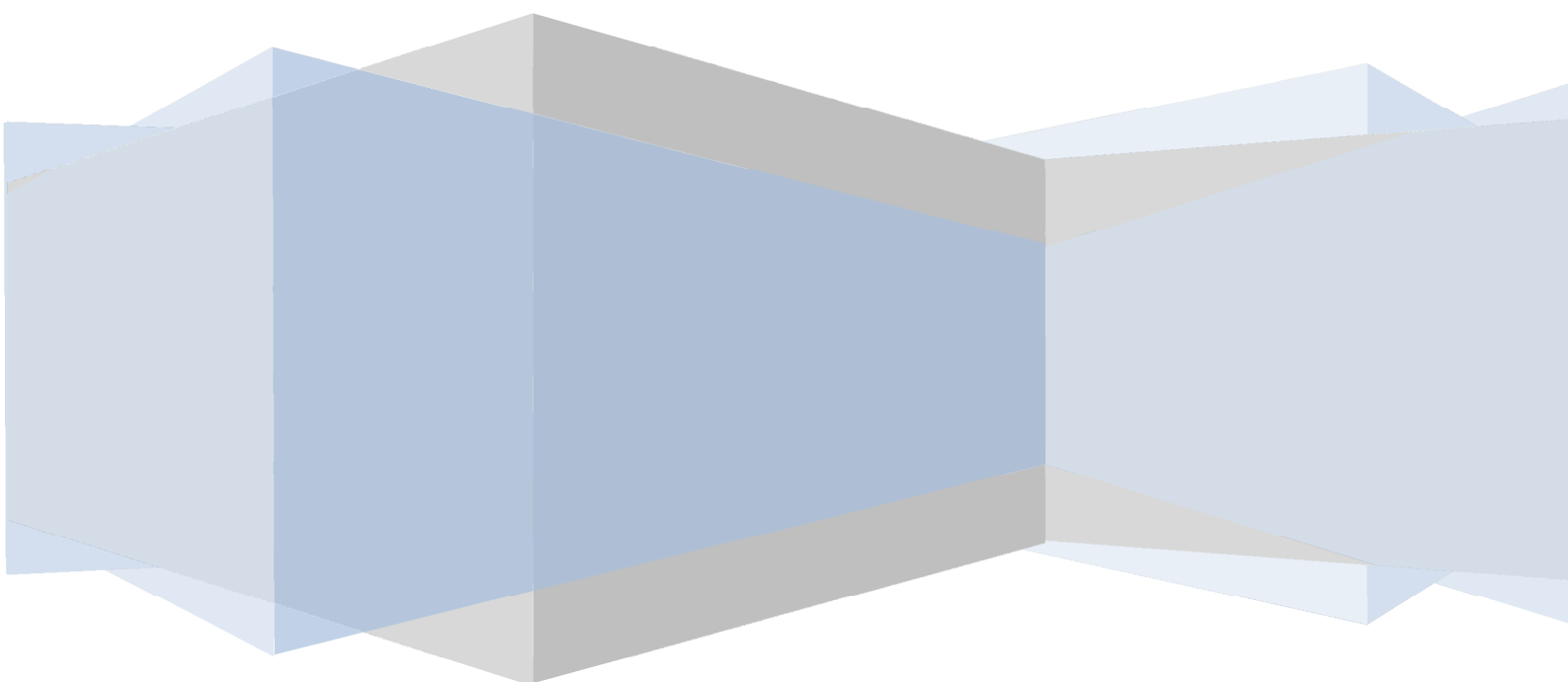


Commercial and Industrial Waste Management Plan Guidelines

A resource for Western Australian Local
Government, Developers, Building Managers
and Business Owners.



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1 Introduction

Why was this Guideline developed?

This Guideline has been developed for two primary reasons, to provide consistent guidance on waste management in relation to Commercial and Industrial (C&I) developments and to encourage increased diversion of waste from landfill.

In Western Australia there is limited consistent guidance on and consideration of waste management issues in the design, development, operation and ongoing management of C&I developments. The absence of consistent guidance in relation to these types of developments had led to a range of issues that affect the ongoing operations of the developments, such as inadequate bin storage areas, difficulty in accessing collection points and illegal dumping.

The WA State Government, has developed a State Waste Strategy 'Creating the Right Environment' which sets ambitious targets for diversion of C&I waste from landfill; 55% diversion of material presented for collection by 30 June 2015 and 70% diversion from landfill by 30 June 2020. Given the 2009/10 diversion rate for C&I was 46% a concerted and coordinated effort will be needed to achieve these targets.

This Guideline is part of a project funded by the Western Australian Waste Authority and developed through the WA Local Government Association. This Guideline will be supported by Local Government requirements, as part of the planning approval process. This Guideline is intended as a consistent reference for property owners, builders, developers and Local Government officers to assist in ensuring that the basic requirements for collection and access are covered and to encourage the increased diversion of waste from landfill.

What type of development does the Guideline cover?

This document outlines the main issues to be considered when designing a waste management system for C&I developments which require planning approval from Local Governments. These developments include:

- Office buildings;
- Non-food retail outlets i.e. hardware stores, home wares stores, department stores, variety stores;
- Food retail outfits i.e. cafes, restaurants, take-away outlets;
- Group retail centres i.e. shopping centres, plazas; and
- Hospitality and accommodation i.e. hotels, motel and boarding houses or hostels.

The information provided may also be applicable to other building types, including light industrial developments and serviced commercial buildings.

Mixed-use developments

For mixed use developments the usual practice is that commercial and residential waste streams and domestic waste streams are stored and managed separately. This is to ensure that there is no conflict between employees and residents and that each service is used and managed correctly. Waste streams and management approaches can vary substantially between commercial and industrial and domestic situations. Also, as outline in Section 3, Local Government only has legislative responsibility for the domestic waste stream.

What is covered in this Guideline?

This guideline covers a range of information in relation to C&I developments. It covers both the design considerations and the ongoing operation of a development. The guideline includes:

- Better practice waste management systems: an outline of what a better practice approach is in relation to waste management;
- The importance of Local Government liaison: to ensure that the systems put in place will be usable;
- Waste streams and generation rates: an outline of the type of waste that may be generated through the developments operations;
- General design considerations: such as noise, odour, hygiene, vermin and health, safety and the environment and security;
- Waste storage considerations: in particular, the design of bin storage areas;
- Waste collection: an outline of where waste presentation points should be located and access issues;
- Education: the importance of signage and ongoing education; and
- Ongoing management: some of the issues associated with the ongoing management of a development.

How should this Guideline be used?

This Guideline should be used as a resource for developers when designing developments and considering how the development will operate, including ongoing management of waste. Appendix 5a includes a Level 1 Waste Management Plan of issues to incorporate in the development process.

This Guideline should be used by building managers and owners to identify the range of issues which should be included in management approaches for ongoing operations. Appendix 5b includes a Level 1 Waste Management Plan template of issues to consider in the development process.

The Level 1 Waste Management Plan template will be appropriate for most developments however more complex developments (such as mixed use) may require a more in-depth, Level 2, Waste Management Plan. A template for a Level 2 Waste Management Plan is provided in Appendix 6.

The Guideline should be used by Local Governments officers in the assessment of development applications. Appendix 7 includes a checklist of issues to consider during the assessment of a development.

2 Better Practice Waste Management Systems

The adoption of a better practice waste management system has a range of benefits including increasing amenity, ease of use, improving environmental performance and promoting appropriate waste management behaviours from tenants and building management. Implementation of better practice waste management also offers organisations the opportunity to demonstrate corporate social responsibility.

2.1 What is better practice?

The term 'better practice' indicates that the techniques, methods and advice provided are better than that might have been proposed or implemented previously. The term 'best practice' has been avoided as it implies that no further improvement or innovation is possible. In addition to usual

waste management collection practices, better practice waste management services in C&I developments may include:

- Services to manage recyclable materials, these materials will vary from building to building, but generally cover materials such as office paper, cardboard, plastics film, packaging and recyclable containers;
- Services to manage organics materials, such as green waste and food organics, which may comprise bin-based collection systems or on-site manual or automated composting;
- Services to manage bulky waste, such as used furniture and fit-out materials; and
- Specialised waste services for items such as toner cartridges, batteries, fluorescent lights, e-waste, mobile phones and chemicals.

Better practice means embracing innovation and looking for ways to improve infrastructure, systems and services as knowledge and experience increases. A better practice system encourages tenants and cleaners to actively participate in the management of waste. This, in turn, encourages waste minimisation, increased resource recovery and reduced contamination of recyclables and organics. Figure 1 provides an outline of the different stages of planning a best practice waste management system.

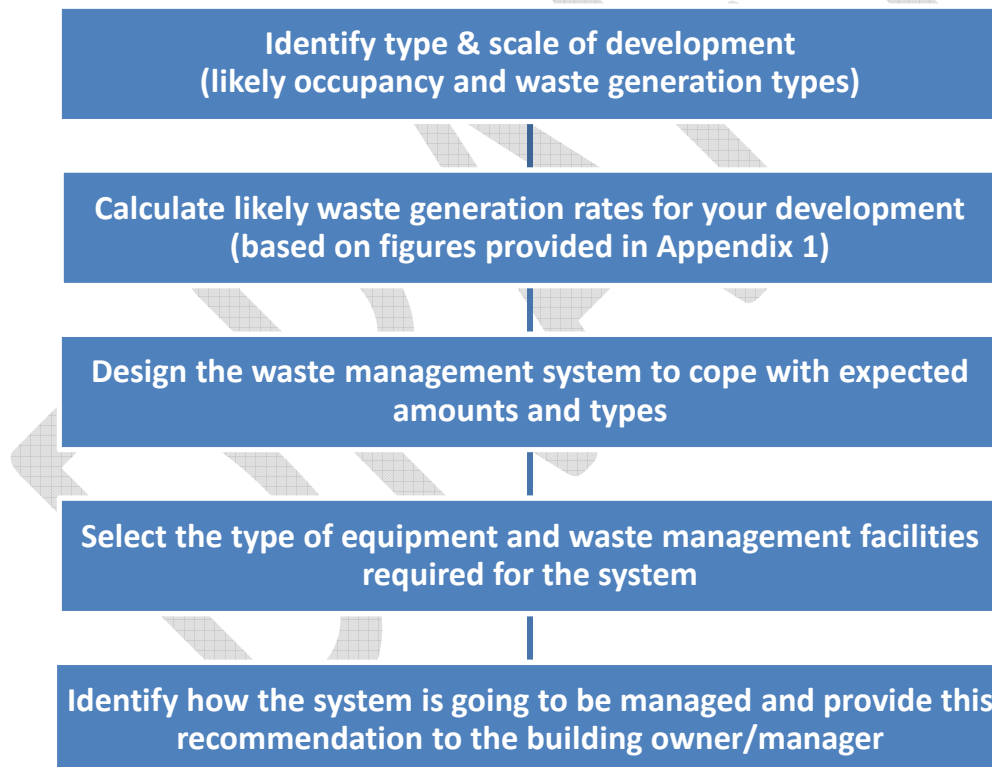


Figure 1: Waste Management System Planning flowchart

2.2 Better Practice Waste Management Strategies

The Waste Hierarchy is the broadly accepted approach that is used to develop waste management strategies; the Hierarchy is commonly characterised as ‘reduce, reuse, recycle, dispose’. The Hierarchy rates waste management options from the most favourable – reduce, to the least favourable – disposal and is a tool to assess options in relation to a waste management strategy.

An effective waste management strategy includes all of the elements of the Hierarchy, from identifying what waste generation can be avoided, through to ensuring that any waste generated is appropriately disposed of. The following have been included, to provide some simple examples of approaches that can be taken:

- **Reduce/avoid:** double-sided printing, electronic filing, provision of reusable cups, provision of electronic hand-driers;
- **Reuse:** reuse one-sided prints for internal print-outs, reuse manila folders and ring-binders, donate unwanted items to local schools or charities, return packaging to suppliers for reuse;
- **Recycling:** providing locked bins for shredding and recycling of sensitive documents, having specific bins for materials that require separate recycling;
- **Recovery:** composting of organic material and waste to energy options; and
- **Disposal:** for some materials, disposal at a suitably licensed landfill is the only option (e.g. asbestos).

3 The Importance of Local Government Liaison

Liaising with Local Government officers forms a crucial stage in the development of a better practice waste management system for C&I developments. Early consultation with Local Government officers enables developers to obtain a better understanding of local waste planning requirements for new developments. Whilst Local Government is not obliged to provide a waste collection service for commercial or industrial developments under the *Waste Avoidance and Resource Recovery Act 2007* (WARR Act), some Local Governments may offer a collections service to smaller businesses. Even where the Local Government will not be engaged to provide the waste collection service, discussions with officers will assist proponents in ascertaining what type of service will be required and how the design of the development should accommodate better practice waste management. This will avoid potentially costly design modifications. Discussions should include Local Government engineers, planners and waste managers.

4 Waste Stream Composition and Generation Rates

The composition and amount of waste generated by commercial and industrial developments vary in line with individual operations and management. Examples of typical waste streams generated by commercial and industrial operations, and how these individual waste streams are managed are outlined in this Guideline. Appendix 1 includes generation rates for a range of businesses and Appendix 2 includes of strategies for managing the various waste streams. Table 1 shows the types of waste likely to be generated

Waste Stream	Comment
General Waste	The quantity and composition of general waste generated by a commercial or industrial operation can vary significantly. General waste includes non-recyclable plastics, food waste, recyclable packaging which is contaminated with food waste and other non-recyclable materials, as well as recyclables which have not been placed in the correct bin.
Recyclables	Workers frequently consume beverages packaged in recyclable containers, such as aluminium cans and polyethylene terephthalate (PET) bottles and milk is often provided by organisations in liquid paperboard or high density polyethylene (HDPE) containers. These materials can form a significant proportion of the waste stream in

	commercial and industrial buildings. Occasional company events can also generate irregular but significant quantities of glass and other containers.
Glass	Glass bottles are a primary component of the waste streams generated within licensed venues such as pubs and clubs, as well as food retailers such as cafes and some take-away shops. Glass is very dense which makes it difficult to store and move efficiently.
Office Paper	Waste audits have shown that by quantity, paper is by far the largest waste stream generated from offices. Office paper is generally white, A4-size and 80 grams per square metre (gsm, g/m ²), although many other combinations of colour, size and grade are also generated. Office paper is a higher grade paper and as it is usually generated in large quantities it is generally collected separately and recycled.
Cardboard and Bulk Packaging	Most waste generated from non-food retail facilities is bulk packaging material that protects goods delivered to the facility for sale or distribution.
Plastic Film	Plastic film, such as shrink pallet wrap, is another major component of non-food retail building waste. This material is very bulky, but very light weight and compacts well.
Food Waste	Most commercial and industrial developments generate some quantities of food waste. The volumes of food waste generated within a development can vary significantly depending on the type and scale of the business; ranging from uneaten employee/staff meals within office buildings through to food outlets, which can produce large quantities of food waste on a daily basis.
Cooking Oil & Grease	Used cooking oil is produced in large volumes by food retailers such as fish and chips shops and fried chicken stores. Waste oil can cause significant issues if improperly disposed of to the sewage system.
Controlled Waste	<p>The Environmental Protection (Controlled Waste) Regulations 2004 apply to a controlled waste that is produced by, or as a result of:</p> <ul style="list-style-type: none"> • An industrial or commercial activity; • A medical, nursing, dental, veterinary, pharmaceutical or other related activity; • Activities carried out on or at a laboratory; and • An apparatus for the treatment of sewage. <p>Controlled Waste is defined as all liquid waste, and any waste that cannot be disposed at a Class I, II or III landfill site.</p>
Other wastes	These can include printers, copies, and toner cartridges, IT equipment, batteries, mobile phones, furniture, florescent lights, paint, pallets and mattresses, timber, ferrous and non-ferrous metal.

Table 1: Types of waste generated by commercial and industrial operations.

Summary of better practice considerations for waste composition and generation rates

- ✓ Identify the types of waste likely to be generated by the development; and
- ✓ Determine what the likely generation of waste will be for the development, using the standard generation rates provided (Appendix 1).

5 Design Considerations

A number of problems can arise from inadequate consideration of waste management in developments. Some of these problems include noise, odour, hygiene issues, vermin, negative impacts on the health, safety and environment and illegal activities. To avoid these issues it is vital to consider waste management systems in the design and planning of commercial and industrial developments.

5.1 Noise

When designing waste management infrastructure for developments, proponents must ensure that compliance with the Western Australian *Environmental Protection (Noise) Regulations, 1997* can be achieved during the operation of the development.

Noise issues associated with waste management typically occur when bins are emptied into collection vehicles. For example one particularly problematic material is glass. Additional noise impacts can be associated with the lifting mechanism and reversing alarms of collection vehicles.

Better practice noise management strategies include:

- Locating bin storage areas and collection points away from neighbours, tenants and public areas to reduce the impact of noise during bin use and collection;
- Eliminating the need for collection vehicles to reverse;
- Using road, driveway and pathway surfacing materials that minimise noise;
- Considering how materials will be transferred into bins or static compactors at storage points; and
- Proposing collection times which ensure the least amount of disturbance to neighbours, tenants and those using public areas, particularly in mixed-use developments.

5.2 Odour

Greenwaste or food waste (organic waste) are the most likely part of the waste stream to cause odour. Where large amounts of organic waste are generated, having separate and more frequent collections will help to reduce the problem. Alternatively, dedicated freezers can be used to store wrapped food waste until collection.

In enclosed storage and service areas, the air flowing from interim storage areas and central waste storage areas should not exit near public areas. Ventilation openings should be located as close to the ceiling and floor as possible and designed to protect against flies and vermin.

If a forced ventilation or air conditioning system is used for an enclosed storage area, it must meet the requirements of the Building Code of Australia and Australian Standard AS1668.2 - *The use of Ventilation and Air Conditioning in Buildings*. These systems should not be connected to the same ventilation system supplying air to public or tenanted areas of the building.

Ensuring that bins are regularly emptied and cleaned will help to minimise potential odour problems. It is also important that waste storage areas are regularly cleaned, have a drain to the sewer and are well-ventilated.

5.3 Hygiene and Vermin

Waste which is not sealed in containers is unhygienic and can attract vermin. In designing bin storage areas the following are essential considerations, bin storage areas should be easy to clean, be equipped with hot and cold running water (including a hose) and a connection to the sewer (as water from this source cannot be disposed of into stormwater drains).

To maintain hygiene:

- Assign responsibility for keeping bin storage areas and collection points clean;
- Do not allow bins to sit open for prolonged periods;
- Keep waste collection and storage areas free of clutter and dumped rubbish; and
- Regularly wash the bins, floors and walls of bin storage areas.

5.4 Health, Safety and the Environment

Potential health, safety and environment risks associated with waste management and recycling systems will vary between developments, but may include:

- Manual handling injury from moving bins;
- Cuts and lacerations, or contact with unknown hazardous substances;
- Exposure to malodorous materials;
- Potential conflict between building design and collection vehicles;
- Injury arising from motor vehicle use;
- Injury from using stored bins and equipment;
- Damage to buildings, structures, landscaping and equipment; and
- Damage to the local environment from accidental spills/releases.

Waste management systems and services should be designed and operated in a manner that prevents the potential risk of injury or illness associated with the collection, disposal or recycling of material. This includes risk to:

- Tenants and their staff using the service, bins and equipment;
- Building management and cleaning staff that maintain the service;
- Collection staff providing the service;
- Others engaged in or affected by the waste management system; and
- The surrounding environment.

Once the development is operational, the developer may not be responsible for the ongoing management and the provision of waste collection services. However, the designer, developer and

operator need to consider how building design will impact on the ability of others to collect waste and provide services in a safe manner. Collection methods and systems used for waste management in commercial and industrial developments must comply with the applicable health, safety and environment legislation. A preliminary risk and hazard analysis should be undertaken during the design phase to identify potential risks to health and safety. Identifying risks early will enable the proposed design to be modified to eliminate or minimise the likelihood of human injury or damage to property and equipment.

5.5 Security

Another issue to be considered in the design of the development is the opportunity to reduce the potential for illegal activities. Crime Prevention Through Environmental Design (CPTED) principles can be applied to the design of bin stores for example. The four CPTED principles are:

- *Surveillance*– Allow people to see what others are doing by ensuring clear sightlines, selecting appropriate landscaping and providing adequate lighting.
- *Access control*- Establish physical and symbolic barriers to attract, channel or restrict the movement of people.
- *Territorial reinforcement*- Create a sense of community ownership to promote use and discourage antisocial behaviours.
- *Space management*- Manage and maintain spaces to ensure that space is appropriately utilised and well cared for i.e. repair or removal of vandalism and graffiti, replacement of burnt-out lighting and removal of litter.

As far as practicable, the design of waste storage areas should:

- Maximise every day surveillance by other tenants; and
- Allow and encourage easy access for tenants and building management whilst barring access by the general public.

Summary of better practice considerations in Design

- ✓ By designing the waste management system in line with better practice considerations, significant issues with noise, odour, hygiene, vermin, illegal activities, health, safety and the environment can be minimised;
- ✓ Noise considerations include the type of waste being generated and the collection times and locations;
- ✓ Odour issues arise predominantly from green and organic waste, minimising these wastes and managing them appropriately will significantly reduce their impact;
- ✓ Vermin and hygiene issues are often associated with waste storage areas not being kept clean, to avoid this ensure the areas are designed to be easy to clean and that responsibility to keep them clean is assigned;
- ✓ The Health, Safety and Environmental impacts of waste management result from how the waste is stored, handled and disposed of; and
- ✓ Illegal activities such as dumping of waste can be minimised through careful design and placement of waste storage facilities.

6 Waste Storage - Bins, Containers and Waste Handling Equipment

In developing sufficient waste storage, there are a number of factors that need to be considered, this includes how the waste will be stored and what type of bin storage area will be used. Appendix 3 contains more information on the range of waste management equipment which is currently available.

6.1 Bins and Containers

All waste and recycling generated by a commercial building needs to be stored in appropriate bins or containers with permanent, well-fitting lids. Waste bins and containers should conform to *AS 4123 Mobile Waste Containers* if the standard is applicable for the selected bin or container type. Waste bins and containers greater than the capacity covered in the Standard (>1,700 L) should be designed to address safety risk.

Coloured and labelled bin lids are an important means of correctly identifying what material should go into each bin, therefore replacing or repairing damaged and missing lids should be a priority for those managing the area. Whether they are situated indoors or outdoors, bins should always be in a clean and presentable condition and free of any dirt, accumulated waste or dried liquids. Maintaining bins in a clean and presentable condition will help to encourage appropriate waste and recycling behaviour, with users more likely to take care when disposing of waste and avoid or clean up any accidental spills.

Waste handling equipment, including balers and compactors, should conform to the relevant design and safety standards. Volume reductions achieved by such compacting and/or baling recyclables and waste offers potentially cost savings through reduced collection requirements.

6.2 Bin Storage Area– General Considerations

Bin storage areas are where the bins receiving waste and recyclables from across the development are stored. Well-designed bin storage areas eliminate potential issues with conflicting uses of areas as well as minimise the impacts of inappropriately stored bins on local amenity and employee health and safety (Figure 2 and Figure 3). This is particularly important for commercial operations situated within mixed-use developments.

Building and development designs need to incorporate sufficient space to store, in separate bins or containers, the volume of waste and recycling (and potentially organics) likely to be generated during the period between waste collections. Space should also be included for appropriate signage to clearly identify how to use the bins/equipment.

When calculating the likely storage space requirements, consider:

- Waste and recycling generation rates;
- Frequency of likely collection;
- Suitable waste and recycling storage equipment;
- Ability of those depositing waste to access the area; and
- The likely collection service type, including the access requirements for collection vehicles (such as width and height of gates).

In relation to the design of the storage area, it should have smooth, cleanable and durable floor and wall surfaces that extend up the wall to a height equivalent to any containers held within the area. A

further feature could be a bin wash option. It is also suggested that bin storage areas are fitted with doors, gates or roller doors that are durable, self-closing, lockable and are able to be opened from both inside and outside the storage area.

How the bin storage will be serviced is an essential consideration. Bins may be taken and emptied directly from the bin store area, or transported to a separate presentation point where they will be emptied by the service provider. If the storage is located away from the collection point, a responsible individual will be needed to transport separated waste from individual tenancies or areas.



Figure 2: Haphazard storage of commercial bins within a rear laneway.



Figure 3: Inappropriate and unsafe storage MGBs.

6.3 Bin Storage Area – Size

The most difficult part of calculating the size of a bin storage area is predicting the collection service that will be needed as businesses expand or as tenancies change. Service requirements should be

discussed with waste contractors or consultants and some flexibility needs to be built into the design to provide for future needs. The design of the building can incorporate flexibility by:

- Identifying suitable waste storage and collection point locations that would enable onsite collection in the future;
- Keeping waste storage areas clear of potential obstacles that would limit bin size. For example, fixed structures to separate individual bins or bays should be avoided as bin sizes and/or configurations may change;
- Designing access paths and doorways greater than the minimum width requirements to allow for potential changes in bin size. For example, installing double doors on a waste storage area would allow easy movement of either MGBs or bulk bins should either system be installed; and
- Sizing bin storage areas to allow for a potential increase in waste generation from the development, for example, if the building is expanded or its use is changed.

6.4 Bin Storage Area – Design

When designing the bin storage area, there are some general consideration, the areas need to:

- Be constructed in accordance with the requirements of the Building Code of Australia; and
- If enclosed, have a separate ventilation system to comply with *AS 1668 – The use of mechanical ventilation and air-conditioning in buildings*.

Bin storage areas should not affect the aesthetics of a development and should blend in with the surrounding buildings and landscape (Figure 4). Aside from aesthetics, locating storage areas out of sight of the public can reduce the chance of vandalism (as bins are less accessible) and reduce the impact of noise and odour.



Figure 4: These bins are easily accessible, but highly visible from the roadway. A bin store would help to minimise their impact on local amenity.

It is essential to provide an adequate area to enable waste and recycling (and organics collected) bins to be kept separate within the storage area (Figure 5). However, bin storage areas that are too large may encourage bulky items to be dumped. The storage area should be designed for easy access and manoeuvring of bins to allow trouble-free cleaning. It is also important to consider the access requirements for maintenance and servicing. Other services and appliances, such as electrical meter

boards, gas meters or conduits, should not be located in bin storage areas as they may be damaged during collection or cleaning.



Figure 5- Appropriate storage of bins.

6.5 Bin Storage Area – Use

Locating bins near other facilities and services, like loading docks, encourages good housekeeping and keeps bins visible. It also makes it easier and more convenient for tenants and cleaners, as waste and recyclable disposal can be done as part of a daily routine. Bins located out of the way or in inconvenient or hard to get to places will be used less, tend to attract dumped rubbish and encourage poor behaviour.

Summary of better practice considerations bin storage areas

In general, better practice bin storage areas should:

- ✓ Have adequate storage space for required bins (based on the building size and the applicable waste and recycled material generation rates outlined in Appendix 1);
- ✓ Be designed with some flexibility in relation to size to ensure future uses for the development are not limited;
- ✓ Permit easy, direct and convenient access for tenants, cleaners and other users of the facility, whilst restricting access to unauthorised persons;
- ✓ Permit easy transfer of bins to the presentation point if required, with doors and access wide and high enough to allow easy manoeuvring of any stored bin;
- ✓ Permit easy, direct and convenient access for collection service providers; and
- ✓ Are integrated into the design of the overall development and do not affect visual amenity.

7 Waste Collection

7.1 Waste Presentation Point

Presentation points are the locations in which the bins containing accumulated waste and recyclables from across the development are presented for collection by service providers. If a presentation point is difficult for the service provider to access, collection charges may be higher. Ideally, the presentation point and storage area should be in the same place, avoiding the need to move bins to the presentation point in time for servicing. If this is not possible, the presentation point should be as close to the storage area as possible.

Some better practice design and location considerations for presentation points include that these points should:

- Not be situated near intersections, ramps, round-a-bouts, pedestrian crossings, or on busy roads or in narrow lane ways;
- Not be located near building awnings, overhead wires, tree canopies or other overhead structures;
- Be clear of air-conditioning and other service ducts and pipes, sprinklers, CCTV cameras, movement sensor, smoke detectors and other ceiling fixtures if located inside a building;
- Be on a level surface;
- Have an access-way rated for use by heavy vehicles;
- Have enough room for bins to be manoeuvred by the driver for servicing (if necessary);
- Be away from public areas, be well-clear of vehicle, pedestrian, public, staff and visitor traffic areas;
- Not be restricted by parked cars or vehicle loading or unloading bays (Figure 6);
- Not be restricted by bollards, signs, plants, bins, seats or other street furniture;
- Not require vehicles to reverse;
- Not impede the normal operations of the building; and
- Be accessible during collection times and not located behind locked gates.



Figure 6: 240L MGBs for general waste presented for collection.

All collections should take place in accordance with all relevant legislation. If the storage area and presentation point are in separate locations, bins will have to be moved by staff or

cleaners/caretakers from the storage area to the collection point. In order to protect the occupational health and safety of employees:

- The distance between the storage area and the presentation point over which the bins are to be transported must not exceed 75m;
- The grades between the storage area and the presentation point should not exceed 1:14 (Figure 7); and
- There should be no steps or kerbs along the route.

Bins larger than 660L and smaller than 1.5m² in volume should not be moved more than five metres from the storage area to the collection point. Manual movement of bins greater than 1.5m³ in capacity should be avoided. If manual movement cannot be avoided, the bins should not be moved more than three metres from the storage area to the collection point. No grade along the route should exceed 1:30, to ensure ease of bin transport and reduce the risk of manual handling injuries.

Waste service companies may charge a greater collection fee if drivers are required to enter a bin store to service bins.



Figure 7- Inappropriate and unsafe storage of plastics recycling bins along a steeply inclined loading bay.

7.2 Access

Building managers in large commercial developments will need to arrange for a commercial waste collection service. In some areas Local Government's may operate commercial waste services. Local Governments typically require the separate storage and collection of commercial and domestic waste and recycling within mixed-use developments.

In each commercial development, waste, recyclables and organics disposal should be equally convenient for tenants and cleaners. Recycling and organics facilities should never stand-alone; they should be located near general waste facilities but suitably demarcated and signed. Waste systems should be convenient, simple to use and as intuitive as possible to maximise resource diversion and minimise contamination. Some options for developing this type of system include:

- Where tenants are expected/required to take their own waste to storage facilities, provide suitable containers for tenants to allow them to store separated waste and recycling within tenancies or retail units and transport it to the storage area;

- Signs should be displayed at back-of-house areas and storage areas which clearly identify waste and recycling bins provide signs. The signs should provide instruction on how to use the waste and recycling facilities, including identifying what is and what is not recyclable;
- Supply bins and signage using colour coding according to *AS4123.7-2006 Mobile Waste Containers – Part 7: colours, markings and designation requirements*; and
- Provide directional signage and other techniques, such as lines on the ground, to show the location of, and routes to, waste storage facilities.

Summary of better practice considerations waste collection

To ensure that waste management systems are easy to use and practical:

- Waste presentation points should be located as close as possible to the storage point;
- The route from storage to presentation point should be, as short, flat and easy to navigate as possible;
- Access to the waste presentation points for collection vehicles should not be in high traffic areas and should focus on a 'drive in, drive out' design; and
- For those using the waste management systems, the location of storage points should be convenient and well signed to ensure the system is used correctly.

8 Education

8.1 Signage and Education

Regardless of the type of building or development, signage and education are critical to ensuring that the waste and recycling system is used appropriately and works effectively. Clear signage is vital, as it provides those using the waste management system with instructions on how to use the system.

Education and communication must be regular and ongoing in order to overcome the transient nature of cleaning contractors and the commercial rental market. The main aspects of signage to be considered are:

- Waste recycling and organics bins must be clearly and correct labelled at all times;
- Waste storage areas must have clear signage instructing cleaners and tenants how to correctly separate waste, recycling and organic materials. Pictorial guides and community languages should be used if appropriate;
- The location of, and directions to, waste storage areas must be well signposted, with directional signs, arrows or lines on the floor indicating the most direct routes for cleaners and tenants;
- 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 relevant standard signage requirements.

Summary of better practice for education and signage

To ensure that waste management systems are easy to use and practical:

- Signage should be clear and provide instructions on how to use the waste management system; and
- Education should be ongoing to ensure that even if tenants change, the waste management system still functions.

9 Ongoing Management

There are a number of considerations to be taken into account in relation to the ongoing management of a commercial or industrial development. Table 2 provides an outline of some of these considerations – Appendix 4 provides a detailed breakdown of each of these issues and options available.

Ongoing service requirement	Comment
Waste type and quantity	In order to manage the waste from the development, understand the type and quantity of waste to be generated.
Service Contract	There are several different types of service contract that can be entered into.
Legal obligations	Be aware of the legal obligations in relation to due diligence.
Cleaners	Cleaners are a very important part of the overall waste management system as they will frequently have full responsibility for waste collection.
Waste management contractors	There are a range of different service providers, with different specialities. Talk to several providers to understand the best option for your development.
Access	Ensure sufficient access for contractors to be able to service the waste infrastructure.
Equipment	The type of equipment provided will often affect the price of service.
Regulatory of service	Services can be on call or scheduled. For developments with limited space, more regular collections are an option.
Pricing	There is no fixed price for waste collection, therefore it is important to receive multiple quotes for service delivery.
Building management	Good ongoing management of the waste facilities requires monitoring of the overall system performance.
Service monitoring and reporting	To ensure the systems functions as anticipated it is important to have ongoing monitoring/reporting mechanisms in place.

Table 2: Considerations for ongoing management of waste

Summary of better practice considerations ongoing management

For ongoing management, the aim is to ensure that the maximum amount of material is recovered and waste to landfill is minimised. Some of the key better practice activities associated with this are:

- Put a contract in place which takes into account waste generation and type;
- Manage tenants and provide information on the waste management system in place;
- Monitor the implementation of the contract to ensure services are meeting needs and the waste management system is being used correctly; and
- Put in place systems which give incentives to reduce costs of recycling.

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11 Appendices

Appendix 1 - Waste Generation Rates

Table 3 details the average and maximum recorded volumes of waste and recyclables generated per 100m² per day for a suite of different commercial and industrial developments. These waste generation rates are from the *NSW Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities*. The rates were estimated based on a survey of a range of different businesses in August 2012. A summary of the survey methods and data presented here. For all results, including statistical analysis of the data, the full survey report, Commercial Waste Generation Survey NSW EPA September 2012, can be obtained from the NSW EPA.

Type of Premises	General Waste Generation	Recyclables Generation
Food premises		
Butcher	80 L/100m ² floor area/day	Information not available
Delicatessen	80L/100m ² floor area/day	Information not available
Fish monger	80L/100m ² floor area/day	Information not available
Greengrocer	240L/100m ² floor area/day	120L/100m ² floor area/day
Restaurants	660L/100m ² floor area/day	130L/100m ² floor area/day
Supermarkets	660L/100m ² floor area/day	240L/100m ² floor area/day
Takeaway stores	80L/100m ² floor area/day	Information not available
Retail (non-food sales)		
Shops with less than 100m ² floor area	50L/100m ² floor area/day	25L/100m ² floor area/day
Shops with over 100m ² floor area	50L/100m ² floor area/day	50L/100m ² floor area/day
showrooms	40L/100m ² floor area/day	10/100m ² floor area/day
Hairdresser	60L/100m ² floor area/day	Information not available
Other		
Backpacker accommodation	40L/occupant/week	20L/occupant/week
Boarding house/guesthouse	60L/occupant/week	20L/occupant/week
Offices	10L/100m ² /day	10L/100m ² /day
Hotel	5L/bed day 50L/100m ² floor area/day 660L/100m ² dining area/day	50L/100m ² of bar and dining areas/day
Licensed club	50L/100m ² floor area/day	50L/100m ² of bar and dining areas/day
Motel (without public restaurant)	5L/bed/day 660L/100m ² dining area/day	1L/bed/day

Table 3- Waste generation rates for various commercial premises.

Appendix 2- Waste Management Equipment

There are a number of examples of typical waste management equipment employed as part of waste management systems for commercial and industrial developments. This is by no means a comprehensive list, but is intended to provide developers and operators with an indication of what equipment is available for use in better practice waste management systems.

Bins

The most common bins used in commercial and industrial waste management are mobile garbage bins (MGB). MGBs are moulded plastic contains incorporating 2 or 4 wheels, a close-fitting lid and handles for manual transport and manoeuvring. They are manufactures in a variety of standard sizes and are designed to be lifted and emptied by purpose-built trucks.

Mobile Garbage Bins (MGB)

MGB are available in a variety of sizes, from 80L up to 360L capacity. The dimensions of some commonly available wheelie bins are outlined in the Table 4. Table 5 shows the capacity of a range of larger bin sizes.

Bin capacity	80L	120L	140L	240L	360L
Height (mm)	870	940	1065	1080	1100
Depth (mm)	530	560	540	735	885
Width (mm)	450	485	500	580	600
Approximate footprint (m2)	0.24	0.27	0.27	0.43	0.53

Table 4: Dimensions for standard Mobile Garbage Bins.

The most frequently utilised bin type in Western Australia is the standard 240L MGB. These bins are widely used for residential waste collections, but may also be appropriate for a range of commercial and industrial developments which do not generate large volumes of waste and recycling. MGB's with 240L capacity are a very versatile and flexible container. Most are produced to a standard design which allows for small quantities of waste to be moved easily by hand. They can be used for storing and moving waste within premises as well as for direct collection for waste disposal. Multiple bins are generally used to accommodate the higher volumes of waste generated by commercial and industrial operations. However, space limitations and manual handling requirements may mean that a bin or bins with a larger volume may be more practical. The most common capacities of larger mobile bins in commercial and retail applications in Australia are 660L and 1100L. Regardless of their size, mobile bins are typically serviced by vehicles that lift them on a hydraulic 'comb' at the rear of the vehicle and empty the contents into a deep receptacle. A large grip sweeps the waste into the body of the truck. They are often referred to as 'rear-lift' bins for this reason.

660 Litre Bins

At 660L, these bins have the equivalent capacity of almost three 240L MGB's. They feature four wheels, one on each corner, and a hinged lid. Their footprint is only slightly larger than two, 240L MGBs and they can be easily pushed and manoeuvred by staff on foot or towed by tow motors or tractors.

1100 Litre Bins

Larger developments or operations which generate greater volumes of waste than can be accommodated in this size of bin should opt for 1100L skip-type bins. These bins have a volume 4 times greater than conventional MGB's and These have the advantage of being emptied by a rear-lift vehicle which can enter and easily manoeuvre in areas such as basements and loading docks, where clearance in less than six metres. They also can be easily pushed and manoeuvred by staff on foot or towed by tow motors or tractors.

Bin capacity	660L	770L	1100L	1300L	1700L
Height (mm)	1250	1425	1470	1408	1470
Depth (mm)	850	1100	1245	1250	1250
With (mm)	1370	1370	1370	1770	1770
Approximate Footprint (m2)	1.16	1.5	1.7	1.21	1.27

Table 5: Larger mobile garbage bin dimensions.

Front-Lift Bins

These bins range from 1– 4.5 m³ in size and are typically serviced by vehicles that lift them on a hydraulic 'forks' at the front of the vehicle, over the cab and empties them into the body of the vehicle. A hydraulic ram then compacts the collected waste. For this reason, they are termed 'front-lift vehicles'. Front-lift vehicles require at least 6.2 m height clearance to empty bins which means that they cannot be used in many applications. They are nevertheless very common and are most often located outdoors where overhead clearance is not an issue.

Rear-Lift Bins

Some specially designed three cubic metre bulk bins can be serviced by rear-lift vehicles, often by pulling them up using a cable on the rear of the vehicle. These are becoming less common. Common bulk bin sizes are provided in Table 6. Please note that the dimensions given are a guide only and differ according to each manufacturer.

Bin type	2m ³	3m ³	4.5m ³
Height(mm)	865	1225	3750
Depth(mm)	1400	1505	1605
Width(mm)	1830	1805	1805
Approximate footprint (m2)	2.6	2.7	2.9

Table 6: Bulk bin dimensions

Skips

A variety of bin types come under the general heading of 'skips'. Mostly these are 'marrell' bins but some are also roll-on-roll-off or 'RORO' bins and have subtypes including hook and dyno bins. Generally they are all open, that is they have no lid and are not enclosed or sealed. They range in size from 1–36 m³ and are most often used where large amounts of dry waste, such as building material, is generated. They usually require a significant amount of space on site for vehicle access unless they are located on property boundaries so that vehicles depositing and collecting them can manoeuvre in the street.

Tipper Bins

Tipper bins are bins designed to be lifted and tipped by either a forklift or a mechanical (hydraulic) bin tipper. The tipper bins are usually designed to allow the bin to roll forward when loaded and unlatched, and then return to an upright locked position. The bins may or may not have castors attached under the sub-frame for manoeuvrability.

Australian Standard

All mobile garbage bins with capacities up to 1700 L should comply with Australian Standard AS 4123 *Mobile Waste Containers*. There are seven parts to the Standard:

- Part 1 – Containers with two wheels and a capacity up to 400L for lifting devices – dimensions and design. This standard specifies dimensions and design requirements for mobile waste containers with two wheels with a nominated capacity up to 400L.
- Part 2 – Containers with four wheels with a capacity from 500L to 1200L with flat lid(s), for trunnion and/or lifting devices – dimensions and design. This standard specifies dimensions and design requirements for mobile waste containers with four wheels, flat lids and a capacity from 500L to 1200L to be used by trunnion and/or comb lifting devices
- Part 3 – Containers with four wheels with a capacity from 770L to 1300L with dome lid(s), for trunnion and/or lifting devices – dimensions and design. This standard specifies dimensions and design requirements for mobile waste containers with four wheels, dome lids and a capacity from 770L to 1300L to be used by trunnion and/or comb lifting devices
- Part 4 – Containers with four wheels with a capacity from 750L to 1700L with flat lid(s), for wide trunnion or BG and/or wide comb lifting devices – dimensions and design. This standard specifies dimensions and design requirements for mobile waste containers with four wheels, flat lids and a capacity from 750L to 1700L to be used by wide trunnion or BG lifting and/or wide comb lifting devices;
- Part 5 – Performance requirements and test methods. This standard specifies the performance requirements and test methods for mobile waste containers up to 1700L as covered by parts 1–4 of AS 4123;
- Part 6 – Health, safety and environment. This standard provides the most essential safety and health requirements for mobile waste containers;
- Part 7 – Colours, marking and designation requirements. This standard specifies the colours, markings and designation requirements for mobile waste containers up to 1700L as covered by parts 1–4 of AS 4123.

Compactors

A compactor is a device for compacting material and holding compacted material. There are two types of compactors; fixed and integrated. Fixed (or stationary) compactors have two parts, namely:

- The compactor itself, an hydraulic ram that compresses waste material and is often fixed to the ground; and
- The bin, the receptacle into which waste is forced.

Integrated (or transportable) compactors have both the compactor mechanism and the bin in one unit. Bins can be 5–30 m³ in size. Compactors are commonly used in situations like shopping centres where large amounts of easily compacted materials are generated, such as putrescible waste and cardboard. Space is also often at a premium. Compactors compress materials down to about a third of their uncompacted volume so that a 30 m³ compactor can hold the equivalent of up to 90 m³ of uncompacted waste. Provide adequate clearance to services to avoid potential damage to property.

Balers

Balers compress materials such as cardboard and plastic film and tie them into bales so that they remain compacted. They are used in situations where large amounts of bulky materials such as cardboard and plastic film are produced but not enough is produced to warrant a compactor and/or where space is limited. The advantages of balers are that bulky materials can be compressed and not occupy valuable bin capacity. The balers themselves come in a wide variety of sizes and capacities and have a small footprint. Balers can be customised by size and use requirements. Although some balers operate automatically, someone is normally required to load and operate the baler which is a disadvantage. The bales can also be large, heavy and difficult to move by hand. Sometimes equipment such as a forklift is required to move them.

Bale Frames

Bale frames are stands which are used in conjunction with a bale bag to collect recyclable material such as plastic, cardboard or mixed recyclables. These stands hold the bale bag open at the top allowing for easy placement of material into the bale. Bale frames are most suitable for small to medium-sized applications and businesses with space restrictions.

Bin Lifters

These are lightweight bin lifting devices that attach to larger bins, such as front-lift bins or open bins, and use hydraulic or air strut supports to assist users to empty wheelie bins into the larger bins. They help make emptying smaller bins into larger bins easier and safer for operators. Bin lifters may be powered (hydraulic) or unpowered. There are a variety of different types, sizes and lifting capacities

Appendix 3- Waste Management Systems

Waste management systems refer to the facilities, services and actions undertaken as part of the collection, processing transport and disposal of waste within a development or business. Systems will vary significantly between different businesses and must be tailored to suit individual developments or buildings. There are a range of waste streams that require different approaches to management, some options are outlined as follows.

General Waste

A compactor may be used for waste if the business is large enough and produces enough waste. General waste can be collected in bulk bins in smaller businesses. Audits show that most waste generated from non-food retail buildings is recyclable. These materials can only be recycled if they are separated and this is where problems can occur. Waste materials are often mixed so well, or physically glued or fixed to each other, that separation is either impossible, or not cost-effective. This mixed waste is the main component of the waste stream in non-food retail buildings.

Depending on the volumes of waste generated, the Local Government or their waste contractor may be able to collect commercial general waste for an agreed service fee. Where this option is not available, such as where service vehicles would be required to enter private property or where waste volumes are incompatible with the service offered by Local Government, then a private waste collection contractor should be engaged. These service providers will be able to assist operators in designing a bin and collection system which best suits their requirements.

Recycling

Most commercial and industrial operations generate sufficient quantities of these materials to warrant the adoption of a comingled recycling system as part of their waste management strategy (Figure 8).

Recyclable items should be placed loose into bins to ensure that it can be properly sorted at material recovery facilities. Some Local Governments may be able to provide this service for an agreed fee. Alternatively, private waste contractors may be engaged to provide the required bins and collection service. Operators should ascertain what recyclable materials are likely to be generated within their development, and identify a suitable waste contractor who can collect this material.



Figure 8: Comingled recycling collection bin outside office kitchenette.

Glass Bottles

There is often limited space available back-of-house to store glass containers. In the past, bottles had to be kept whole so they could be separated into different colours for recycling, which increased the storage space required. However, the introduction of optical sorting equipment at recovery facilities means that systems that crush glass on site are now increasingly popular. However, if there is sufficient space; it may still be more viable to store whole bottles in bins (Figure 9). The emptying of dedicated glass bins can result in significant noise issues, so consideration must be given swapping rather than emptying bins and to the timing of collections to ensure compliance with the requirements of the *Western Australian Environmental Protection (Noise) Regulations, 1997*.



Figure 9: Large quantities of glass bottles are generated by pubs and clubs.



Figure 10: Commercial comingled recycling bins employed by a cafe.

Office Paper

Paper is dense and its weight makes it difficult to handle in large quantities. Most offices use MGBs for collecting paper on each floor, transporting it to the collection point and collection by a contractor. Typically workers have a small bin or cardboard box for the collection of paper beside their desks. In some offices, workers empty their own desk-side paper bins into centrally located bins, while in other offices the desk-side paper bins are emptied by the cleaners.

Offices also generate other, lower grade types of paper waste, for example newspapers or magazines. Office paper is a higher grade paper to others and is generally collected separately because of its sheer quantity. There may also be a financial advantage to separate collection due to the market and price for this type of paper.

Cardboard and Bulk Packaging

Typically, bins for general waste and separate bins for paper/cardboard and co-mingled recyclables are used for the disposal of bulk packaging. Where large volumes of packaging materials are generated balers and compactors can be installed to reduce the volume. Front-lift bins with wire panels that allow contamination checks are used widely for cardboard. Tenants and cleaners should flatten cardboard boxes as much as possible to save space in bins. Cardboard is generally very bulky but comparatively light weight and compacts well. Compactors and balers are ideal for cardboard for transport. One problem with cardboard from food retail buildings is that it can be contaminated with food and liquids. This makes it unsuitable for recycling. However, this contaminated cardboard is suitable for composting alongside food waste. Figure 11 and 12 show different types of cardboard/paper collection.



Figure 11: Dedicated 660L MGB for cardboard recycling presented for collection.



Figure 12: Commercial service providing a skip bin for the collection of large volumes of cardboard packaging.

Plastic

Plastic wrap and shrink films have traditionally been difficult to recycle, due to limitations with sorting, cleaning and collecting systems. But new technology enables these materials to be recycled,

preventing this resource from being sent to landfill. Plastic film wrap is most suitable for recycling if it is kept clean and separate from other types of plastic. This material is not generally as common as cardboard, and so is best compacted in baler rather than collected in bins.

Styrofoam or expanded polystyrene vegetable boxes can often be returned to the markets for reuse. Businesses such as electronics outlets (which generate significant quantities of expanded polystyrene boxes and packaging material) can stockpile this material in a cage onsite for separate collection. If expanded polystyrene is a major component of the waste stream, the purchase of a Styrofoam compactor may be justified. These machines are capable of compacting expanded polystyrene to just 10% of its original size, reducing the required frequency of skip bin collections. This material compacted can then be recycled into materials such as artificial timber for outdoor construction.

Food Waste

The recovery of food waste can be problematic commercial and industrial developments, but there are a range of management options:

- Disposed of into the general waste stream;
- Separated and collected for processing at an external facility; or
- Separated and processed on site in small-scale in-vessel composting units.

The separation of food waste from the general waste stream is gaining in popularity, with a number of organics waste diversion programs in place across Australia. The quality and quantity of the food waste generated will determine whether recovery is viable and which methods may be suitable. High quality food waste, which is free from contamination by plastics and glass, is most suitable for recovery. On site, small-scale processing systems are available for high quality food waste and they can handle most quantities. On-site systems present a number of potential challenges, which can be resolved through good management, including:

- Limiting contamination of food waste;
- General odour and leachate run-off management;
- Space availability;
- Vermin;
- Psychological barriers – aversion of putrescible food waste;
- Operation and maintenance of the organics processing system; and
- Regular monitoring and maintenance requirements.

Food retailers can generate significant quantities of food waste, which dominates the waste stream. The type and scale of food retailers can vary significantly, as does the type and quantity of waste generated. Examples of food retailers and associated waste streams are detailed in Table 6.

Food handling and sale	Types	Typical waste composition	Main responsibility for waste
Cooked or prepare, served or sold and consumed on site.	Restaurants, cafes, function centres, hotels	'Back of house' food preparation waste (quantities will vary), some food scraps and waste from plates, packaging waste, plastics	Staff

	Food halls with public seating	Beverage containers, paper and plastic packaging waste.	Cleaners and customers
Cooked or prepare, served or sold and consumed off site.	Food halls, takeaway stores, some cafes	'Back of house' food preparation waste (quantities will vary), packaging waste, plastics	Staff
Freshly prepared and packaged on site but sold and taken away to be consumed elsewhere.	Supermarkets, some takeaway shops	'Back of house' food preparation waste (quantities will vary), packaging waste, plastics	Staff
Packaged and placed on shelves, sold and taken away to be consumed elsewhere.	Supermarkets, specialty food shops	Bulk packaging waste, cardboard and plastics	Staff

Table 6: Food retailer categories and associated waste streams.

People in offices and small businesses do not normally generate significant quantities of food waste (Figure 13). As quantities of food waste are generally low it can be recycled reasonably easily on site with some commitment. In contrast, food retailers and grouped retail centres can generate large volumes of food waste. A certain level of expertise is also required. Building management and cleaners are not normally involved and staff generally arrange and maintain any on-site food recovery system.

Composting- A composting system could be established with building management's permission where a building has gardens or grounds. Composting requires little effort other than regularly turning and aerating the compost. Information on composting techniques is widely available and some Local Governments provide brochures, training and sell compost bins. Electric fully automated composters are also available and are becoming increasingly popular. These units can reduce the volume of food waste by up to 90% within just 24 hours, converting it into usable compost over a very short period. This compost can then be sent to market gardens for use as a soil improver.

Worm farms- In some buildings without gardens or grounds, worm farms have been used to dispose of food waste. Although well-managed worm farms do not emit odour, the possibility of odours is enough to discourage some office management from using these systems. There are some types of food waste that worms will not eat, such as citrus peels, and some which should not be added because of potential odour issues, meat and excess dairy. In addition, the castings and liquid produced from worm farms also has to be managed appropriately. Worm farms in offices require significant staff expertise and commitment and are still quite uncommon.

Bokashi bins- Bokashi is a method that uses an air-tight container and a mix of microorganisms to ferment food and minimise odour. Most practitioners utilize commercial microorganism starters comprising of a carbon base (e.g. sawdust or bran) impregnated with bacteria as well as a sugar for food (e.g. molasses). The mixture is layered with waste in a sealed container, where it does not decompose but ferments and reduces in volume as the water content of the waste drains through the grate at the bottom of the bucket. After a few weeks, removed and buried beneath the soil as a soil improver or added to a conventional composting system or worm farm.



Figure 13: Clearly labelled dedicated food waste bin in office lunch room.

Food manufacturers, which can generate substantial quantities of food waste, may also opt for a food dehydrating system to minimise the volume and weight of waste, thereby reducing storage space requirements. Food dehydrators can reduce weight by up to ninety percent, substantially reducing collection and disposal costs. The dehydrated, compressed waste, which resembles dry soil, is inert, odourless and can be applied directly to soil as a conditioner and fertilizer or re-wet and composted. Dehydrators operate at high temperatures, eliminating bacteria.

Cooking Oil & Grease

Cooking oil is commonly recycled through specialist oil recyclers. Typically these recyclers will provide a large container for storing the oil on site before collection. A grease arrestor or grease trap is an industrial wastewater pre-treatment device used in food preparation processes. It is designed so that fats, oil and grease rise to the top and solids sink to the bottom, reducing the amount of these substances flowing into the wastewater system where they may cause blockages.

The Water Corporation is responsible for approving applications from commercial and industrial operations for the discharge of waste water to sewer in Western Australia. All business involved in the cooking and preparation of foods will normally need to install and maintain a grease arrestor. The effectiveness of a grease arrestor is dependent on good housekeeping practices and frequent clean-out and maintenance. Business owners are responsible for the pump-out of grease arrestors, which must be undertaken in accordance with their conditions of approval. More detailed information of greasy waste is available at <http://www.watercorporation.com.au/home/business/industrial-waste/greasy-waste>.

Controlled Waste

Controlled Waste is defined as all liquid waste, and any waste that cannot be disposed at a Class I, II or III landfill site. Controlled Waste also includes asbestos, clinical or related waste, tyres and waste that has been immobilised or encapsulated. Schedule 1 of the Environmental Protection (Controlled Waste) Regulations provides a full list of the prescribed controlled wastes. For more information on controlled waste and licensing requirements, please visit <http://www.der.wa.gov.au/our-services/controlled-waste>.

Appendix 4 - Ongoing Management of facilities

Waste Type and Quantity

Waste type is likely to influence contractor's fees, with heavy materials often costing more, as it costs the contractor more for disposal. Other waste types, such as controlled waste, have specific legislative requirements associated with their transport and disposal therefore these will be more costly.

More waste generally means more services and/or bigger bins, which results in more charges by the waste contractor. The exact combination of bins and services that may suit your building will depend on some of the other factors discussed in this section.

Service Contracts

The structure of service contracts is important to make sure commercial buildings are efficiently serviced. There are generally two contracts needed in better practice management systems, one to cover a cleaning service and one for a waste collections service. These contracts are usually held in parallel with the building manager, but in some cases, the contracts are in a series i.e. a contract between the building manager and a cleaner and then another contract between the cleaner and a waste contractor. Parallel and series contracts each have their advantages and disadvantages, some of which have been outlined in Table 7.

Contract	Advantages	Disadvantages
Parallel	Building managers have direct control over both service providers. Each contract can be independently developed, tendered and awarded and at different times. Individual reporting requirements can be specified	Additional management time and resources are required.
Series	Reduced management time and resources are required. Cleaning staff have a greater incentive to practice good waste management (e.g. reporting contamination, educating tenants and keeping recycling separate).	Building managers have little or no control over waste collection from the building or contractor engagement. All instructions for, and changes to, the waste collection service must go through the cleaners. Cleaners may not be very experienced or skilled at managing waste contractors. Difficult to enforce waste collection data recording requirements and difficult to verify waste collection data.

Table 7: Advantages and disadvantages of parallel and series waste management contracts.

Providing a sense of certainty to waste contractors enables them to plan future income and resourcing, and so establishing a servicing contract with a waste collection contractor may be cheaper than utilising the same service without a contract. Where expensive equipment is required or where equipment needs to be installed, contractors may insist that a contract be signed in order

to ensure that the cost of supplying and installing the equipment can be recouped. Contracts are generally not required for simple, small-scale services, such as the provision of MGB's.

Companies or organisations which have multiple outlets in differing locations across a city, State or the country, may be able to negotiate a lower price by arranging a contract which covers multiple locations. However, these contracts may not have the same degree of flexibility as locally arranged, individual contracts. They may also reduce the choice of contracts available as; in general, only larger contractors can provide the same service at multiple sites.

Resource Management Contracts

Under a traditional disposal contract, the client pays the contractor according to the amount of waste collected and subsequently disposed of at a landfill facility or waste transfer station. A resource management contract caps disposal costs, regardless of volume/weight. This encourages the contractor to work with the client to improve resource efficiency through source reduction, recycling and materials recovery. Resource management contracts provide financial incentives for the contractor to find cost-effective waste reduction and recycling opportunities. Incentives are linked to services that encourage avoidance, reuse and recycling before disposal. For example, the savings are shared if the contractor helps to identify a cost-effective recycling market for material that would otherwise have been sent to landfill.

The benefits of resource management contracts include:

- Streamlined services from a single contractor;
- Reduced waste disposal costs;
- Increased recovery and recycling;
- Increased waste prevention opportunities; and
- Improved contractor data tracking and reporting.

Contracts of this type are uncommon. The amount of waste generated in buildings can vary greatly due to changing occupancy levels, seasons, business productivity and many other factors. This increases the risk for contractors under a resource management contract. Collection and disposal of some waste streams are more expensive and every additional truck that is required to collect a separate stream has an associated cost.

Legal Obligations

When a waste management contract is administered in a building, it is the responsibility of the cleaner (series contract) or building manager or owner (parallel contract) to complete due diligence checks to make sure that waste and recyclables are being deposited at a lawful, licensed facility.

Cleaners

Cleaners are the critical element in a successful waste management system. In the past, large businesses and buildings employed their own cleaners. Most cleaning is now performed under contract by professional cleaning contractor, who may have contracts to clean many different buildings and who recruit and employ their own staff. Cleaners have direct access to tenants and are often better placed to educate them and monitor their waste performance and behaviour.

Therefore it is important to make sure that cleaners understand the waste management system used in the building. Cleaners often work after hours, as a result, building management does not have the opportunity to regularly meet cleaners in person. It is recommended that the cleaning services are closely monitored and action taken to ensure compliance with the contract.

When cleaning contractors are calculating the fee for cleaning a particular building, they consider the number of hours it will take to complete the required tasks. Systems which increase the time taken for cleaners to complete these tasks, or that increase the number of cleaners required, may be more expensive. Elements which increase cleaning time include:

- A greater number of bins;
- A greater range of bins;
- A larger area to cover;
- A greater distance over which to transport waste and bins; and
- Bins which are more difficult of time consuming to empty.

Time management is a priority for cleaners, so implementing a system which increases, or appears to increase, the amount of time and effort required to complete their tasks is unlikely to result in their cooperation. Cleaning contractors will generally want to negotiate a variation to their contract fees if there are changes to the type or amount of work which their staff are required to undertake. Therefore, changing waste systems mid-contract may not be feasible. It may be better to wait until the start of a new contract so the new requirements can be clearly stated.

The cleaning contract, whether specified at the tender stage or proposed by the contractor should specify;

- Tasks the cleaners will perform;
- Bins to be emptied;
- Other cleaning that is to be undertaken;
- How many hours they will work, including start and finishing times;
- Which parts of the building they will have access to;
- Where waste will be taken and how it will be stored;
- What waste will be collected when it is not placed in bins; and
- What materials will be collected and separated.

Waste Contractors

Waste collection contractors are another critical element in a successful waste management system. Success can depend on the range of services provided by the contractor and their ability to adapt to changing needs. Key questions to be asked of potential waste collection contractors are:

- What recyclable materials can be collected?
- What contamination levels in recyclable materials will you accept?
- Where will waste and recycling be taken?
- Is the contractor licensed to transport the particular material type(s) and is the material delivered to a suitable facility?
- Will a subcontractor be used?
- What types of equipment might be suitable?
- How do I make contact, especially after hours?
- How do you respond to missed services?
- What are your applicable fees and charges?
- What contingency plans do you have if one of the facilities receiving your waste or recyclables is unavailable?

Access

Contractors will generally conduct a site inspection before quoting for service provision. This is generally conducted to establish:

- What bins and equipment might be required;

- How access would be gained to the collection point;
- The ease and safety of access;
- Whether the driver needs to go inside the building to get any bins;
- How far the driver might need to push bins; and
- Whether there are any low clearance issues such as ceilings, awnings or overhead wires.

Quick and easy collections are favoured by contractors and they will charge more for collections that require more time on site. Contractors may need to spend more time on sites where presentation points (or access to them):

- Are narrow;
- Are on a steep gradient;
- Require gates or roller doors to be opened;
- Require security staff to provide access;
- May be restricted by parked cars or traffic;
- Have limited turning circles; and
- Can only be accessed at certain times of day.

Equipment

In general, contractor's costs will be higher if sophisticated or specialised equipment is required. The simplest and cheapest services are those that only require common bins, like 240 litre MGB's or front-lift bins. Services that require expensive and complex equipment, like compactors, may cost more. This is because there are a range of equipment costs include manufacture, delivery, installation, operation and maintenance. However, equipment that appears more expensive might actually be cheaper per tonne to use when you consider the amount of waste or recycling to be collected.

Regularity of Service

Waste collection services can be 'on-call' or 'scheduled'. On-call services require the customer to contact the contractor when a service is required; this would generally be when bins are full (or preferably nearly full). A scheduled service is one that takes place on the same day(s) and at the same time(s) each week. In these cases the contractor does not need to be contacted in advance and they will arrive at the scheduled time to perform the service. Scheduled services are generally cheaper per service, as the contractor is more certain of their likely income. On-call services may be quite infrequent and the contractor offsets this uncertainty by charging more per service. Scheduled services work best in buildings where the same amount and types of waste are generated regularly. On-call services work best in buildings where only small amounts of certain types of waste are generated or where waste is generated infrequently (e.g. at peak times). There are several advantages and disadvantages of each service type, which are outlined in Table 8.

Work together with your contractor to decide whether it is better for you to have small amounts collected frequently or larger amounts collected less frequently.

Contract type	Advantages	Disadvantages
On-call	Bins only emptied when full. Overall cost may be lower.	Service may not be provided immediately. Requires management time and resources to monitor bins and contact the contractor. Generally higher cost per service.
Scheduled	Requires little management time or resources to monitor bins or contact contractor. Generally lower cost per service.	Bins may be emptied even if not full. Less flexibility in collection schedule. Could be serious problems if a service is missed or is late. Overall cost may be higher.

Table 8: Advantages and disadvantages of scheduled and on-call waste collections.

Pricing

There is no set price for the provision of a waste collection service. Depending in where you are located, the waste collection industry can be very competitive and quotes are negotiable. It is worth talking to a number of different contractors to gauge the services they provide and what charges might apply. Waste contractors charges are based on a number of criteria. In general, contractors will quote lower prices where the service is easy and efficient for them over a long period.

Strategic or Competitive Influences - Waste contractors may discount collection costs if the contractor is trying to generate a critical mass of customers in a new area it may offer low prices. A contractor may also offer lower prices for strategic reasons, for example when taking on a competitor in a particular area.

Building management

Specialist building management firms look after a range of services, including waste management, in most commercial buildings, particularly those with multiple tenants or occupants. Good ongoing waste management is imperative to:

- Maintain amenity;
- Maximise safety for cleaners, tenants, collectors and other users;
- Maximise resource recovery; and
- Enable efficient servicing of the building.

Ongoing management is required to monitor tenant and cleaner behaviour and to identify requirements for further education and/or signage. Building managers must also quickly address any negative behaviour, such as waste dumping or misuse of bins and equipment. This will help to prevent these practices from escalating and maintain the amenity, access and convenience of the waste system for all users. It is important to establish and delegate responsibility for the tasks involved in ongoing waste management, including:

- Moving bins to the collection point (if required) in time for collection;
- Washing bins and maintaining storage areas;
- Arranging for the prompt removal of dumped rubbish;
- Displaying and maintaining consistent signage on all bins and in all storage areas;
- Managing on-site composting systems (if applicable); and
- Ensuring all tenants and cleaners are informed of the waste, recycling, organics and bulky waste arrangements.

Service Monitoring and Reporting

Successful waste management systems are not 'set and forget', they require ongoing management. To ensure the system continues to work well, ongoing monitoring is recommended. This monitoring, by the building manager/owner, could be based on the amount of waste and recycling generated over a given time period. This information could be collected from the waste contractor.

Waste audits generally involve collecting sample from all the waste streams over a set period of time, then the constituent of the waste stream are identified, separated and weighted. Waste audits can provide valuable information about the waste stream which can be the basis of changes to waste services provided. For example, if a large portion of the waste stream is organic, as specific organic collection could be implemented.

Commercial buildings and shopping centres are often owned by banks and investment firms. Many companies are now required to monitor and report their environmental performance for a variety of reasons, including measuring and reporting on carbon emissions and to comply with:

- Environmental management systems;
- Quality management systems,
- Shareholder and corporate expectations; and
- State of the environment reporting.

Appendix 5a – Level 1 Waste Management Plan — Design Phase

The following simple Waste Management Plan has been developed to confirm that the main issues essential for waste management implementation have been considered and provide a brief outline as to how they have been incorporated into the design of the development.

Key issues	Completed	N/A	Outline of consideration in relation to the development
Initial planning			
Have you consulted with Local Government to find out what waste management services are offered, or if there are any specific requirements, policies etc that the development will need to incorporate?			
For mixed-use developments, will residential and commercial waste streams be managed separately?			
Waste composition and generation			
Have you identified what kinds of waste are likely to be generated in operations of the development?			
Have you identified the volume of waste that is likely to be generated in the			

operations of the development?			
Design considerations			
Noise – does the development design include better practice measures to minimise noise associated with use of the waste management system?			
Odour – does the development design include better practice measures to minimise odour associated with the use of waste management system?			
Vermin – has the development been designed to minimise the entry of vermin to the waste storage areas?			
Hygiene – has the development been designed to allow the waste storage areas to be kept in a good condition?			
Health, Safety and the Environment – does the development design include better practice measure to minimise the risk to Health, Safety and the Environment?			
Waste Storage			
Is there sufficient space within the property boundary to store the volume of waste and recycling (and organics) likely to be generated at the development during the period between collections?			
Is future service flexibility incorporated in the design?			
Have storage areas been designed to accommodate easy access, internal manoeuvring of bins and cleaning?			
Are storage areas conveniently located for tenants, staff and cleaners?			
Are storage areas out of sight or well screened from public areas?			
Are storage areas located an appropriate distance from waste sources to reduce potential amenity and OH&S impacts?			
Are storage areas designed to fit into the			

overall look of the development?			
Waste collection			
Does the development design include better practice measures to ensure waste presentation points are easy to access by waste contractors?			
Has the route from the bin storage area to the presentation point been designed to minimise occupational health and safety risks to those transferring the bins?			
Education			
Has clear signage been included to provide instructions on how to use the waste management system?			
Ongoing management			
Have hand over notes been completed so that a building manager is aware of what waste management systems have been planned in the development?			

Appendix 5b – Level 1 Waste Management Plan — Operational Phase

The following checklist has been developed to identify some of the ongoing management issues associated with the implementation of a waste management plan.

Key issues	Completed	N/A
Ongoing management		
Has responsibility been assigned (to a building manager, caretaker or cleaners) to:		
- Manage and clean waste storage areas and presentation points?		
- Transport bins to the presentation point?		
- Use and manage bins, compactors, balers and other waste equipment?		
- Undertake ongoing education of tenants in the correct use of the waste management system?		
- Manage waste collection contract?		
- Evaluate the operation of the waste collection contract?		

Appendix 6 – Level 2 Commercial and Industrial Development Waste Management Plan Template

The Template outlined below should form the basis for the preparation of the waste management plans for multiple dwelling developments. The Template is based on the areas detailed in the Guideline, there may be further considerations that commercial and industrial developments need to include.

Introduction

- Background- address, development area, nature of development, ownership and management details
- Address, development area, nature and scale of development (floor areas, vehicle movements etc.), ownership and management details, projected number of tenants and workers.
- Details of initial contact with Local Government in relation to waste management in the development.

Waste Composition and Generation

- Calculation of projected waste composition and generation rates based on floor areas and proposed uses.

Waste Management System – Outline

Bin Storage Area

- Provide details on the size and location of proposed bin storage areas.
- Provide details on the proposed number and sizes of the required bins.
- Provide justification for the selection of the bin storage area location.
- Provide details on how better practice approaches to waste management have been included in relation to noise, odour, hygiene and vermin and Health, Safety and the Environment.

Access

- Provide details on the access routes between the bin storage area and presentation point.
 - This information is to include scaled waste management diagrams, showing the location, access pathways for residents and access pathways for moving bins from storage areas to presentation points and the bins configuration when moved to presentation point.

Collection

- Provide details of and justification for proposed bin collection frequencies based on bin numbers and waste volumes.
- Provide proposed collection points (onsite or off-site) with reference to scale-drawing.
- If relevant, details should be provided on the internal road and driveway layout and how collection vehicles will service the site.

Education

- Provide details of the signage within the development to advice tenants how to use the waste management system.

Potential Issues

- Provide details on potential issues which may arise, including how illegal dumping, theft of and/or damage to infrastructure will be monitored and dealt with within the development.

Implementation Schedule

- Provide details on how the system will be established, if by the developer, or how the information used to design the system will be passed onto the new owners/tenants.

Auditing/Monitoring

- Provide details on how the system can be monitored by cleaning/waste contractors.

References

- Provide a list of references for information presented within plan.

Appendices

- Provide any relevant reports or supporting documents; including agreements with Local Governments or waste contractors.

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Appendix 7 - Local Government Commercial and Industrial Waste Management Plan Checklist

This checklist will be used by relevant officers in assessing submitted waste management plans. This checklist may also be used by proponents and their consultants to ensure that their management plans contain all the required information.

Section	Key element	Adequately addressed in WMP (Yes/No)	Comments/feedback	Required modifications
Introduction	Is a brief background provided, including details of : <ul style="list-style-type: none"> - Address; - Development area; - Nature and scale of the development (including number and type of dwelling); - Ownership and management details; and - Projected occupancy. 			
	Are the details of initial contact with Local Government in relation to waste management in the development included?			
Waste Generation	Have the projected waste generation rates based on occupancy and uses been calculated using the provided figures?			
Waste Management System – Bin Storage Area	Have details been provided on the size and location of the proposed storage areas?			
	Have details been provided on the proposed number and size of bins and is this in line with the expected waste generation figures?			
	Is there clear justification for the location of the storage facility?			
	Has a good description been included about how better practice waste management has been included in order to minimise noise, odour, vermin and to take into account hygiene, security, health safety and the			

	environment?			
Access	Have clear details been included of the route for any movement from temporary storage areas to presentation areas? [including diagram]			
Collection	Have the proposed bin collection frequencies, based on bin numbers and waste volumes, been properly justified?			
	Have the proposed collection points (onsite or off-site) been identified and indicated in a scale-drawing?			
	If relevant, have details been provided on the internal road and driveway lay out and how collection vehicles will service the site?			
Education	Have details been provided on the signage which will be used to inform workers/occupants about use of the waste management system?			
Potential Issues	Have details been provided on the range of potential issues which may arise during occupancy and how these issues will be addressed?			
Implementation Schedule	Have details on how the system will be established and how new workers/tenants will be introduced to and educated about the system and appropriate behaviours been included?			
Auditing / Monitoring	Are details on how the system will be monitored and who by provided?			
References	Are the relevant references provided?			
Appendices	Are any relevant documents attached?			

