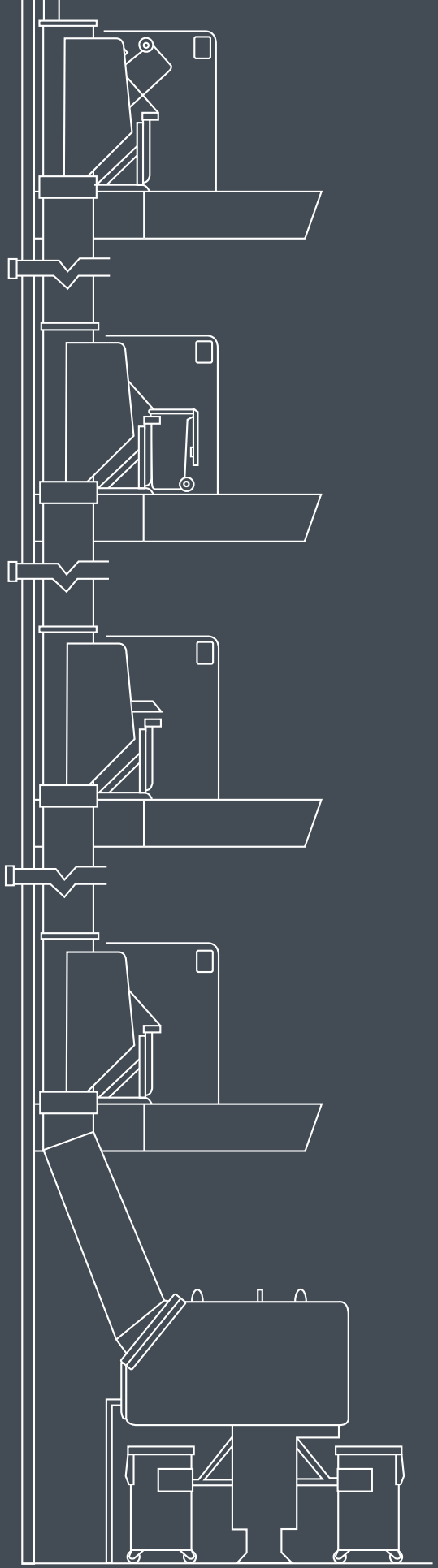

Better Practice Guide for Waste Management in Multi-unit Dwellings

Department of **Environment & Climate Change** NSW

Acknowledgement

The Department of Environment and Climate Change NSW acknowledges the work undertaken by GHD Pty Ltd in the development of the draft version of the Better Practice Guide for Waste Management in Multi-Unit Dwellings.

Published by

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ISBN 978 1 74122 594 5

DECC 2008/42

June 2008

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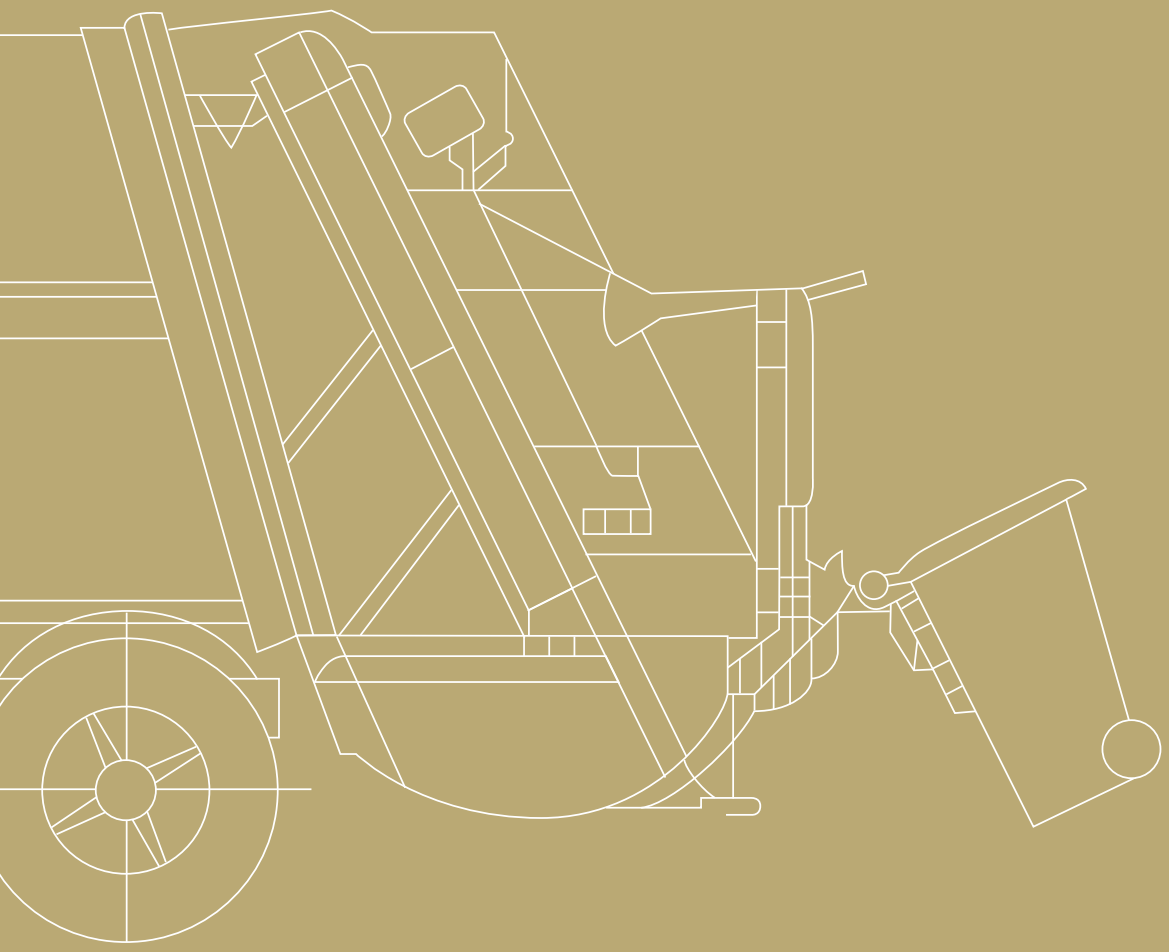


Glossary

Better practice waste management

Better practice waste management refers to installing and maintaining services and infrastructure that enable garbage, recycling, organics and bulky waste handling systems and collection services to be made in a way that achieves the best possible waste minimisation and resource recovery outcome.

Better practice management systems include effective, efficient and safe systems for both their ease of use by residents and their ability to be serviced by collection crews.

Bulk bins

For the purpose of this guide, bulk bins refer to garbage and recycling bins with capacity of $1m^3$ or greater. Bulk bins are generally fitted with wheels for manoeuvrability.

Bulky waste services

Services and facilities to manage bulky household items that would not be collected in a typical garbage service, such as furniture or white goods.

Collection point

The point from which garbage or recycling is collected and transferred from the storage receptacle to the collection vehicle.

Development control plan

Development Control Plans (DCP) support local environmental plans and provide specific, more comprehensive guidelines for types of development or small sections of the planned Local Government Area.

Garbage services

Services and facilities to manage residual domestic wastes, ie those not collected by a dedicated recycling or organics service.

Indemnity

Indemnity means that a party providing services to a particular property will not be held responsible for any loss or damage to such property as a result of the routine provision of the service.

Local Environmental Plan

Local environmental plans are prepared by councils to guide planning decisions for Local Government Areas. Through zoning and development controls, they allow councils to supervise the ways in which land is used.

Mobile garbage bin

A bin with wheels that can be moved around. For the purpose of this guide, the term 'MGBs' is only applied to bins with up to $1m^3$ capacity, unless otherwise stated.

Note: MGBs can be used for various waste streams, including garbage, recyclables and organics.

Organics services

Services and facilities to manage garden and food organics, which may include a bin-based collection system or onsite composting.

Presentation area

An area on-site at the development that acts as an intermediate point (for bins) between the normal storage area and collection point, which may be on- or off-site.

Recycling services

Services and facilities to manage dry recyclable materials. The type of recyclables collected in the recycling service may vary across different council areas, but generally covers recyclable materials that are generated in a typical household. These include: paper and cardboard, glass bottles and jars, steel cans and aerosols, aluminium packaging, and plastic containers. Recyclables may be collected as separate streams of each material type or as a commingled (mixed) stream.

State Environmental Planning Policy	A planning instrument made by the State (the Minister for Planning). State environmental planning policies (SEPPs) make sure that government policies are carried out uniformly, deal with state-wide issues and set guidelines for regional environmental plans and local environmental plans.
Undercroft	The area underneath a building, but not underground, with architectural supports like columns, pillars or posts. The area is open and often able to be used for parking
Waste Management Plan	A document that details the type and quantity of garbage and recyclable material that is likely to be generated during the construction, demolition, and ongoing operation of a development. It also details where and how the garbage and recycling should be stored, how it will be reprocessed or disposed of and handling procedures. A Waste Management Plan is generally required as part of the documentation supporting a development application. Requirements for Waste Management Plans may vary between Local Government Areas.

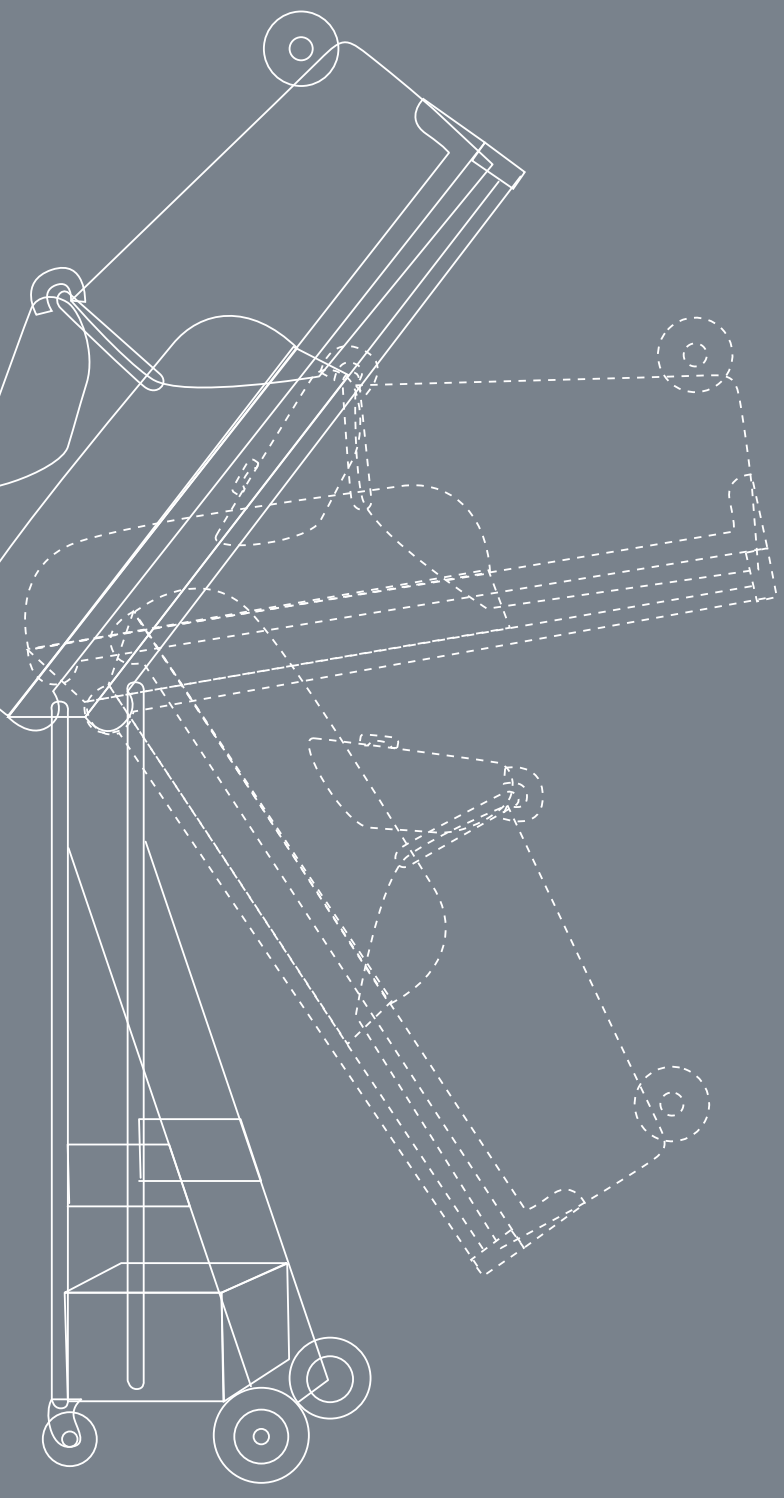
Abbreviations

AS	Australian Standard
BCA	Building Code of Australia
DECC	Department of Environment and Climate Change (NSW)
MGB	Mobile Garbage Bin
MUD	Multi-Unit Dwelling
OH&S	Occupational Health and Safety

Units

L	Litre
m	Metres
m^3	Cubic metre

1.
Introduction



This guide has been developed to assist council staff, architects, residential developers and building management incorporate better practice in the design, establishment, operation and ongoing management of waste services in residential multi-unit developments (MUDs). It outlines various essential points to be considered when designing a waste management system for medium or high-density residential, mixed-use and integrated housing developments.

Better practice encourages appropriate resident behaviour in relation to waste management and increases the amenity, ease of use of waste services, environmental performance and reputation of developments with well-managed waste facilities.

Early consultation with council engineers, planners and waste managers regarding specific requirements for waste services in the local area is essential to developing better practice systems.

What is better practice?

Waste management systems in MUDs may incorporate any or all of the following:

- Garbage services to manage residual domestic wastes, ie those not collected by a dedicated recycling or organics collection service.
- Recycling services to manage dry recyclable materials. The type of recyclables may vary across different council areas, but generally covers recyclable materials generated in a typical household, including paper and cardboard, glass bottles and jars, steel cans and aerosols, aluminium packaging and plastic containers. Recyclables may be collected as separate streams of each material type or as a commingled (mixed) stream.
- Organics services to manage garden and food organics, which may include a bin-based collection system or onsite composting.
- Bulky waste services to manage bulky household items, such as furniture or white goods. Note: materials collected in bulky waste services differ across Local Government Areas.

Better practice waste management therefore establishes and maintains services and infrastructure that enables **garbage, recycling, organics and bulky waste** services to be made in the best possible way in a particular situation to improve resource recovery. Better practice requires continuously searching for ways to improve infrastructure, systems and services as knowledge and experience accumulates over time.

Better practice management systems are effective and safe: residents can use them with ease and collection crews can easily service them. The design, installation and ongoing management of better practice systems encourage residents to use the services appropriately. This includes greater participation in the services provided, minimised waste generation, increased resource recovery and a reduction in contamination of recyclables and organics.

Why incorporate better practice?

As a nation, we now consume more resources and generate more waste than at any time in history, mainly because of our growing population and increasingly high standard of living[1]. It is important that we take steps to tackle waste generation and put in place resource recovery services (such as recycling and organics services) to reduce the environmental impacts of our consumption and disposal habits.

Resource recovery services to single-dwelling domestic households can divert more than 50% of domestic waste from landfill[2]; however, the current recovery level in MUDs is often significantly less than this. Faced with increasing MUD development and habitation, it is important to incorporate better practice waste management systems in all new MUD developments to increase resource recovery and to improve overall environmental and social outcomes.

In addition to wider environmental and social issues, better practice waste management can help maintain a development's aesthetic appeal and efficient management. Facilities for garbage, recycling and organics are essential aspects of a building that are often overlooked or undervalued. If designed and managed properly, they are virtually invisible to the occupants. If designed or managed poorly, they are a perpetual irritation, which can become worse as the building ages. A small amount of planning in the design stage can save a great deal of difficulty and inconvenience for residents, building managers and collection crews throughout the future life of the building.

1 *Australia's Environment: Issues and Trends,* Australian Bureau of Statistics (2003)
2 *Local Government Action Plan*, NSW Department of Environment and Conservation (2003)

Better waste management practice will result in benefits for all stakeholders and the wider community, as shown below:

Stakeholder	Benefits
Architects/designers	Recognition of good building design leading to environmental and design awards and achievements
Developers	Improved reputation through increased satisfaction of buyers, building managers, state agencies and local councils
Council and private certifiers	Improved ability to assess developments against recognised better practice principles where these form part of development consent conditions
Agents/building managers	Increased ability to maintain waste areas and equipment in an efficient and pleasing manner Less risk of injury to caretakers Happier tenants and owners Reduced cost of maintenance and ongoing management
Residents	Improved satisfaction with service provision Increased ability and willingness to participate in recycling, improved amenity and safety Increased standardisation of services leads to improved knowledge and awareness
Waste collection service providers	Reduced safety risk Ease and increased efficiency for collection Ability to offer more flexible services that meet the needs of residents living in MUDs
Wider community	Improved aesthetics, amenity and public health and safety
Wider environment	Increased recovery of recyclables and organics Reduced contamination of the recyclables stream Greater contribution to the state-wide targets for waste reduction and resource recovery

What is in this guide?

This guide provides a list of essential issues that should be considered when designing better practice waste management systems for MUDs. Examples of system options, based on actual developments, have been provided as a guide to better practices. However, architects and building designers who have good ideas should not feel constrained by these examples. The main features, advantages and disadvantages of suggested better practice systems are provided to help in the consideration and evaluation of alternative systems from those showcased in the guide.

This guide is limited to multi-unit residential developments, which include:

Development Type	Description
Villas and townhouses	Villas and townhouses are taken to be 1-2 storey dwellings, where there are three (3) or more dwellings on the same parcel of land all at ground level. This type of dwelling often has a small yard and/or a car space per dwelling. Elements of this development type are also relevant to nursing homes and retirement villages and the residential component of caravan and holiday parks.
Low-rise developments	This category includes 2-3 storey 'walk-ups' that are generally held to be small blocks of units (say 4-12 units) that are two or three storeys high, with separate dwellings on each storey. They are called walk-ups because, as they are under four (4) storeys high, they are not required to have a lift and access to the dwellings on the upper storeys is by stairs. Elements of this development type are also relevant to the residential component of hotels and serviced units.
Residential blocks of 4-7 storeys	These developments are medium-large blocks of units that are 4-7 storeys high, with separate dwellings on each storey. Blocks of units with four (4) or more storeys are required to have lift access to the dwellings on the upper levels. Elements of this development type are also relevant to the residential component of hotels and serviced units.
High-rise developments (>7 storeys)	High-rise blocks are large blocks of units that are more than seven (7) storeys high, with separate dwellings on each storey. Blocks of units with four (4) or more storeys are required to have lift access to the dwellings on the upper levels. Elements of this development type are also relevant to the residential component of hotels and serviced units.
Mixed-use developments	Mixed-use developments incorporate residential dwellings and commercial establishments within the same development, and would include, for example, shop-top housing. Mixed-use developments may be small, for example two storeys incorporating a residential property on the top floor and commercial outlet on ground level, or they may be large with one or more levels of commercial property beneath low-rise or larger medium to high-rise residential developments above.
Integrated housing developments	Integrated housing developments incorporate different types of residential dwellings or commercial buildings, including individual houses, MUDs and mixed-use developments on one parcel of land. Integrated housing developments often feature internal private access roads and are typically developed into community title-type sub-divisions.

Garbage and recycling requirements for residential development categories not included in the guide should be discussed with council.

This guide does not cover waste management requirements for commercial and industrial developments.

How does the MUD Guide link in with other planning requirements and other codes and policies?

The guide's principles and objectives should be considered alongside relevant State Environmental Planning Policies, Local Environmental Plans, local Development Control Plans and other applicable codes and policies. Some councils may incorporate some or all of the guide's principles in their local Development Control Plans.

This guide does not supersede state and local planning control requirements. When designing a development you should consult with council staff, eg engineers, planners and waste managers, regarding specific requirements for facility design and placement in accordance with local requirements.

What is my role?

Figure 1-1 provides an overview of how the guide fits into the overall development process and the various roles and responsibilities of key stakeholders. In addition to these roles, council officers can support the implementation of the guide by referring to it or incorporating it into local Development Control Plans.

Note that Figure 1-1 is a simplified representation of the development application, approvals and construction process. Detailed information about each of these stages should be obtained by contacting council.

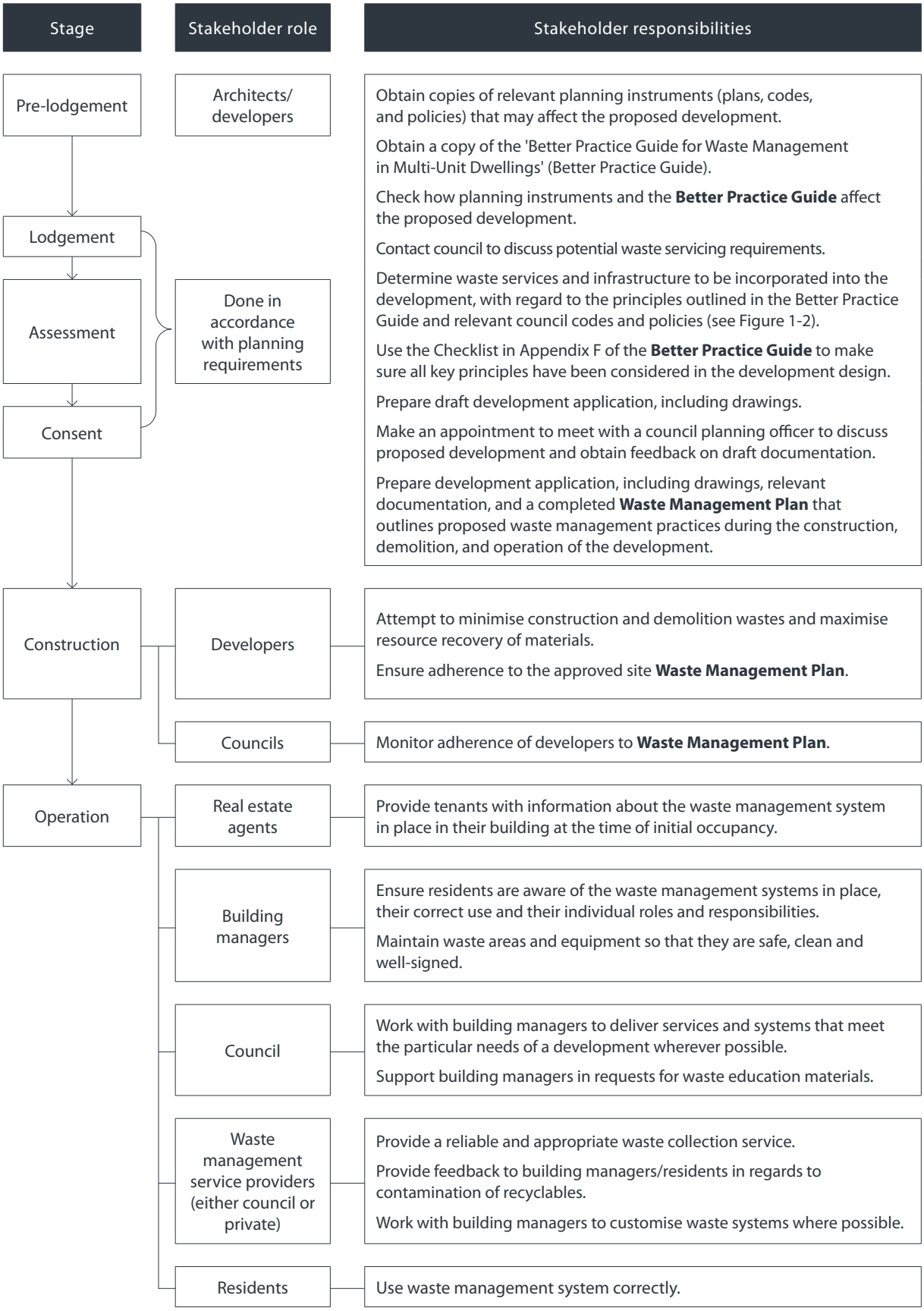


Figure 1-1 Getting it right – who's responsible?

How to use this guide

While the guide is designed to be a stand-alone information resource, it has been specifically developed to assist architects and developers to effectively plan and design appropriate garbage, recycling and organics management systems and facilities for MUDs.

To use the guide, readers should:

1. Read Section 2 for the essential requirements that are applicable to all development types.
2. Read the section of the guide that corresponds to your development type (ie choose from Sections 3 to 8 as applicable).
3. Refer to the appendices as required.

An overview of how to use the guide as part of the overall design process is provided in Figure 1-2.

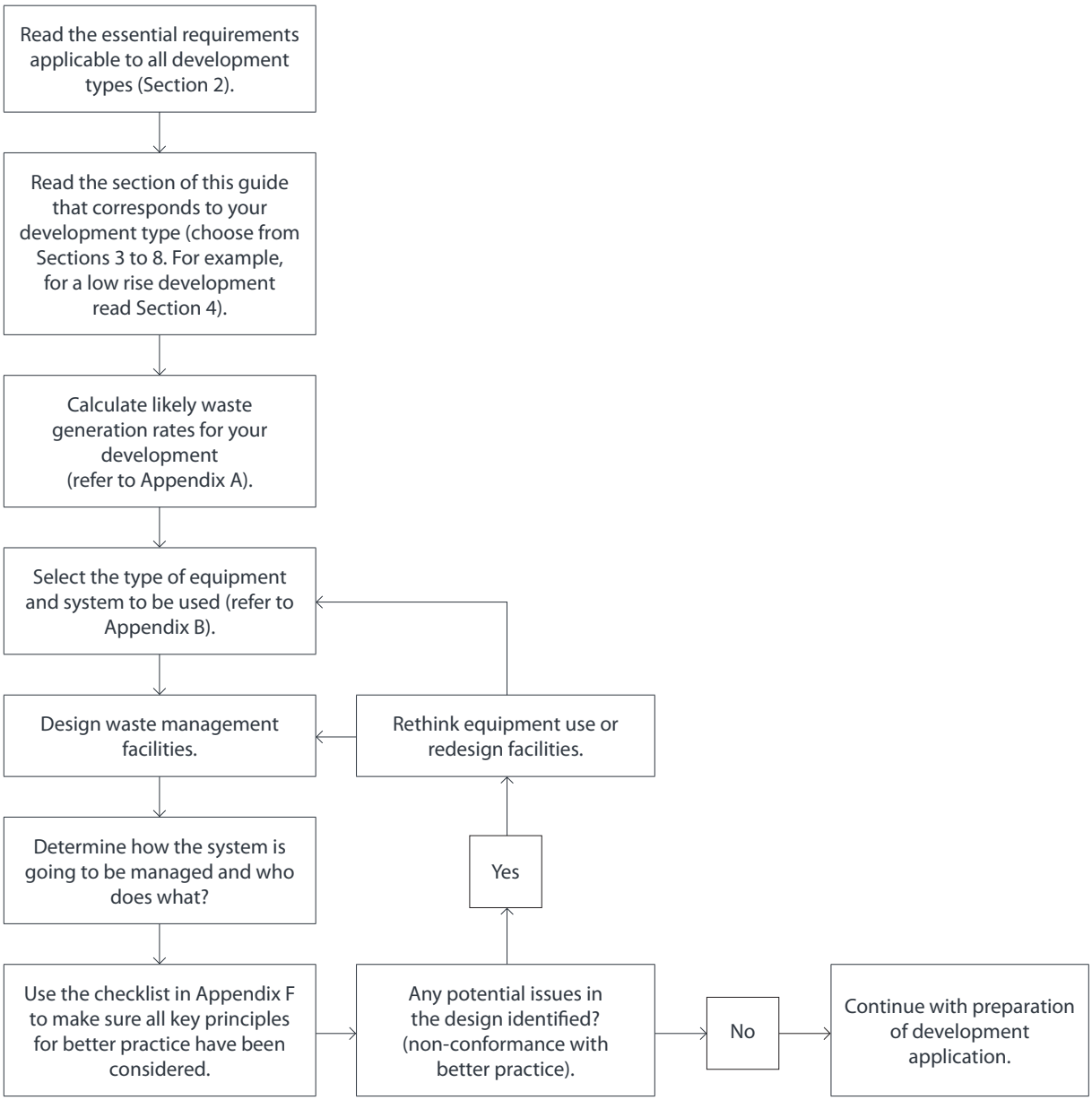
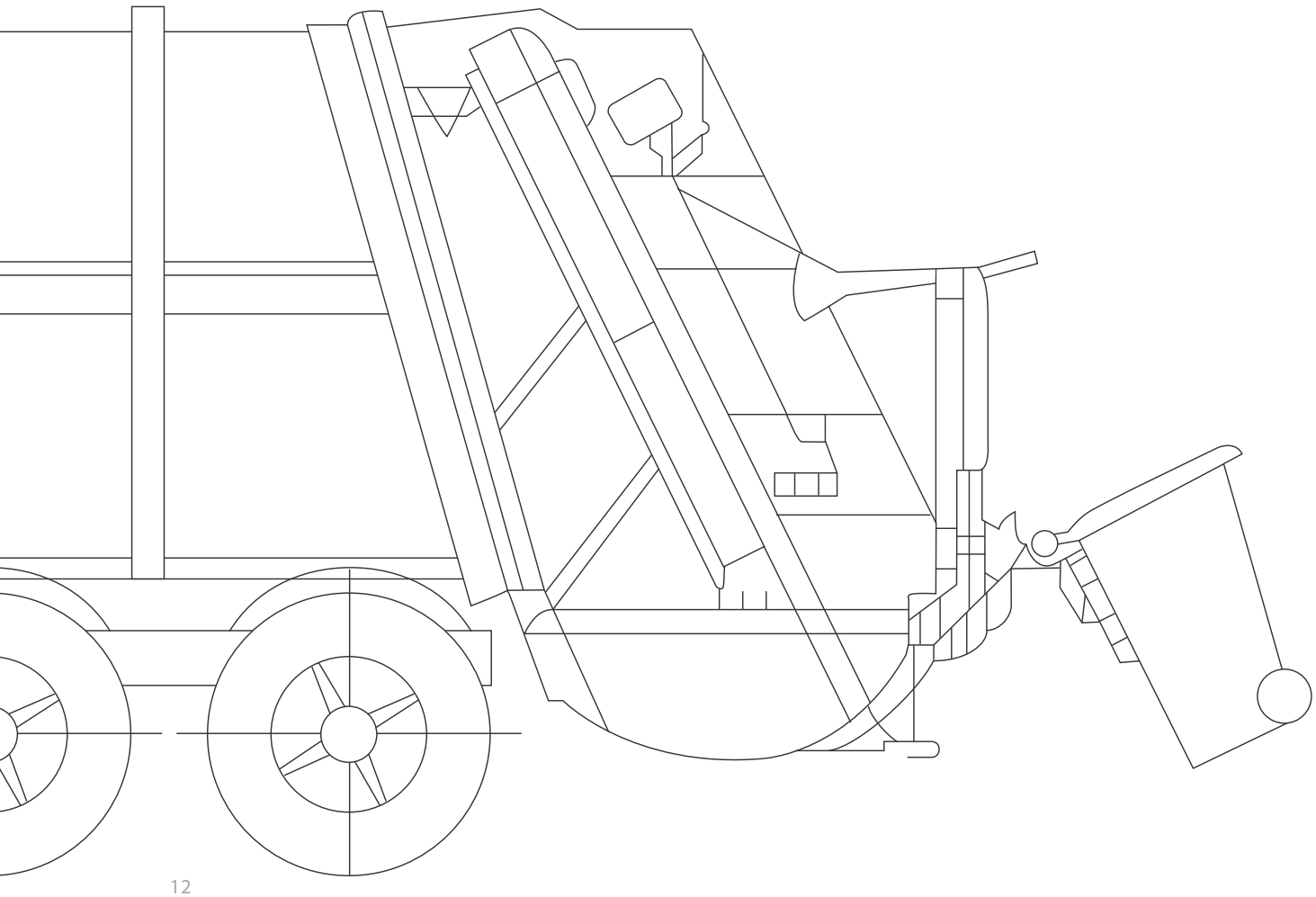


Figure 1-2 How to use the MUD Guide

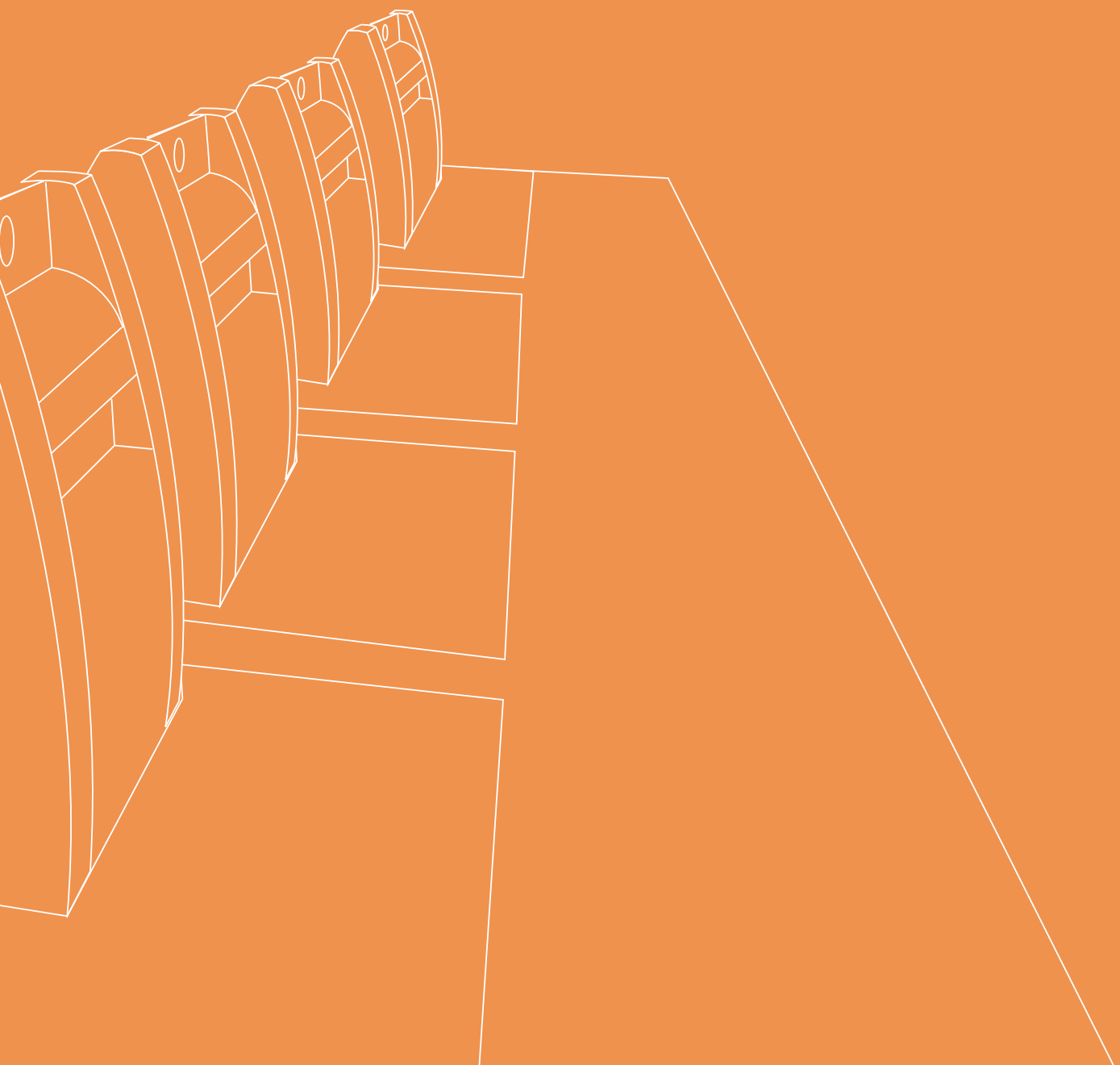
The appendices include information, tools and resources to support putting the guide and its principles into practice:

Appendix	Description
Appendix A Waste Generation Rates	Provides information on domestic and commercial garbage and recycling rates. This information should be used to estimate the likely garbage and recycling generation for your development. This appendix also includes examples of how to calculate bin storage area requirements.
Appendix B Waste Management Equipment	Provides dimensions for crates, bins, worm farms and compost bins. An overview of the operation of chutes, compactors, in-sink disposal units and other garbage and recycling handling equipment is included in this appendix.
Appendix C Collection Vehicles	Provides dimensions for waste collection vehicles that are commonly used for domestic waste collections from MUDs.
Appendix D Vehicle Access/Turning Circles	Provides information on vehicle access requirements, including road and driveway construction and geometry and vehicle turning circles and manoeuvring requirements. Turning circle templates and reverse entry templates are provided. These templates can be used to check vehicle paths on intersection layout drawings. The templates are taken from standard AS 2890.2 Parking Facilities: Off-Street Commercial Vehicle Facilities and can be sourced from SAI Global Limited (www.saiglobal.com).
Appendix E Standard Signage	Provides information on standard signs that should be displayed in waste rooms and on bins.
Appendix F Checklist	Includes a checklist that can be used to check if proposed garbage and recycling facilities have been designed in accordance with better practice principles, and to highlight issues of concern.

Additional tools and resources, including case studies for different development types, are available on the Department of Environment and Climate Change NSW (DECC) website www.environment.nsw.gov.au



2.
All Developments



Remember, this MUD Guide does not supersede State and local planning control requirements. You should consult with council engineers, planners and waste managers regarding specific requirements for facility design and placement in accordance with local requirements.

The underlying principles that were used to develop this guide are:

- Hygiene, safety and cleanliness are a priority.
- Systems should be as simple to use and as intuitive as possible.
- Some systems, particularly in high rise blocks, require a caretaker or manager.
- Systems should aim to maximise source separation and recovery of recyclables.

This section of the guide discusses essential issues that apply to all development types and should be considered when designing garbage and recycling management systems.

Please note that the checklist in Appendix F has been developed to help you to confirm that these key issues have been considered in your building design. Use the checklist in Appendix F to ensure that proposed garbage and recycling facilities have been designed in accordance with better practice principles.

Council service provision

Local government has a number of roles and obligations including providing domestic waste management services. Council services vary between Local Government Areas. To achieve better practice, it is therefore imperative to consult early on with council engineers, planners and waste managers regarding specific requirements and options for waste services in the local area.

It is important to note that the *Local Government Act 1993* requires councils to levy an annual charge for providing domestic waste management services on all parcels of rateable land for which the service is available, whether or not the service is actually used.

Risks to health and safety associated with the handling and disposal of waste and recycled material

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

- residents using the service;
- building management and cleaning staff (if applicable) that maintain the service;
- collection staff providing the service; and
- other people engaged in or affected by the waste management system.

Whilst others may be responsible for making collections and providing services once the development is operational, the designer, developer and operator have an important role in considering the potential impact of design on the subsequent ability of others to make collections and provide services in a safe manner.

Collection methods and systems used for waste management in MUDs must comply with the *Occupational Health and Safety Act (2000)* and the *Occupational Health and Safety Regulation (2001)*. The Code of Practice for Collection of Domestic Waste (NSW WorkCover)[3] should be referred to when designing waste facilities for MUDs. The code provides guidance on how to prevent injury and illness caused by the collection of domestic waste and highlights examples of common hazards and risk control measures.

Irrespective of the size of the development, all services to MUDs must comply with OH&S requirements. A preliminary risk and hazard analysis should be done during the design phase to identify potential risks to health and safety associated with the proposed services and design layout. This will assist the early identification of risks, thus enabling modification of the proposed design to preferably eliminate, or minimise, the consequence or likelihood of human injury or damage to property and equipment.

3 *Code of Practice: Collection of Domestic Waste,* WorkCover NSW (2005) (www.workcover.nsw.gov) in the publications section.

Examples of risks that should be eliminated or controlled through appropriate system design include:

Risk	Examples of control measures to be considered in design
Manual handling injury from moving bins	Ensure adequate storage space for easy manoeuvring of bins within the property and to and from the storage area to the collection point. Identify an appropriate collection point that is free from obstacles and traffic hazards. Include sufficient space to accommodate required disposal capacity so that bins do not become overloaded or overcrowded. Paths for movement of bins should be free from steps and of an appropriate grade. Collection points should enable the mechanical pick up of bins.
Damage to buildings, structures and equipment	Ensure collection points are easily accessible for the collection vehicle and appropriate in terms of overhead clearances, strength, width and geometric design.
Cuts and lacerations, or harm from contact with unknown hazardous substances	Maintain areas so that all garbage and recycling is contained within appropriate bins. Ensure education programs are in place addressing the safe and appropriate disposal of garbage.
Potential conflict between building design and collection vehicles	Provide adequate turning space for vehicles. Ensure vehicle access and turning areas are free from obstacles that may impair driver visibility.

The above are limited examples only. Further hazards and risks and appropriate management strategies should be identified through a risk assessment and considering the recommended design standards included in this guide.

Resident access to garbage and recycling services

Recycling bins should never stand alone, they should always be next to a garbage disposal point.

Waste management systems provided to different developments may vary and be negotiable. In general, however, each development should be provided with access to garbage and recycling services. If there is little garden area and/or a contractor maintains the garden, it may be possible that the council will waive the garden organics service for a particular development.

Within developments, the disposal of garbage and recyclables should be equally convenient for residents. Recycling facilities should be located adjacent to garbage facilities and should never stand alone. Although located near each other, garbage and recycling bins should be kept separated within the storage area and not intermingled.

Systems provided should be convenient, simple to use and as intuitive as possible in order to maximise recycling and minimise contamination. Intuitive systems are systems whereby the manner in which the system operates is obvious to the uninformed resident.

Suggested methods to encourage recycling and minimise contamination include:

- Provide adequate storage space inside each dwelling unit for temporary storage of at least two days' worth of recycling.
- Provide containers to residents that can be stored within dwellings and used to transport recyclables from the dwelling to the storage area or recyclables disposal point. Note: ideally a requirement to return containers could form part of the rental agreement.
- Encourage ownership by numbering bins with unit numbers where individual bins are provided for individual units.
- Display signs in public areas of the building clearly identifying garbage and recycling bins and storage areas.
- Signs should provide instruction on how to use the garbage and recycling facilities, including identifying what is and is not recyclable.

Bins and containers

All garbage, recycling and garden organics generated by a development needs to be stored in the appropriate waste bins or containers with permanent well-fitting lids.

Waste bins and containers used should conform to the Australian Standard for Mobile Waste Containers (AS 4213) if the standard is applicable for the selected bin or container type. Waste bins and containers greater than this capacity (1,700L) should be designed to appropriate safety and other requirements.

Further detail about waste bins and containers is provided in Appendix B.

Waste handling equipment

Waste handling equipment, including chutes and compactors, should conform to the relevant design and safety standards.

Further information about waste handling equipment can be found in Appendix B of this guide or by referring to the DECC website www.environment.nsw.gov.au

Storage

Storage space

Inside the dwellings

Consideration needs to be given to providing sufficient space within the kitchen, or other convenient location, in each dwelling unit for interim storage of at least two days' worth of garbage and recycling.

Space inside dwelling units should allow for separate storage of recyclables from the garbage stream. Ideally sufficient space should also be allocated for the segregation of food organics in a separate waste container.

Bin storage areas

Provision of adequate storage areas both within and external to dwellings is a key element of better practice systems.

Whatever the specific arrangements, the building design needs to incorporate sufficient space within the property boundary to store, in separate bins or containers, the volume of garbage and recycling (and garden organics where appropriate) likely to be generated at the development during the period between collections. There should also be space allowable for signs and educational materials to be located adjacent to bins and equipment.

In order to assess the storage requirements, consideration should be given to the generation rates (see Appendix A), the storage equipment to be used (see Appendix B) and the type of service offered. It is essential to provide an adequate area to enable garbage, recycling and organics bins to be kept separated within the storage area and not intermingled. However, bin storage areas that are too large may actually encourage dumping of bulky items.

The storage area should be designed for easy access and manoeuvring of bins to allow easy cleaning of the storage area. Consideration should also be given to access for maintenance and servicing requirements. It is undesirable to locate other services and appliances, such as electrical meter boards, gas meters or conduits, in bin storage areas, as they may be damaged during collection or cleaning.

The greatest difficulty in calculating space allocation is predicting the collection service that will need to be catered for in the future. Service requirements should be discussed with the local council, but some flexibility needs to be allowed in the building design for the future. Examples of how flexibility can be incorporated in building design include:

- Identifying suitable locations for waste storage and collection points that would enable future onsite collection if required.
- Keeping waste storage areas clear of potential obstacles that would impair the ability to modify existing bin sizes. For example, in communal bin areas the use of fixed structures to separate individual bins 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 possible future changes in bin sizes. For example, installing double doors on a communal garbage area would allow easy movement of either mobile garbage bins (MGBs) or bulk bins should either system be installed.
- Sizing communal bin storage areas to allow for a potential increase in waste generation from the development or a change in allocated council services per dwelling. For example, from an increase in two bins per dwelling (say for a villa development) to three bins per dwelling.

Refer to Appendix A for examples of possible layouts for bin storage areas.

Storage location

Garbage and recycling storage facilities should be located in positions that:

- Permit easy, direct and convenient access for the users of the facility.
- Permit easy transfer of bins to the collection point if relocation of bins is required.
- Permit easy, direct and convenient access for collection service providers.
- Are well screened and do not reduce amenity.
- Are secure and provide protection against potential vandalism.

Identifying the best location for communal bin storage areas can be difficult. Locating waste storage areas is a balance between convenience to residents, space, access, noise, security, planning requirements and architectural integration. The following points should be considered when deciding where to locate garbage and recycling storage areas:

Better practice	Reasons
Location of the bins should be convenient to residents	Conveniently located bins are more likely to be used appropriately by residents.
Bins should be in a high pedestrian-traffic area	Locating bins in a high-pedestrian traffic area encourages good housekeeping, as the bins are visible to a large number of people. It increases the ease of access and convenience to residents as disposing of garbage and recyclables can occur as part of the daily routine of walking to the post-box or entering the parking area. Bins located in a rarely frequented area of the property tend to attract dumped rubbish and encourage poor practices.
Where collection of bins is from the kerbside, the waste storage areas should be as close to the kerb as possible	Manual moving of bins from storage areas to the collection point should be minimised where possible to reduce potential health and safety risks. A well-located storage area reduces the time required to take bins out for collection and bring them back.
Storage areas should be out of sight or well screened from the street	Bin storage areas should not affect the aesthetics of the development and should blend in with surrounding buildings and landscape. Locating storage areas out of sight from the road also improves safety. Bin storage areas that are too close to the street can be subject to vandalism.
Storage areas should be located an appropriate distance from dwellings	Locating bin bays and collection points away from residents will reduce the impact of noise during bin use and waste collection. It will also increase amenity through reduced odour impacts.

Contracts

The structure of service contracts plays an important role in ensuring efficient servicing of MUDs. Indemnity and waste service flexibility are two important contract issues that should be considered in relation to deciding an appropriate better practice system for your development. It is important to talk to council as early as possible to identify potential servicing issues.

Requirements for onsite collection vary between council areas. Be sure to check with council regarding the availability of onsite servicing before assuming it is possible.

Indemnity

- Some councils may provide on-site collection where:
- There is insufficient space on the kerbside to temporarily place bins for waste collection.
- Collection of waste from the kerbside would be unsafe.
- Collection of waste from the kerbside would cause significant traffic disruptions.
- Collection of waste from the kerbside would occur in an excessively restrictive area.
- Council considers kerbside collection inappropriate.

Most councils, however, will not enter private property with their vehicles unless indemnity against liabilities, losses, damages, and other costs arising from the onsite collection service has been provided. In some council areas, all bins are required to be presented at the kerb of a public road, and no on-property service is offered at all.

To enable better practice waste management in MUDs:

- Designers/developers

  Decide the preferred waste management system to install having regard to the principles outlined in this guide.

  Before submitting your development application meet with council to discuss if on-site collection is required or allowed:

  If onsite collection is required:

  - ensure design of facilities can safely accommodate on-site collection;
  - liaise with council to find out if it can provide the on-site service; and
  - identify indemnity arrangements that would be needed to service the development.

Service flexibility

The design of the waste management system should accommodate services provided by council where possible. Some councils may only be able to offer MUD developments the same (or similar) services as those offered to single dwellings. In many cases, particularly for medium to high-rise developments, the efficient provision of cost-effective garbage and recycling collection services for MUDs may require using an alternative service option, for example bulk bins or underground systems.

To enable better practice waste management in MUDs:

- Designers/developers

  Check with council about the garbage and recycling service options available and whether they are suitable for the proposed development.

- Councils

  Seek a better practice contract structure that provides for variations to services during the agreed contract period.

Collection point

Location of garbage and recycling collection point

Consideration should be given to identifying a suitable waste collection point. Discuss collection requirements with the council.

General requirements

Collection points where possible should **not** be located:

- near intersections;
- near roundabouts or slow-points;
- along busy arterial roads;
- in narrow lanes;
- near possible obstructions, including trees, overhanging buildings, and overhead powerlines; or
- where they pose a traffic hazard.

> Collectors need to be able to move the bins from where they are left for collection to the collection vehicle as quickly as possible, preferably with no manual handling.

The collection point(s) should enable collection operations to be carried out on a level surface away from gradients and vehicle ramps.

Where MGBs will be used and collected from the kerb, there should be sufficient space on the street for them to be lined up neatly in (preferably) a single row along the kerb. Remember cars parked along the street and bins placed two or more rows deep are an obstacle for safe and efficient kerbside collection, as they require collection operators to get out of the collection vehicle and manually move bins to an appropriate position for collection. They also create amenity issues for residents, can impede pedestrian access and can be a traffic hazard for motorists.

Identifying a suitable collection point is particularly important for servicing developments where there are a large number of bins to be collected, there is limited direct access to the development (for example battle-axe block developments), or where the development has specialised servicing requirements due to equipment used to provide the waste service. For example:

- The collection point for bulk bins or bins containing compacted waste should be located such that the bins can be accessed with minimal manual handling required.
- Underground systems require suitable access for the collection vehicle to enable safe lifting of the underground containers for servicing.

Developers should consider what alternatives are available for locating collection points, particularly for developments built on small blocks with steep gradients, to enable safe presentation and uplift of bins.

Onsite collection

Some councils will not enter private property to make collections, or will only do so if an indemnity has been provided.

It is important to confirm potential arrangements for onsite collection with the council **before** assuming that it will be possible. Where an agreement for onsite collection is made, the onsite collection points should be located:

- So that collection vehicles do not interfere with the use of access driveways, loading bays or parking bays during collections (see 2.7.1).
- Close to waste storage facilities to permit easy transfer of bins to the collection point, if relocation of bins is required.
- In a relatively flat area and on the same level as the collection vehicle (ie bins should not be placed for collection on elevated loading bays or nature strips/footpaths).
- In a position that provides collection vehicles safe access to the collection point and which has adequate clearance and manoeuvring space.
- So oncoming traffic can be clearly seen as the collection vehicle leaves the property.

Manoeuvring bins to the collection point

Where bins of up to 360L in capacity need to be wheeled to the collection point:

- the distance should not exceed 75m in all circumstances;
- for aged persons or persons with a disability, the distance should be limited to 50m;
- the bin transfer grade should not exceed 1:14; and
- bins should not need to be wheeled over steps (neither up nor down).

For bins greater than 360L capacity, if relocation of bins is required:

- Bins should not need to be wheeled over steps (neither up nor down).
- If less than or equal to 1.0m^3 in capacity, bins should not need to be wheeled more than 5m from the interim storage point to the collection point.
- If greater than 1.5m^3 in capacity, manual manoeuvring of bins should be avoided wherever possible. Where it cannot be avoided (for example if bins are stored in a room or enclosure), the bins should not need to be wheeled more than 3m from the interim storage point to the collection point.
- The bin-transfer grade should not exceed 1:30.

Access to the collection point for service providers

Wherever possible, waste collection vehicle movement should be in a forward direction with no need to reverse.

Specific access requirements for collection vehicles will vary slightly from council to council, depending upon the waste collection arrangements. In all cases, however, collectors need to be able to move bins from the collection point to the vehicle as quickly as possible, preferably with no manual handling. It is noted, however, that requirements for manual handling may differ between councils.

Whatever bin type is used, the developer needs to ensure there is sufficient space for the collection vehicle to drive to the collection point, empty the bin and safely leave the collection point. Wherever possible, collection vehicle movement should be in a forward direction with no need to reverse.

The design aspects to take into account for vehicle access include:

- the presence of parked cars on access roads;
- heavy vehicle access and turning circle requirements (refer Appendix D);
- collection vehicle overhang and possible interference with bins and street furniture; and
- clearance height for servicing, particularly when developments are serviced internally, or where an external collection point is near trees or overhead obstacles.

In addition to the above design aspects, general access to the collection point should be considered in the development design and operation. Locked gates and security systems that prevent access to waste collection points can cause serious delays and problems in servicing if not well designed and/or waste collection operators are not provided with the required authority for access. Designers and developers should consider the likely ongoing operational arrangements for access to locked gate communities and how this needs to be incorporated in the design. For example, some councils may require a set of keys or remote control access to enter developments, whereas others may require security systems to be compatible with a single master key held by council.

Remember, garbage and recycling collection may occur at different times depending on the Local Government Area and service provider, thus access should not be restricted at any time.

On-site collection

If a collection vehicle is required to drive onto a private road or private property, the driveway and road need to be suitable for the collection vehicle in terms of strength, width, geometric design and height clearance (see technical specifications in Appendix C and D). The access points and collection area should be free from overhead obstacles and of an appropriate gradient. When making an on-site collection from within a building, the 'clearance height' should be clear of any air conditioning ducts, sprinklers or other potential obstructions.

Appropriate heavy vehicle standards should be incorporated into the development design, including those specified in acts, regulations, guidelines, and codes administered by Austroads, the NSW Roads and Traffic Authority, NSW WorkCover and any local traffic requirements.

Presentation area

Where the collection of bins from either the normal storage location (inside the property) or a location on the kerbside could cause amenity and safety concerns, some councils may require the use of a presentation area. This is an area at the development that acts as an intermediate point between the normal storage area and collection point, which may be on- or off-site.

Where a presentation area is used, someone (eg a caretaker) must be identified as responsible for moving the bins from the storage area to the presentation area for collection. Collection operators would collect the bins from the presentation area at the time of collection and return them to this area after collection. The caretaker would then be responsible for moving the empty bins back from the presentation area to the normal storage location.

Presentation areas, if used, should be located as close as possible to the collection point.

Not all council areas support presentation areas, you should check with council regarding specific local requirements and service options.

Composting

Space could be provided for a home unit worm farm or compost bin to allow residents to compost their own food scraps. Individual worm farms could be located on the balcony for example.

If the development has a garden area, space could be allocated for a communal compost unit or worm farm. However, experience of communal composting arrangements indicates this option should only be considered where there is a caretaker or gardener able to manage the compost unit.

Communal composting areas, if appropriate to the development, should be located with consideration for:

- Visibility and accessibility of the composting area. Location in an easily accessible and visible area would increase awareness of the compost pile and the need to keep the area well maintained.
- The positioning of dwellings (onsite and in adjoining properties).
- Their potential to generate odours.
- Ensuring any potential run-off is away from site drainage points.

Refer to Appendix B for size and space requirements of typical compost units and worm farms.

Noise

The main sources of noise associated with domestic waste collection are emptying glass into bins, emptying glass from bins into the collection vehicle and reversing alarms on collection vehicles.

Better practice principles that should be incorporated to reduce noise include:

- Locating bin bays and collection points far enough away from residents as to reduce the impact of noise during bin use and waste collection.
- Eliminating the need for collection vehicles to reverse.
- Chutes, if installed, should be well insulated to avoid noise disturbing neighbouring units. The noise associated with waste falling out the bottom of the chute and with compactors can also be problematic and should be dealt with.
- Select appropriate surfacing materials that will assist in minimising noise for pathways and driveways that bins will need to be wheeled over.
- Consider how material will be transferred into bins or static compactors at storage points.

Remember – waste is collected at least once per week. In some areas, waste is collected daily and therefore noise can be a significant concern for residents.

Odour

Odour problems can be minimised by having well-ventilated waste storage areas.

For enclosed storage and service areas, the air flowing from interim storage areas and central garbage rooms should not exit close to units. Ventilation openings should be protected against flies and vermin and located as near the ceiling and floor as possible, but away from the windows of dwellings.

If a forced ventilation or air conditioning system is used (for enclosed storage areas):

- it should be in accordance with the ventilation requirements of the Building Code of Australia and Australian Standard 1668.2 *The use of Ventilation and Air Conditioning in Buildings;* and
- it should not be connected to the same ventilation system supplying air to the units.

Hygiene/vermin

Remember to locate drains to the sewer undercover to prevent rainwater infiltration.

Waste not sealed in containers attracts vermin and is unhygienic. Do not allow bins to sit open for extended periods of time.

As far as possible, prevent vermin getting into waste collection and storage areas. Keep waste collection and storage areas free of clutter and dumped rubbish.

In communal bin areas

Communal bin storage areas need to be easy to clean, with access to water (a tap and a hose) and correct drainage to the sewer. Never allow the water from washing bins and/or waste storage areas to flow into the stormwater drain.

Ideally, having covered floor junctions at walls helps with cleaning and avoids the build up of dirt/spills.

To maintain hygiene:

- assign responsibility for keeping communal areas clean; and
- wash both bins floors and walls of garbage bays and rooms regularly.

Visual amenity

All waste management facilities (including storage areas) should be adequately screened, not readily visible from any public place and should blend in with the development.

A poorly designed and poorly located bin storage area can detract from the overall development, encourage misuse of the facilities provided and affect recycling outcomes.

Remember to consult with council engineers, planners and waste managers regarding specific requirements for facility design and placement in accordance with local development codes.

Security

As far as possible, the design of waste storage areas should allow easy access for residents but **not** non-residents. One option is to ensure bin storage is out of sight from the road. Another option is to design bin storage areas that can be locked.

Communal bin areas, if used, need to be sufficiently open and well lit to allow their use after dark.

All internal garbage and recycling rooms and storage areas should be designed to comply with the Building Code of Australia with particular regard to fire prevention provisions.

Protect equipment from theft and vandalism.

Signs and education

Ongoing education, in addition to having dedicated ongoing management services, is one of the most important factors in encouraging residents to continue to use services and systems to as originally planned.

The importance of signs and education is two-fold: to inform residents why it is important to recycle (raise awareness and perceived importance of resource recovery and the environment), and secondly to provide clear instruction on how to recycle using the services provided. Both these factors influence people's attitude towards recycling.

Ensuring education is 'ongoing' is beneficial because it tackles the transient nature of residents and differences between council services.

Clearly and correctly label all garbage and recycling bins or receptacles. Make sure communal waste storage areas are well signposted, with signs instructing residents in the correct separation of garbage, recycling and organics. Also clearly identify any hazards or potential dangers associated with the waste facilities, including those from the use of any waste handling equipment.

It is recommended you also display information in communal areas that identifies who can be contacted to find out more about the recycling and/or other services in the development.

Appendix E provides further information about standard signs that can be used to support waste facilities and services.

Ongoing management

Active caretakers are vital for effective ongoing management in large developments.

Ongoing management of waste and recycling systems in MUDs is imperative to maintain amenity, maximise safety for residents, caretakers and collectors, maximise resource recovery and enable efficient servicing of the development.

Ongoing management is required to monitor resident behaviour and identify requirements for further education and/or signs. You must also quickly address any negative behaviour, such as dumping waste and recyclables on the floor rather than in bins. A fast response is desirable to prevent spreading of negative behaviour and to maintain the amenity, access and convenience of services to others.

It is important to establish and delegate responsibility for the tasks involved in ongoing waste management, including:

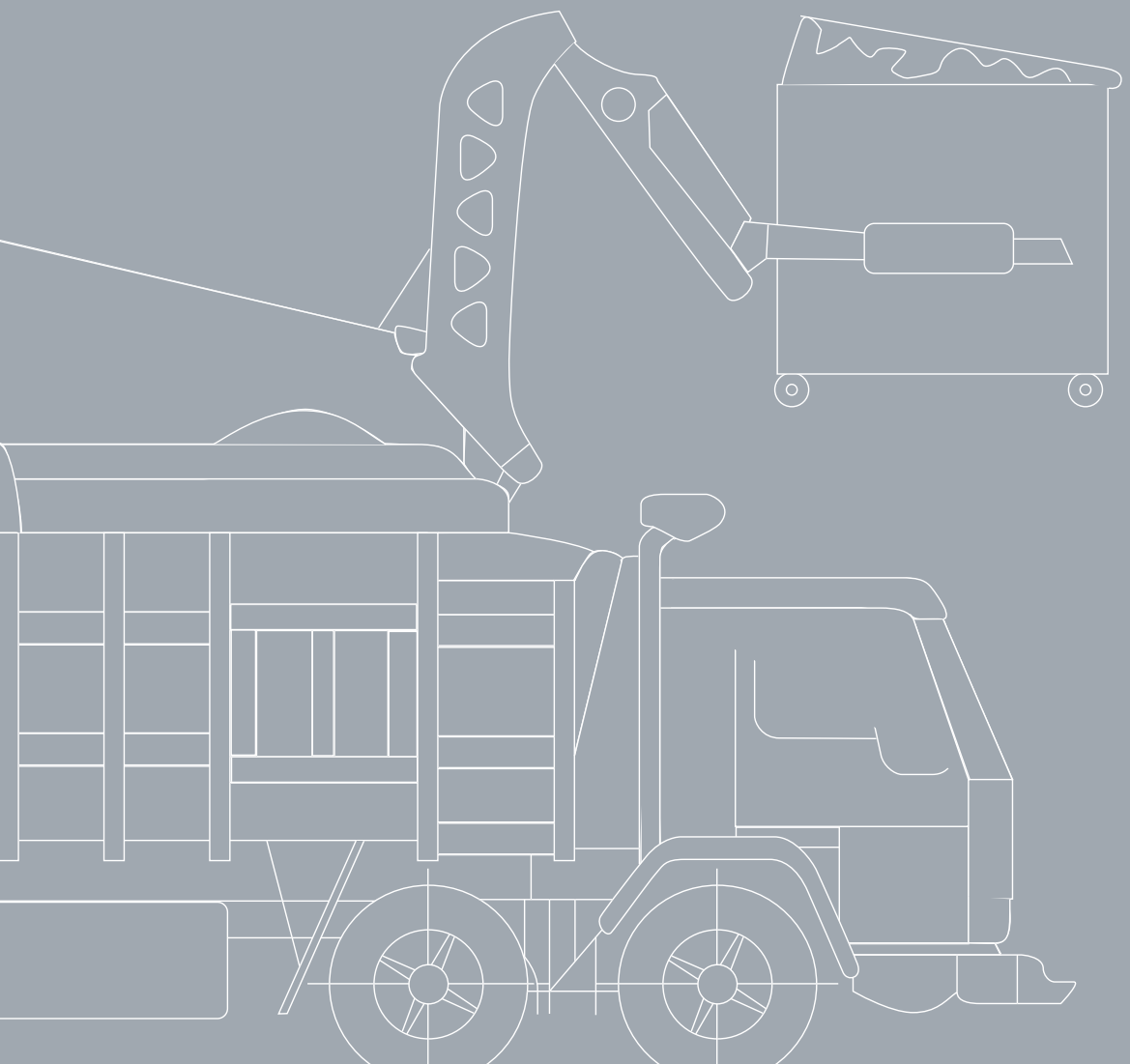
- Moving bins to and from the storage point to the collection point (if required) on collection day.
- Washing bins and maintaining storage areas.
- Arranging for the prompt removal of dumped rubbish.
- Displaying and maintaining consistent signs on all bins and in all communal storage areas.
- Managing communal composting areas (if applicable).
- Ensuring all residents are informed of the garbage, recycling, organics and bulky waste arrangements.

The size of the development will influence the responsibility for ongoing management and maintenance of bins. Active caretakers are recommended for all developments, particularly those with communal storage areas, and are considered vital for effective ongoing management in large (in terms of scale and number of dwellings) developments, whether they be, for example, townhouse, multi-storey or mixed-use developments.

Conditions of consent can require that a development comply with the submitted and approved Waste Management Plan. If a caretaker is required, this may be detailed in the Waste Management Plan and, if so, employment of a caretaker may form part of the conditions of consent, which must be adhered to.

3.

Villas and Townhouses



Villas and townhouses are taken to be 1-2 storey dwellings, where there are three (3) or more dwellings on the same parcel of land and all dwellings are at ground level. This type of dwelling often has a small yard and/or a car space per dwelling.

Elements of this development type are also relevant to nursing homes and retirement villages and the residential component of caravan and holiday parks.

Issues for consideration

The issues discussed in this chapter need to be taken into consideration in addition to those applying to all developments (as outlined in Section 2).

Better practice waste and recycling systems and services

Where the development is relatively small in scale, villas and townhouses may be treated like separate houses when it comes to council waste services. In this case, each townhouse/villa may have its own bin(s), and the resident is responsible for putting the bin(s) on the kerb on collection day. Alternatively, a centralised garbage and recycling enclosure may be used for communal location of bins.

Examples of better practice waste management in villa and townhouse developments include:

- **Option 1:** Use MGBs for garbage and recycling with bins stored in the resident's own yard.
- **Option 2:** Use MGBs for garbage and recycling, with bins stored in a communal storage area. A caretaker may need to be allocated responsibility for transferring bins to the collection point and back into the property in this situation.
- **Option 3:** For large-scale villa/townhouse developments, some councils may provide bulk bins for garbage. Councils may also provide bulk bins for recyclables, such as paper and cardboard, elsewhere the use of MGBs is common for either source-separated or commingled recyclables. Bulk bins and/or MGBs would be stored in a communal storage area.

For Option 1, many councils in metropolitan areas are moving toward providing an 80-140L garbage MGB per dwelling (collected weekly) and a 240L recycling MGB per dwelling (collected fortnightly). Depending on the quantity of garden organics generated, council may or may not offer a garden organics service to these developments.

Services may vary across council areas, consult with council to find out the services provided in the local area. Council's waste management unit will be able to advise what the allocation of bins will be for use in communal storage areas.

The key features of the above systems and their advantages and disadvantages are further outlined in Table 3-1. Note these systems are provided as examples only. Architects and designers who have good ideas should not be constrained by these examples.

Table 3-1 Villa/townhouse development – better practice examples

Option 1

MGBs (up to 240L) used for garbage and recycling.

Bins stored in individual yards.

Advantages	Disadvantages	System requirements[4]
MGBs are generally easy to manoeuvre. Residents have ownership of bins and are therefore more likely to take greater responsibility for maintaining the system appropriately. Residents are responsible for moving bins to and from the collection point, meaning less time is required by caretaker for ongoing management. Bins may be collected from the kerbside where there is sufficient room to do so safely and efficiently. Simple and easy to use system in regards to both garbage disposal and recycling. Encourages participation in recycling through co-location of garbage and recycling bins.	A large number of MGBs may be required to service the development. Large numbers of bins placed out for collection on the kerbside can reduce amenity and pose risks to passers-by as a result of blocking pathways. They also pose a safety risk to collection operators if they are required to manually move bins around cars to the waiting collection vehicle. Residents may leave bins at the kerbside for longer than necessary (where they are taken out early and collected late) and could cause amenity and safety issues.	Allocate sufficient space in each yard to store at least three bins (for garbage, commingled recycling and garden organics) for each townhouse/villa. Provide side or rear access, of suitable grade and distance, to all villas/ townhouses. Identify suitable waste collection point(s) for collection of the number of MGBs required that are free from potential obstacles, including parked cars (remember on recycling days there may be twice as many bins placed out for collection). Ensure responsibilities for educating residents about appropriate use of systems are clearly identified.

4 In addition to the general requirements listed in Chapter 2.

Option 2

MGBs used for garbage and recycling.

Communal storage area(s).

Advantages	Disadvantages	System requirements[4]
MGBs are generally easy to manoeuvre. MGBs can be numbered and shared between allocated units. This would increase perceived levels of ownership, leading to increased accountability and appropriate behaviour of residents. Bins may be collected from the kerbside where there is sufficient room to do so safely and efficiently. Simple and easy to use system in regards to both garbage disposal and recycling. Encourages participation in recycling through co-location of garbage and recycling bins.	A large number of MGBs may be required to service the development. This would require a subsequent large storage area (or a number of smaller areas). It would also require considerable time for ongoing management, including cleaning bins, and moving bins in and out from the collection point. Large numbers of bins placed out for collection on the kerbside can reduce amenity and pose risks to passers-by as a result of blocking pathways. They also pose a safety risk to collection operators if they are required to manually move bins around cars to the waiting collection vehicle. Recycling bins could be contaminated if there is an inadequate number of MGBs provided for garbage.	Design storage areas so that there is easy access for residents and caretakers to all MGBs without the need to move bins around. Identify suitable waste collection point(s) to collect the required number of MGBs that are free from potential obstacles, including parked cars (remember on recycling days there may be twice as many bins placed out for collection). Ensure responsibilities for cleaning communal areas and bins, educating residents in the appropriate use of systems and for moving bins in and out of the storage area for collection, are clearly identified. Engaging a dedicated caretaker is recommended. Display clear signs indicating appropriate use of recycling systems. Ensure adequate garbage capacity is provided to reduce possible contamination of recycling bins.

4 In addition to the general requirements listed in Chapter 2.

Option 3

Bulk bins for garbage and either 240L MGBs or bulk bins used for recyclables. Communal storage area(s).

Advantages	Disadvantages	System requirements[4]
Could reduce footprint required for bin storage area. Could improve amenity compared with having a larger number of MGBs to service. Simple and easy to use system for both garbage disposal and recycling. Encourages participation in recycling through co-location of garbage and recycling bins.	Decreased ownership as a result of sharing bins between greater numbers of units. Bulk bins can be heavy when full and pose a serious health and safety risk if they have to be manually moved. Access for safe and efficient emptying of bulk bins may be limited. Onsite collection is generally required for bulk bins, which may not be available in some local areas. Recycling bins could be contaminated if there is an inadequate disposal capacity provided for garbage. Potentially higher contamination of recyclables if collected in bulk bins. Bulk bins are generally suitable for paper and cardboard collection, but not commingled recyclables or source-separated glass due to glass breakage and safety issues during collection.	Design storage areas so that there is easy access for residents and caretakers to all MGBs without the need to move bins around. Design the development to enable efficient onsite collection of bulk bins. Identify suitable waste collection point(s) for collection of bulk bins to eliminate or minimise manual handling as appropriate (refer to general requirements in Chapter 2). Ensure responsibilities for cleaning communal areas and bins, educating residents in the appropriate use of systems and for moving bins in and out of the storage area for collection are clearly identified. Implement clear signage indicating appropriate use of recycling systems. Ensure adequate garbage capacity is provided to reduce contamination of recycling bins.

Applicable for Options 2 and 3

Storage – space and location of communal bin areas

Storage of waste bins may be in either one or more communal areas, including:

- external enclosures, such as a bin bay;
- enclosures located at ground floor parking level, within the building undercroft; or
- rooms located within the main building or basement.

Large-scale villa/townhouse developments may be spread across a large area, which could have dual or multiple street frontages. Where this is the case, consideration should be given to incorporating more than one communal storage area.

Garbage and recycling collection point

Where villa/townhouse developments are spread across a large area and incorporate more than one communal storage area, it may be appropriate to have more than one waste collection point for servicing the development (subject to street frontage and access).

For MGB-based waste collection systems, the waste collection point is typically from the kerb.

The collection point for bulk bins, if used in the development, should be selected such that it meets the general requirements specified in Section 2.7.

4 In addition to the general requirements listed in Chapter 2.

Example diagrams

The following figures provide examples of the possible location of bin storage areas for villas and townhouses. These examples are provided as a guide only, many other arrangements could be suitable and in accordance with better practice principles. Remember to consult with council engineers, planners and waste managers regarding development requirements specific to a local area.

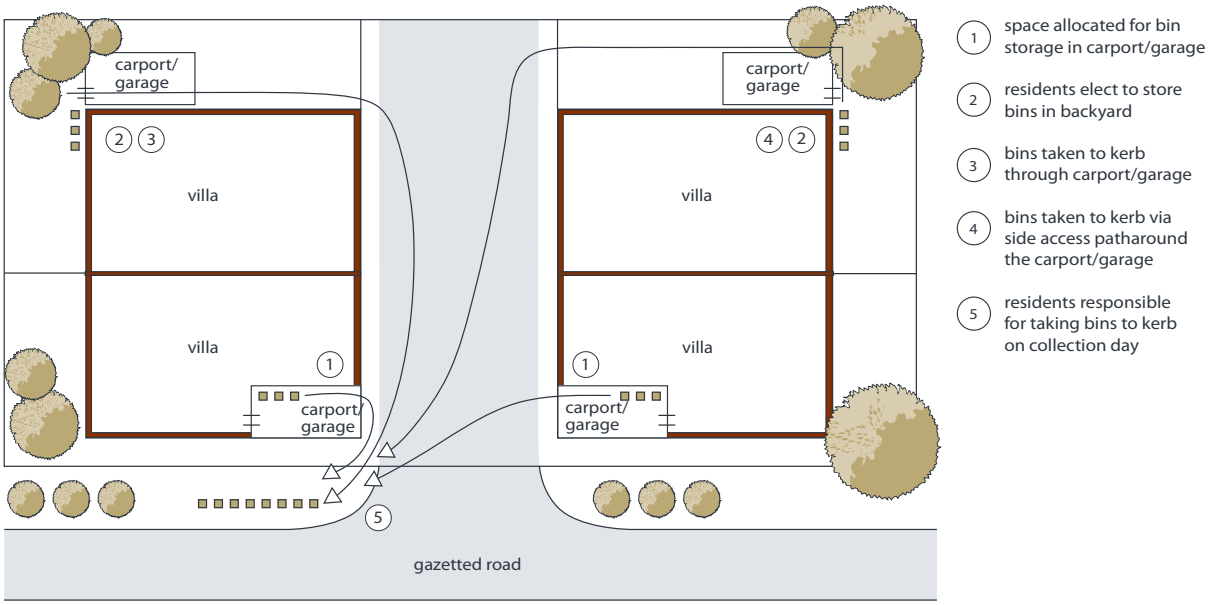


Figure 3-1: Example of Option 1: bins stored within each individual yard

This example demonstrates different bin storage locations that are possible for villas and townhouses where bins are stored within each individual property. Bins would be collected from the kerbside, with residents responsible for the movement of bins to and from the collection point on the collection day.

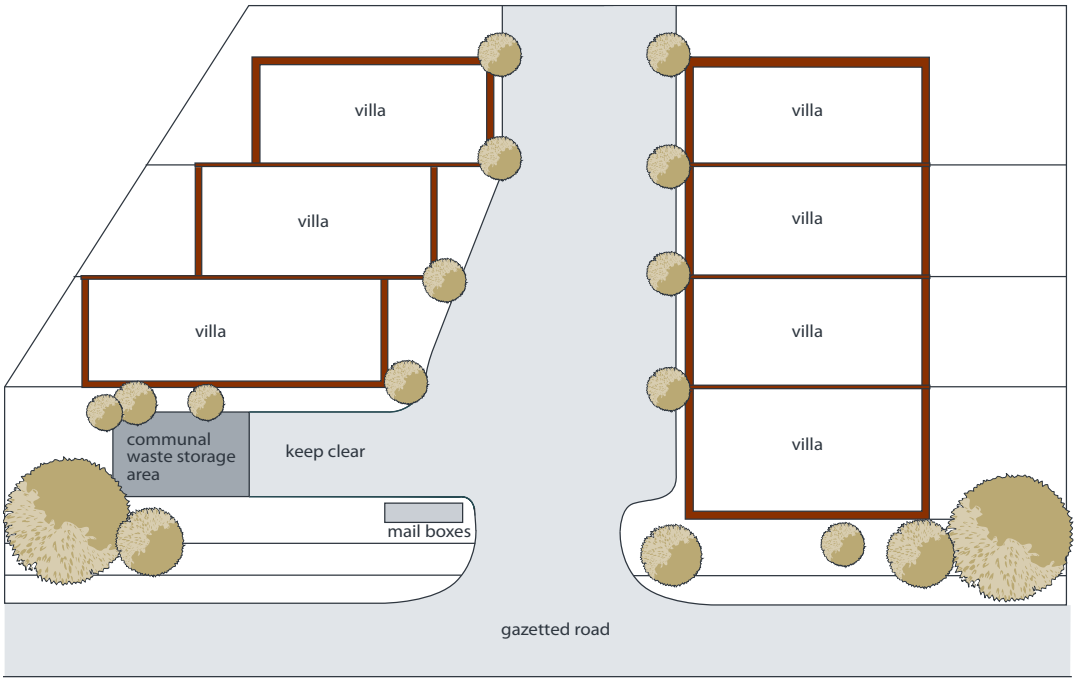


Figure 3-2 Example of Option 2: communal storage area for MGBs

This example demonstrates the possible location of a communal storage area servicing a villa complex. Residents would be required to take garbage and recycling to the communal storage area, which is conveniently located at the front of the property near the entrance to the development. A caretaker or resident(s) may be responsible for transferring bins from the communal storage area to and from the kerbside collection point on collection day, or there may be an arrangement in place for on-site servicing.

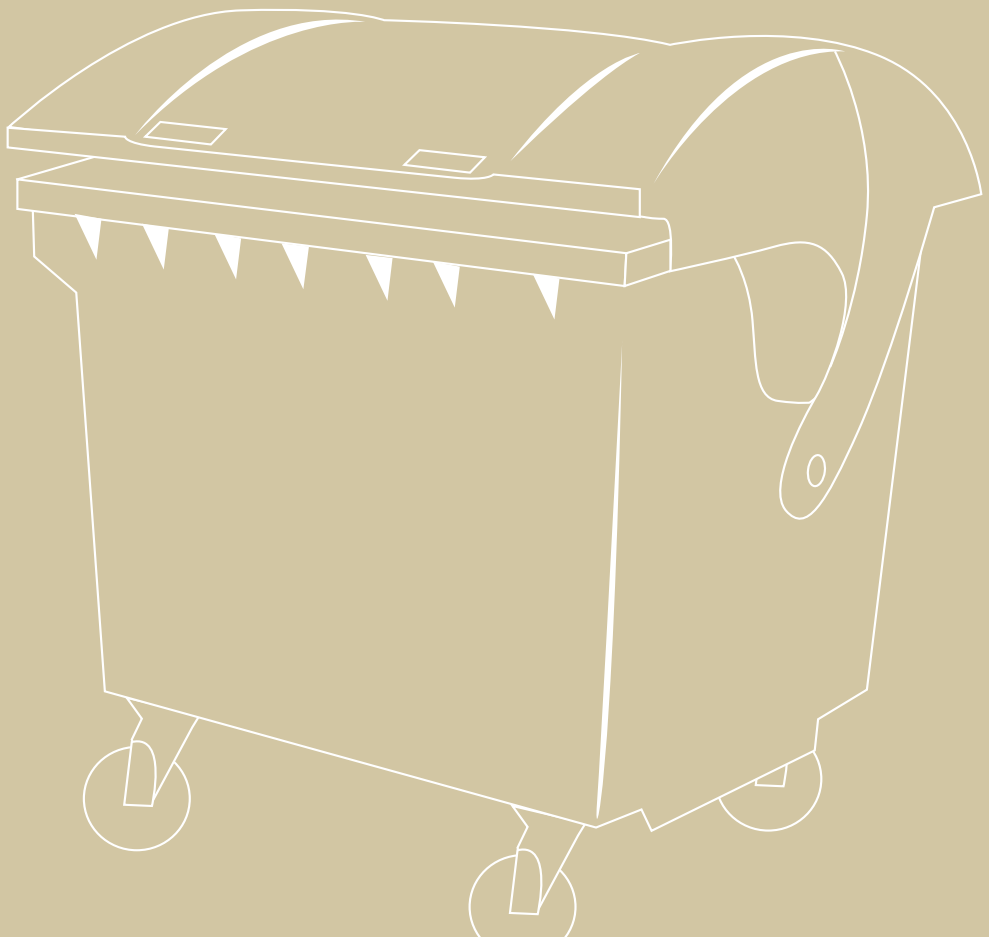
Figure 3-3: Example of Option 3: communal storage area for bulk bins and MGBs

This example demonstrates the possible location of a communal storage area servicing a villa complex that would enable the onsite collection of bulk bins. Residents would be required to take garbage and recycling to the communal storage area, which is conveniently located at the front of the property near the entrance to the development.

A caretaker or resident/s may be responsible for transferring recycling MGBs from the communal storage area to and from the kerbside collection point on collection day, or there may be an arrangement in place for onsite servicing. The bulk bins used for garbage collection would be collected onsite, with there being sufficient space for the collection vehicle to safely access the collection area, and then to reverse within the property so the vehicle could leave in a forward direction.

4.

Low-Rise Developments



Low-rise developments include 2-3 storey 'walk-ups' – small blocks of units (say 4-12 units), with separate dwellings on each storey. They are called walk-ups because, being less than four storeys high, they are not required to have a lift. Therefore, access to the dwellings on the upper storeys is by stairs.

Elements of this development type are also relevant to the residential component of hotels and serviced units.

Issues for consideration

The issues discussed in this chapter need to be taken into consideration in addition to those applying to all developments (as outlined in Section 2).

Better practice garbage and recycling systems and services

Examples of better practice waste management in low-rise developments include:

- **Option 1:** use MGBs for garbage and recycling, with bins stored in a communal storage area. Council's waste management unit will be able to advise what the allocation of bins will be. However, a rule of thumb is one 240L bin of each type (ie garbage, recycling) per two units.
- **Option 2:** some councils in higher density areas offer a special service for MUDs, which may include bulk bins for garbage. Some councils may also provide bulk bins for recyclables, such as paper and cardboard, elsewhere the use of MGBs is common for either source-separated or commingled recyclables. Bulk bins and/or MGBs would be stored in a communal storage area.

The main features of the above systems and their advantages and disadvantages are further outlined in Table 4-1. Note these systems are provided as examples only. Architects and designers who have good ideas should not be constrained by these examples.

Table 4-1 Low-Rise Development – Better Practice Examples

Option 1

240L MGBs used for garbage and recycling.

Communal storage area(s).

Advantages	Disadvantages	System requirements[5]
240L MGBs are generally easy to manoeuvre. 240L MGBs can be numbered and shared between allocated units. This would increase perceived levels of ownership, leading to increased accountability and appropriate behaviour of residents. Bins may be collected from the kerbside where there is sufficient room to do so safely and efficiently. Simple and easy to use system for both garbage disposal and recycling. Encourages participation in recycling through co-location of garbage and recycling bins.	A large number of MGBs may be required to service the development. This would require a subsequent large storage area (or a number of smaller areas). It would also require considerable time for ongoing management, including cleaning bins, and moving bins in and out from the collection point. Large numbers of bins placed out for collection on the kerbside can reduce amenity and pose risks to passers-by as a result of blocking pathways. They also pose a safety risk to collection operators if they are required to manually move bins around cars to the waiting collection vehicle. Recycling bins could be contaminated if there is an inadequate number of MGBs provided for garbage.	Design storage areas so that there is easy access for residents and caretakers to all MGBs without the need to move bins around. Identify suitable waste collection point(s) to collect the required number of MGBs that are free from potential obstacles, including parked cars (remember on recycling days there may be twice as many bins placed out for collection). Ensure responsibilities for cleaning communal areas and bins, educating residents in the appropriate use of systems and for moving bins in and out of the storage area for collection, are clearly identified. Display clear signs indicating appropriate use of recycling systems. Ensure adequate garbage capacity is provided to reduce contamination of recycling bins.

5 In addition to the general requirements listed in Chapter 2.

Option 2

Bulk bins for garbage and either 240L MGBs or bulk bins used for recyclables.

Communal storage area(s).

Advantages	Disadvantages	System requirements[5]
Could reduce footprint required for bin storage area. Could improve amenity compared with having a larger number of MGBs to service. Simple and easy to use system in regards to both garbage disposal and recycling. Encourages participation in recycling through co-location of garbage and recycling bins.	Decreased ownership as a result of sharing bins between greater numbers of units. Bulk bins can be heavy when full and pose a serious health and safety risk if they must be manually moved. Access for safe and efficient emptying of bulk bins may be limited. Onsite collection is generally required for bulk bins, which may not be available in some local areas. Recycling bins could be contaminated if there is an inadequate number of MGBs provided for garbage. Potentially higher contamination of recyclables if collected in bulk bins. Bulk bins are generally suitable for paper and cardboard collection, but not commingled recyclables or source-separated glass due to glass breakage and safety issues during collection.	Design storage areas so that there is easy access for residents and caretakers to all MGBs without the need to move bins around. Design the development to enable efficient onsite collection of bulk bins. Identify suitable waste collection point(s) for collection of bulk bins to eliminate or minimise manual handling as appropriate (refer to general requirements in Chapter 2). Ensure responsibilities for cleaning communal areas and bins, educating residents in the appropriate use of systems and for moving bins in and out of the storage area for collection are clearly identified. Display clear signs indicating appropriate use of recycling systems. Ensure adequate garbage capacity is provided to reduce contamination of recycling bins.

5 In addition to the general requirements listed in Chapter 2.

Storage – space and location

Communal bin areas

Waste bins may be stored in either one or more communal areas, including:

- external enclosures, such as a bin bay;
- enclosures located at ground floor parking level, within the building undercroft; or
- rooms located within the main building or basement.

Low-rise developments may be spread across a large area, encompassing a number of different low-rise blocks within a single development. Where this is the case, consideration should be given to incorporating more than one communal storage area within the development.

Bulky items storage

Consideration should be given to allowing space for residents to temporarily store unwanted bulky items, while awaiting disposal. This is important in guarding against residents illegally dumping this material on the footpath, thus detracting significantly from the quality and appearance of the development.

The space allocated for bulky items storage should consider the intended frequency of collection. Bulky items may be collected by council or contractors. Alternatively, tenants or building managers may make arrangements to take excess bulky items to a waste management centre.

If council provides a bulky items collection it is important to check the details of the service as the frequency and the types and sizes of materials collected may differ between Local Government Areas.

Provide space for the temporary storage of bulky items adjacent to the waste storage area.

Where on-site collection is not available, a caretaker should be employed to move bulky items from the interim storage area to the kerbside (or designated collection point).

Garbage and recycling collection point

Where low-rise developments are spread across a large area and incorporate more than one communal storage area, it may be appropriate to have more than one waste collection point for servicing the development (subject to street frontage and access).

For MGB-based waste collection systems, the waste collection point is typically from the kerb.

The collection point for bulk bins, if used in the development, should be selected such that it meets the general requirements specified in Section 2.7.

Example diagrams

The following figures provide examples of the location of bin storage areas for possible low-rise developments. These examples are provided as a guide only, many other arrangements could be suitable and in accordance with better practice principles. Remember to consult with council engineers, planners and waste managers regarding development requirements specific to a local area.

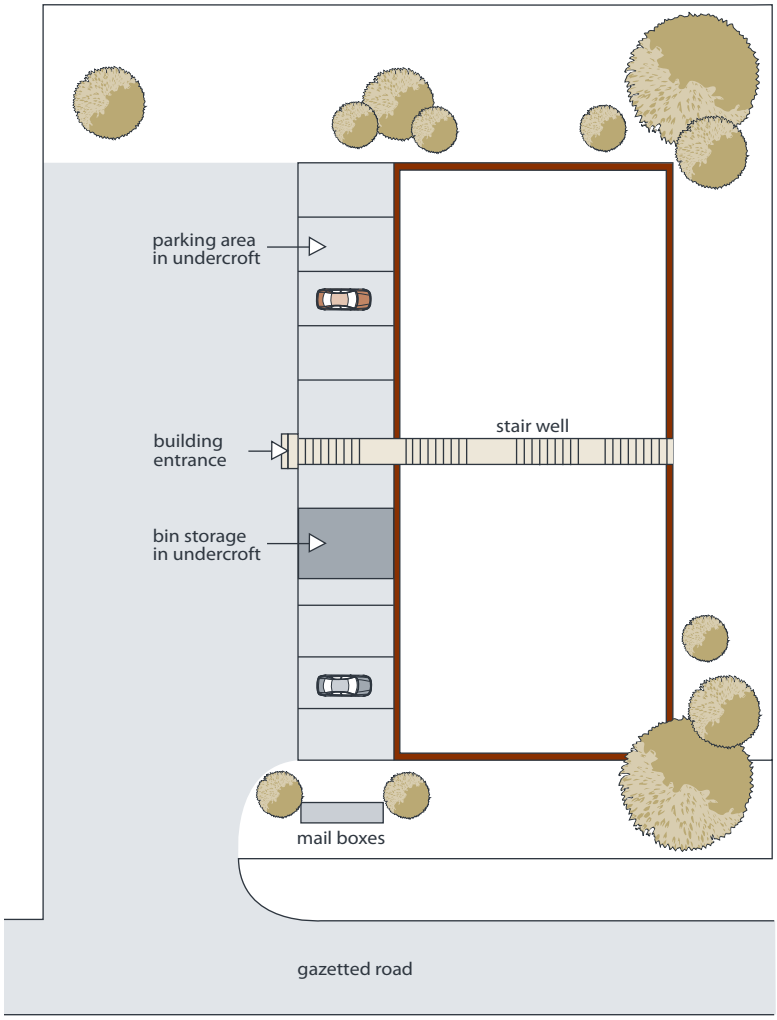


Figure 4-1 Example of Option 1: MGBs used for garbage and recycling

This example demonstrates locating a communal storage area at ground level, adjacent to resident parking. The storage area is easily accessible to residents using the main building entrance. In this example a caretaker may transfer bins to and from the kerbside for collection or an arrangement may be in place for onsite collection.

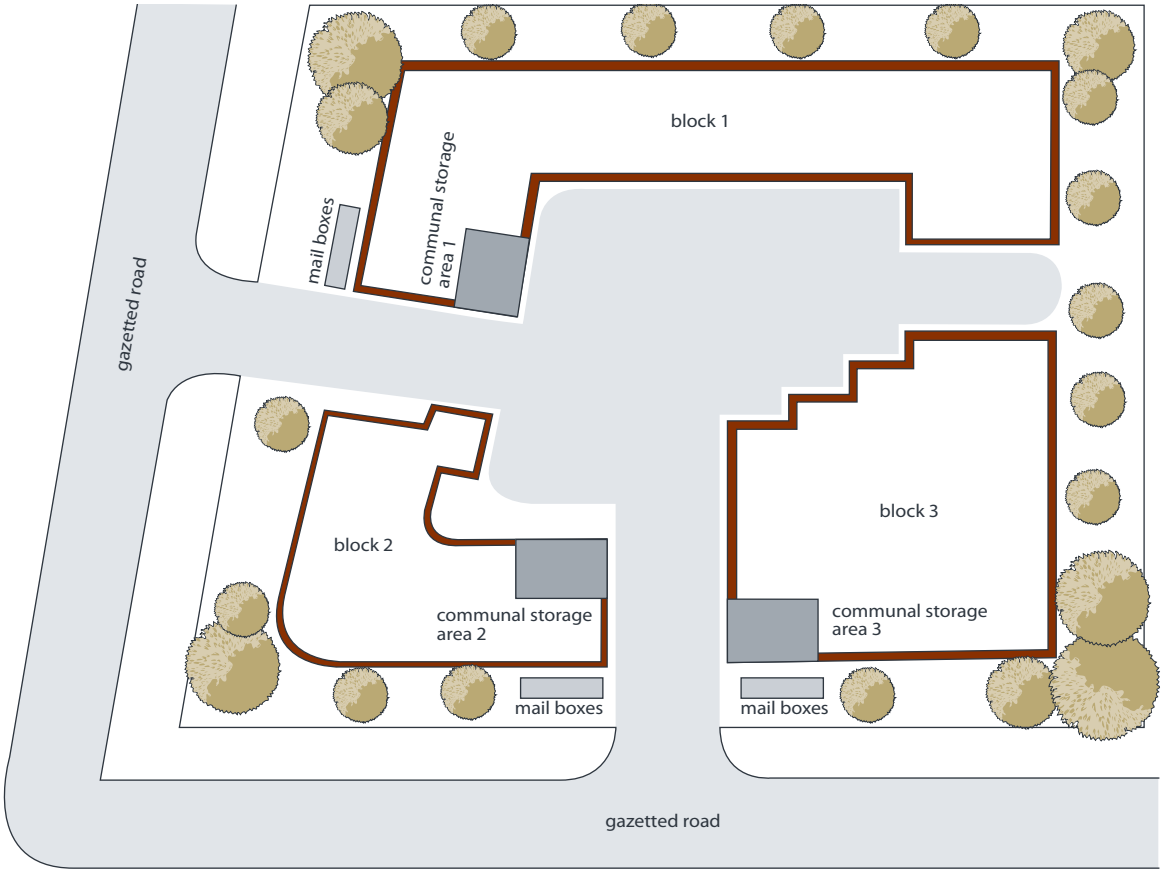
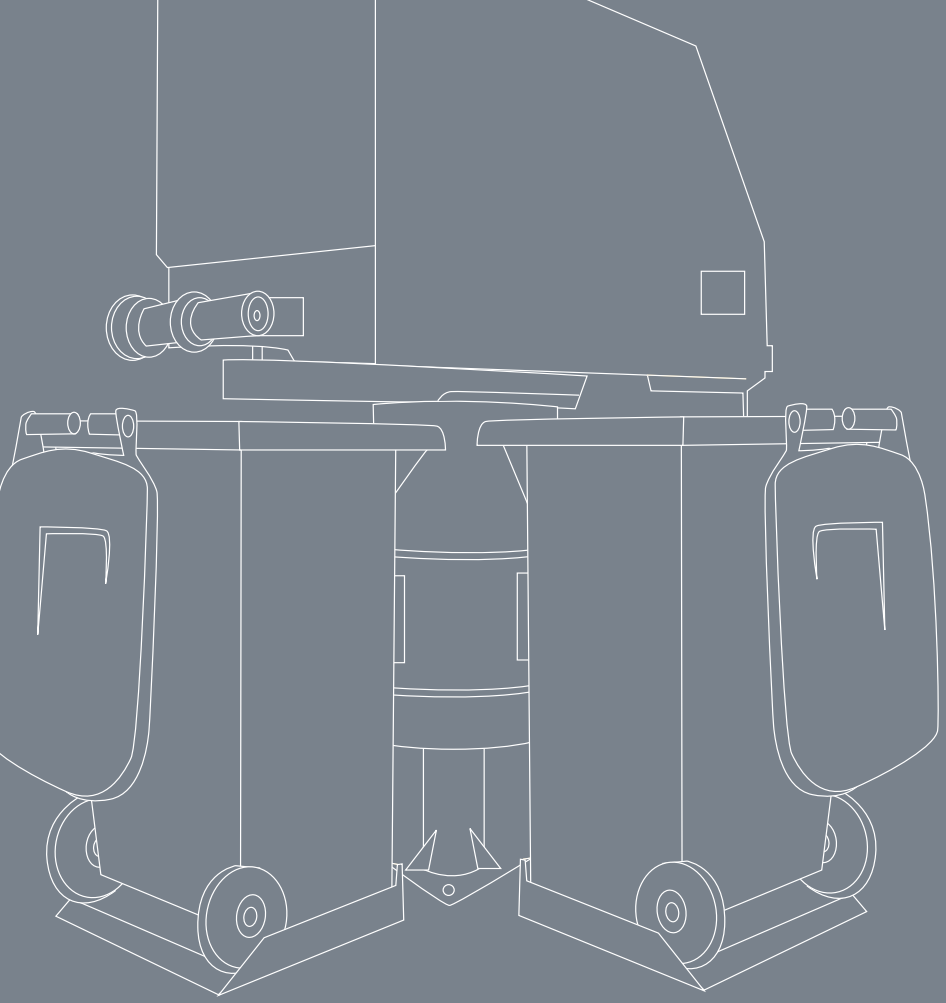


Figure 4-2 Example of Option 2: bulk bins used for garbage and MGBs for recycling

In the above example, multiple communal storage areas are used to service the overall development, with there being one communal storage area for each block of units. Dual street frontage enables bulk bins and MGBs to be used for collection, with bins spread between at least two collection points. It is possible to have on-site servicing of bins as the collection vehicle could enter and leave the development in a forward direction, using the dual access points.



5.

Residential Blocks 4–7 Storeys

Residential blocks of 4-7 storeys are medium-large blocks of units, with separate dwellings on each storey. Blocks of units with four or more storeys are required to have lift access to the dwellings on the upper levels.

Elements of this development type are also relevant to the residential component of hotels and serviced units.

Issues for consideration

The issues discussed in this chapter need to be taken into consideration in addition to those applying to all developments (as outlined in Section 2).

Better practice garbage and recycling systems and services

Examples of better practice waste management in developments with 4-7 storeys include:

- **Option 1:** use MGBs or bulk bins for garbage and recycling, with bins stored in a communal storage area (see note). Residents would be required to carry all waste and recyclables from their unit direct to the communal storage area.
- **Option 2:** provide room for interim storage of garbage (in MGBs) and recyclables (in MGBs or crates) on each floor in an interim storage area. A caretaker takes garbage and recyclables from the interim storage area to a communal storage area.

  Within the communal storage area, garbage and recycling may be stored in either bulk bins or MGBs (see note).
- **Option 3:** install a chute system for garbage, leading to a central garbage room at the bottom of the building. The chute can empty into either a bulk bin or an MGB carousel. However, there may also be a requirement for the chute to empty into a compactor (see Appendix B for discussion on chutes).

  Provide room for interim storage of recyclables is provided in an interim storage area (that also houses the garbage chute inlet hopper) on each floor. A caretaker takes recyclables from the interim storage area to a communal storage area where recyclables may be stored in either MGBs or bulk bins (see note).

Note: Bulk bins may be provided for recyclables, such as paper and cardboard, in some council areas, elsewhere the use of 240L MGBs is common for either source-separated or commingled recyclables.

In each case, council's waste management unit will advise what the allocation of garbage and recycling bins will be according to available MGB or bulk skip sizes.

The key features of the above systems and their advantages and disadvantages are further outlined in Table 5-1. Note these systems are provided as examples only. Architects and designers who have good ideas should not be constrained by these examples.

Table 5-1 Residential blocks 4-7 storeys – better practice examples

Option 1

Use of 240L MGBs or bulk bins for garbage and recycling, with bins stored in a communal storage area.

Residents would be required to carry all waste and recyclables from their unit direct to the communal storage area.

Advantages	Disadvantages	System requirements[6]
Simple and easy to use system in regards to both garbage disposal and recycling. Encourages participation in recycling through co-location of garbage and recycling bins. System is still able to work fairly well in the absence of a full-time caretaker, as long as responsibility for moving bins to and from the collection point is clearly defined.	Less convenient to residents compared with other systems, as they are required to carry all garbage and recyclables down to the storage area. May lead to increased contamination of recyclables as residents often use plastic bags to carry their recycling to the waste area, and place both plastic bags and recycling in the recycling bin. Potential contamination of recycling bins if there is inadequate disposal capacity provided for garbage. ■ Residents carrying garbage and recycling down main lifts and stairwells if there is no service lift in the building could reduce amenity. If using MGBs: ■ A large number of MGBs may be required to service the development. This would require a subsequent large storage area (or a number of smaller areas). It would also require considerable time for ongoing management, including cleaning bins, and moving bins in and out from the collection point. ■ Large numbers of bins placed out for collection on the kerbside can reduce amenity and pose risks to pedestrians and motorists as a result of blocking pathways. It also poses a safety risk to collection operators if they have to manually move bins around cars to the waiting collection vehicle. If using bulk bins: ■ Decreased ownership as a result of sharing bins between greater numbers of units. ■ Access for safe and efficient emptying of bulk bins may be limited. ■ Bulk bins can be heavy when full and pose a serious health and safety risk if they must be manually moved. ■ Onsite collection is generally required, which may not be available in some local areas. ■ Potentially higher contamination of recycling if using bulk bins compared with MGBs for recyclables collection. ■ Bulk bins are generally suitable for paper and cardboard collection, but not commingled recyclables or source-separated glass due to glass breakage and safety issues during collection.	This option is really only viable in blocks with a smaller number of units. **Storage space and location** Locate communal storage areas so they are convenient for residents and servicing arrangements. Ensure adequate garbage capacity is provided to reduce contamination of recycling bins. **Access for residents and caretakers** Design storage areas so that there is easy access for residents and caretakers to all bins without the need to move bins around. **Access for collection** If using MGBs, identify suitable waste collection point(s) to collect the required number of MGBs that are free from potential obstacles, including parked cars (remember on recycling collection days there may be twice as many bins placed out for collection). If using bulk bins, design the development to enable efficient on-site collection of bulk bins. Identify suitable waste collection point(s) to collect bulk bins to eliminate or minimise manual handling as appropriate (refer general requirements in Chapter 2). **Ongoing management** Ensure responsibilities for cleaning communal areas and bins, educating residents in the appropriate use of systems and for moving bins in and out of the storage area for collection are clearly identified. Display clear signs indicating appropriate use of recycling systems.

6 In addition to the general requirements listed in Chapter 2.

Option 2

Room for interim storage of garbage and recyclables is provided on each floor in an interim storage area.

A caretaker takes garbage and recyclables from the interim storage area to a communal storage area.

MGBs or bulk bins for garbage and recycling used in communal storage area, into which waste from interim storage areas is emptied.

Advantages	Disadvantages	System requirements[6]
Simple and easy to use system in regards to both garbage disposal and recycling. Encourages participation in recycling through co-location of garbage and recycling facilities. Storage of smaller quantities of recyclables in each of the interim storage areas provides an opportunity for caretakers to more closely monitor contamination and identify repeat offenders or the need for further education.	Requires regular transfer of garbage and recycling from the interim storage area to the communal storage area. Residents may clutter the interim storage area with bulky unwanted items that then need to be removed by a caretaker or cleaning staff. This system requires a degree of ongoing management in transferring bins to and from the collection point on collection day, and keeping the interim storage areas and communal storage area clean. Recycling bins could be contaminated if there is inadequate disposal capacity provided for garbage in each interim storage area. Residents transporting garbage and recycling down main lifts and stairwells if there is no service lift in the building could reduce amenity. If using MGBs in the communal storage area: ■ A large number of MGBs may be required to service the development. This would require a subsequent large storage area (or a number of smaller areas). It would also require considerable time for ongoing management, including cleaning bins, and moving bins in and out from the collection point. ■ Large numbers of bins placed out for collection on the kerbside can reduce amenity and pose risks to pedestrians and motorists by blocking pathways. They also pose a safety risk to operators if they have to manually move bins around cars to the waiting collection vehicle.	**Storage space and location** Locate an interim storage area on each floor that would hold one or more MGBs for garbage and MGBs or crates for recyclables. The space allocated in the interim storage area should allow for the interim storage of at least two days' worth of garbage and recyclables from dwellings on each floor. Ensure adequate garbage capacity is provided to reduce contamination of recycling bins. **Access for residents and caretakers** Access for residents to waste facilities could be limited to the interim storage area on each floor and the bulky items storage area. This would assist in preventing theft and vandalism of bins in communal storage areas, and also prevents residents placing full bags of rubbish and other large items in the recycling bins. **Access for collection** If using MGBs, identify suitable waste collection point(s) to collect the required number of MGBS that are free from potential obstacles, including parked cars (remember on recycling collection days there may be twice as many bins placed out for collection). If using bulk bins, design the development so they can be efficiently collected on-site. Identify suitable waste collection point(s) for collection of bulk bins to eliminate or minimise manual handling as appropriate (refer general requirements in Chapter 2).

6 In addition to the general requirements listed in Chapter 2.

Option 2 cont...

Advantages	Disadvantages	System requirements[6]
	If using bulk bins in the communal storage area: ■ Decreased ownership as a result of sharing bins between greater numbers of units. ■ Access for safe and efficient emptying of bulk bins may be limited. ■ Bulk bins can be heavy when full and pose a serious health and safety risk if they need to be manually moved. ■ Onsite collection is generally required, which may not be available in some local areas. ■ Potentially higher contamination of recycling if using bulk bins compared with MGBs for recyclables collection. ■ Bulk bins are generally suitable for paper and cardboard collection, but not commingled recyclables or source-separated glass due to glass breakage and safety issues during collection.	**Occupational health and safety** Identify a suitable system to transfer garbage and recyclables from the interim storage areas, which minimises occupational health and safety risks and does not reduce amenity. If crates are used for storing recyclables, some kind of trolley may be necessary, and the storage room will need to accommodate manoeuvring the trolley. If the transfer of garbage from MGBs into bulk bins is required the system must minimise or eliminate any OH&S risks (see 5.4.1). **Ongoing management** Employment of a caretaker to regularly remove garbage and recyclables from the interim storage areas and transfer them to the communal storage area(s) is vital to the success of the system. Garbage and recycling bins (or crates) will need to be changed regularly and stored in a communal storage area on site between collections. It is recommended garbage and recyclables be transferred daily. Ensure responsibilities for cleaning communal areas and bins, educating residents in the appropriate use of systems and for moving bins in and out of the storage area for collection are clearly identified. Display clear signs indicating appropriate use of recycling systems.

6 In addition to the general requirements listed in Chapter 2.

Option 3

Install a chute system for garbage that leads to a central garbage room at the bottom of the building. The chute can empty into either a bulk bin or an MGB carousel. However, there may also be a requirement for the chute to empty into a compactor (see Appendix B for a discussion about chutes).

Room for interim storage of recyclables on each floor is provided in an interim storage area (that also houses the garbage chute hopper) on each floor.

A caretaker takes recyclables from the interim storage area to a communal storage area.

MGBs or bulk bins for recycling are used in the communal storage area, into which recyclables from interim storage areas are emptied

Advantages	Disadvantages	System requirements[6]
Simple and easy to use system for both garbage disposal and recycling. Encourages participation in recycling through co-location of garbage and recycling facilities. Interim storage of smaller quantities of recyclables in each of the interim storage areas provides an opportunity for caretakers to more closely monitor contamination and identify repeat offenders or the need for further education.	Requires regular transfer of recycling and bulky waste items (unsuitable for disposal in the chute) from the interim storage area to the communal storage area. Residents may clutter the interim storage area with bulky unwanted items that then need to be removed by a caretaker or cleaning staff. Chutes are not suitable to transfer recyclables or bulky items, therefore two means of transferring materials in each development are required (the chute and manual methods)[7]. Potential contamination of recycling bins if bulky items or other items that cannot fit down chutes are placed in the recycling stream. Residents transporting recycling down main lifts and stairwells if there is no service lift in the building could reduce amenity. This system requires a high degree of ongoing management in transferring bins to and from the collection point on collection day, keeping the interim storage areas and central garbage room clean, etc.	**Storage space and location** Locate an interim storage area on each floor to house the chute inlet hopper for the garbage chute and MGBs or crates for recyclables. Consult the chute manufacturer about space requirements for the chute opening. The space allocated in the interim storage area should allow for the storage of at least two days' worth of recyclables from all dwellings on the floor. **The interim storage area should:** ■ be large enough to accommodate sufficient MGBs/crates to store the recyclables generated over the entire period between collection days; or ■ have systems in place to empty the containers and transfer the materials to another area on-site in between collections. It is recommended that recyclables be transferred daily, where possible, to a central garbage area to avoid hygiene and dumping issues. Locate the garbage chute outlet in the central garbage room. The building caretaker should not be required to transfer garbage from one side of the building to the other to get it from the chute outlet to the garbage room. Where resident access is restricted to the garbage room, additional garbage MGBs should be located next to the recycling MGBs to avoid contamination of recyclables.

6 In addition to the general requirements listed in Chapter 2.

7 Chutes are not suitable to transfer recyclables because the drop generally results in the damage, or even destruction, of the recyclable material – particularly glass. In addition, cardboard could easily become stuck in the chute and cause a fire hazard. Other recyclables, such as paper and plastics, are also highly flammable. Therefore, having large quantities of recyclables stored at the bottom of a long shaft that runs the height of the building could constitute a fire hazard.

Option 3 cont...

Advantages	Disadvantages	System requirements[6]
Chutes enable transfer of garbage from the different floors within a development without the need to manually carry bags and bins up and down stairs and via lifts to the waste storage area. This increases convenience to residents and can result in improved amenity (due to reduced transfer of garbage in trafficable areas) if well managed.	Regular maintenance, including cleaning and unblocking chutes, is likely to be required. Regular inspection of the waste room into which the chute empties is also required to ensure bins do not become overfull. Where chutes discharge into a compaction unit, the compacted waste bins can become very heavy and increase occupational health and safety risks. Compacted waste may also get jammed in the base of the bins making it difficult to empty the contents. If using bulk bins in the communal storage area: ■ Access for safe and efficient emptying of bulk bins may be limited. ■ Bulk bins can be heavy when full and pose a serious health and safety risk if needing to be manually moved. ■ Onsite collection is generally required, which may not be available in some local areas. ■ Potentially higher contamination of recycling if using bulk bins compared with MGBs for recyclables collection. ■ Bulk bins are generally suitable for paper and cardboard collection, but not commingled recyclables or source separated glass due to glass breakage and safety issues during collection.	**Access for residents and caretakers** Access for residents to waste facilities could be limited to the interim storage area on each floor and the bulky items storage area. This would prevent theft and vandalism of bins in communal storage areas, and also prevents residents from placing full bags of rubbish and other large items in the recycling bins. Resident access should be restricted, for safety reasons, into garbage rooms where chutes empty. **Access for collection** If using MGBs, identify suitable waste collection point(s) to collect the number of MGBs required that are free from potential obstacles, including parked cars (remember on recycling days there may be twice as many bins placed out for collection). If using bulk bins, design the development so they can be efficiently collected on-site. Identify suitable waste collection point(s) for collection of bulk bins to eliminate or minimise manual handling as appropriate (refer general requirements in Chapter 2). **Occupational health and safety** Identify a suitable system to transfer recyclables from the interim storage areas to the communal storage area that minimises occupational health and safety risks and does not reduce amenity. If crates are used for storing recyclables, some kind of trolley may be necessary, and the storage room will need to accommodate manoeuvring the trolley. **Ongoing management** Employment of a caretaker is vital to the success of the system for the regular removal of recyclables from the interim storage areas and transfer to the communal storage area(s). Install clear signs indicating appropriate use of recycling systems. Provide residents with ongoing education in the correct use of the chute, and the need to keep bulky items and recyclables out of the chute system. Ensure that if waste is compacted it does not result in overloading the bins. Regular maintenance, including cleaning and possibly unblocking chutes. Regularly inspect the room into which the waste chute empties to ensure bins do not become overfull.

6 In addition to the general requirements listed in Chapter 2.

Storage – space and location

Communal bin areas

It is essential to provide, at some location in the building, sufficient space to store all garbage and recycling likely to be generated in the period between collection days and the equipment used to manage and store it. There may be more than one communal storage point.

Bulky items storage

Consideration should be given to allowing space for residents to temporarily store unwanted bulky items, while awaiting disposal. This is important in guarding against residents illegally dumping this material on the footpath, thus detracting significantly from the quality and appearance of the development.

The space allocated to store bulky items should consider the intended frequency of collection. Bulky items may be collected by council or contractors. Alternatively, tenants or building managers may make arrangements to take excess bulky items to a waste management centre.

If council provides a bulky items collection it is important to check the details of the service as the frequency and the types and sizes of materials collected may differ between Local Government Areas.

Provide space to temporarily store bulky items adjacent to the waste storage area.

Where on-site collection is not available, a caretaker should be employed to move bulky items from the interim storage area to the kerbside (or designated collection point).

Supporting infrastructure

Trolleys to accommodate recycling crates

Identify a suitable system to transfer recyclables from the interim storage areas that minimises occupational health and safety risks and does not reduce amenity.

If crates are used for storing recyclables, some kind of trolley may be necessary, and the storage room will need to accommodate manoeuvring the trolley.

Bin lifters

If MGBs containing garbage or recycling have to be emptied into bulk bins, provide equipment to eliminate the need to manually lift and empty the bin.

In this situation, the waste storage area design needs to incorporate sufficient space to locate and operate the lifting device. The lifting device should be fitted with safety features to prevent injury to operators, and should be secured to prevent use by unauthorised persons (residents).

The cost of procuring and maintaining the bin lifter and the employment of a caretaker to operate it should be considered and factored into the ongoing management of the development.

A further cost to be considered may be the requirement to purchase an additional set of bins. Most councils will only provide one set of bins to a development (ie MGBs or bulk bins, but not both); therefore, if it is proposed to empty waste from MGBs into bulk bins, an additional set of bins may be required.

Further information about bin lifters and their potential application in MUDs is included in Appendix B.

Service lifts

Where a development incorporates interim storage areas on each level, it is recommended that a service lift also be provided to enable the transfer of materials from the compartment to the communal storage area.

Access

If vandalism or waste dumping is likely to be serious problem, consideration should be given to having a secure centralised lockup to store bulky items.

Ongoing management

All waste management systems in 4-7 storey residential buildings require some degree of ongoing management. A caretaker or manager is recommended for all 4-7 storey residential buildings to maintain clean waste storage areas and keep them free of dumped rubbish, to ensure new residents are aware of the waste management arrangements and to liaise with the council or collection contractor.

Where systems use interim storage areas on each floor, a caretaker is definitely required to manage the transfer of waste and/or recycling from interim storage areas on each floor to communal storage areas and/or to the collection point. A dedicated caretaker will need to be employed for these functions, with the cost factored into the ongoing management of the development.

Conditions of consent can require that a development comply with the submitted and approved Waste Management Plan for the development.[8] If a caretaker is required, this may be detailed in the Waste Management Plan and employment of a caretaker may then form part of the conditions of consent, which must be adhered to.

8 **Chutes are not suitable to transfer recyclables** because the drop generally results in the damage, or even destruction, of the recyclable material – particularly glass. In addition, cardboard could easily become stuck in the chute and cause a fire hazard. Other recyclables, such as paper and plastics, are also highly flammable. Therefore, having large quantities of recyclables stored at the bottom of a long shaft that runs the height of the building could constitute a fire hazard.

Example diagrams

The following figures provide examples of the location of bin storage areas for possible 4-7 storey developments. These examples are provided as a guide only, many other arrangements could be suitable and in accordance with better practice principles. Remember to consult with council engineers, planners and waste managers regarding development requirements specific to a local area.

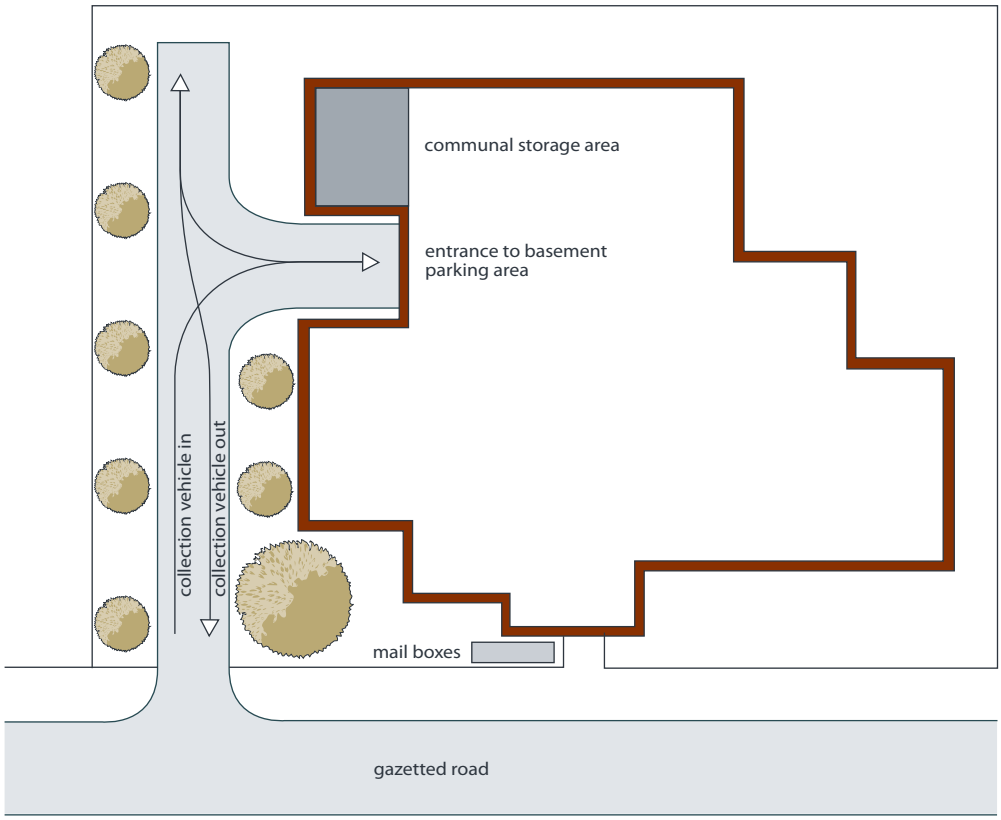


Figure 5-1 Example of Option 1 or Option 2

This example demonstrates locating a communal storage area for a 4-7 storey MUD at the rear of the development, but adjacent to the car park entrance so it is conveniently accessible and visible to car park users. In this example there is sufficient turning space incorporated in the driveway design to accommodate a waste collection vehicle making a three-point turn to allow on-site collection of bins. The collection vehicle would enter the property in a forward direction, nose into the start of the car park entrance driveway, reverse to the area adjacent to the bin storage area where collection would take place and leave the property in a forward direction.

Alternatively, depending on the number and size of bins used in this development, and the distance between the storage area and kerbside, it may also have been possible to arrange for the kerbside collection of bins. In this case, a caretaker would need to be employed to manage the movement of bins to and from the collection point and storage area.

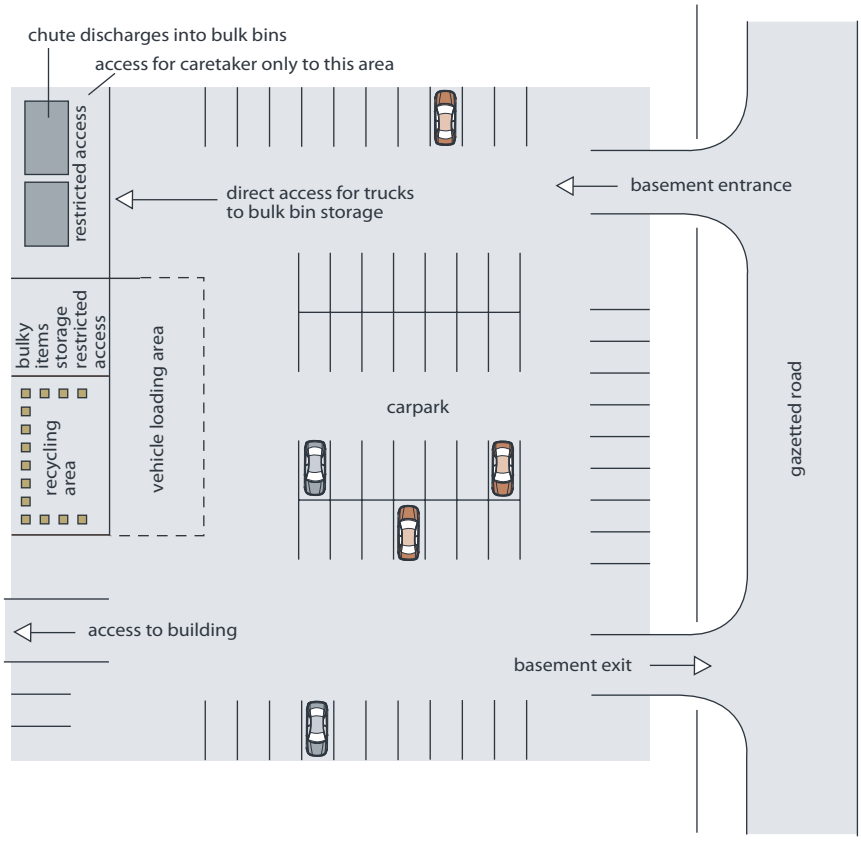


Figure 5-2 Example of Option 3: use chute for garbage and MGBs for recycling

This example demonstrates onsite collection of bulk garbage bins and MGB recycling bins from the basement of a 4-7-storey building. There is no access to the bulk bin storage area for residents, however, they can access the recycling and bulky waste storage areas.

Direct access is provided for the garbage collection vehicle to drive forward up to the bulk bin storage area and use an overhead lift and empty the garbage. The garbage collection vehicle would then proceed to drive through the car park and leave the basement, always moving in a forward direction.

The recycling collection vehicle would enter the basement and proceed to directly in front of the recycling storage area. Sufficient space has been provided to make the collection without obstructing traffic flow through the car park. This example assumes recycling bins are wheeled from the storage area to a rear-loading collection vehicle. The vehicle would then leave the basement car park in a forward direction. Similarly, bulky waste would be moved from the bulky waste storage area to the waiting bulky waste collection vehicle at the time of collection.

***Note:** In the above example, additional MGBs for garbage would be available in the recycling area that are accessible to residents so as to prevent contamination of recyclables.*

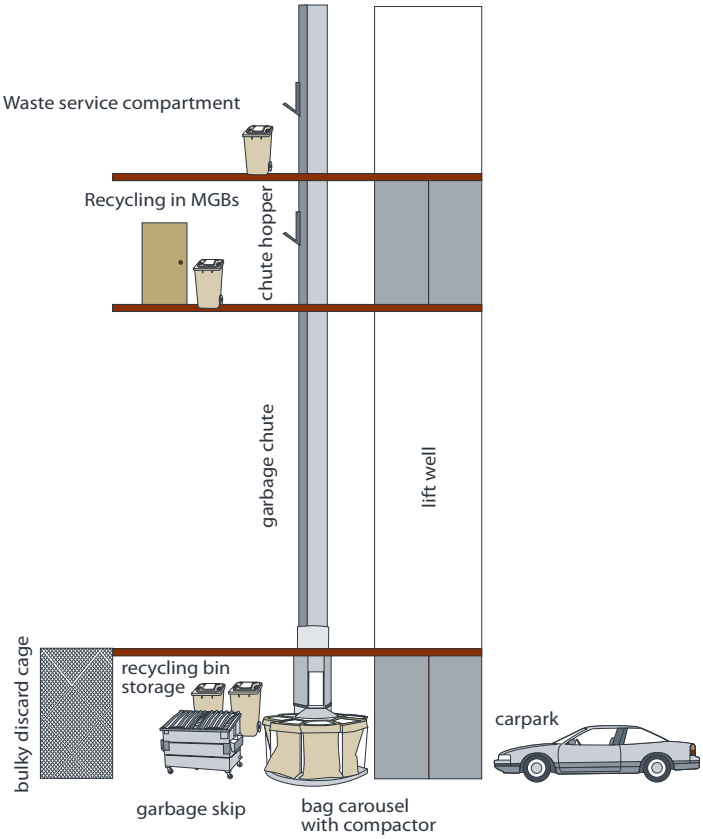
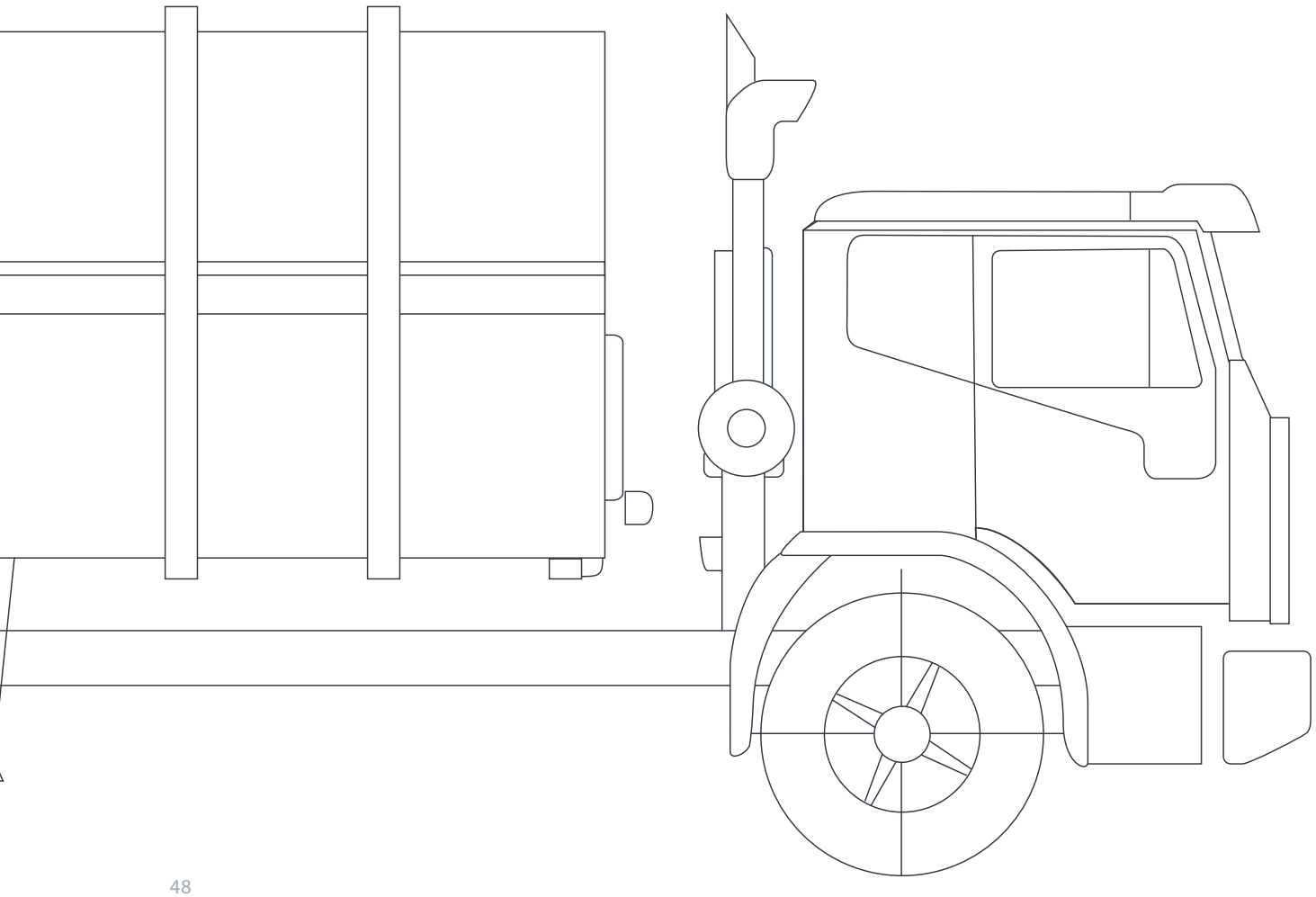
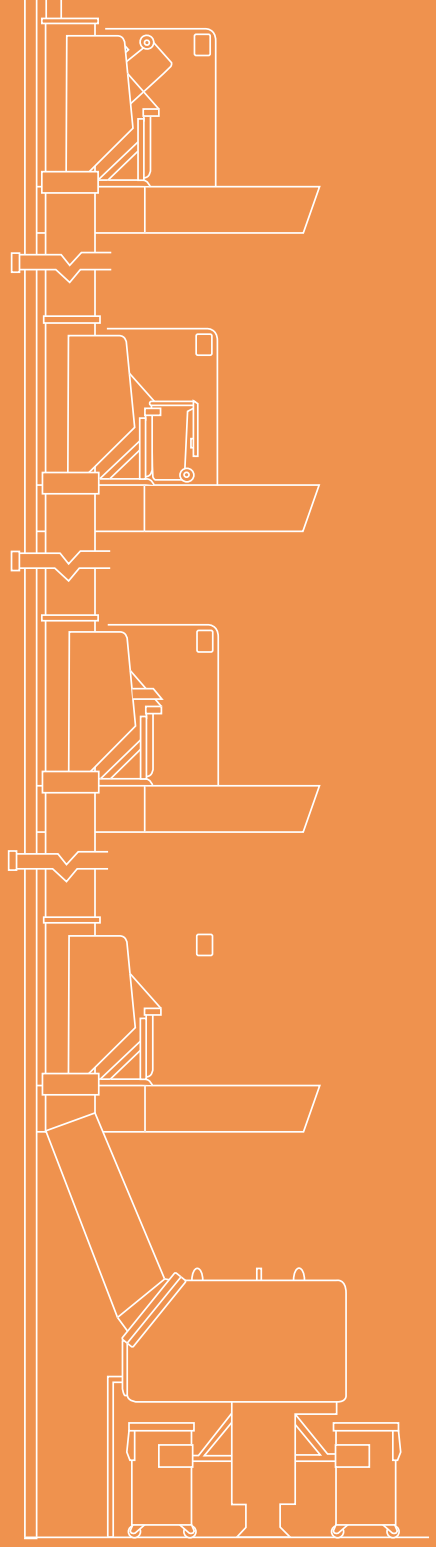


Figure 5-3 Cross-section of Option 3: interim storage area and chute system

This example demonstrates the general principles and operation of a garbage chute system supported by recycling bins located within the interim storage area on each level. Additional recyclables storage and storage for bulky waste items are provided in the car park of the building. The chute discharges into an MGB carousel (or possibly bulk skips), which are located in a room normally locked and not accessible to residents.

***Note:** In the above example, additional MGBs for garbage would be available in the recycling area that are accessible to residents so as to prevent contamination of recyclables.*





6.

High-Rise Residential Blocks More Than Seven Storeys

High-rise blocks are large blocks of units that are more than seven storeys high with separate dwellings on each storey. Blocks of units with four or more storeys are required to have lift access to the dwellings on the upper levels.

Elements of this development type are also relevant to the residential component of hotels and serviced units.

Issues for consideration

The issues discussed in this chapter need to be taken into consideration in addition to those applying to all developments (as outlined in Section 2).

Better practice garbage and recycling systems and services

Considerable care and consideration needs to be given to designing a waste management system for high-rise buildings. Due to the large amount of material generated, poor design decisions can have serious repercussions on the management of the building throughout its lifetime.

Examples of better practice waste management in high-rise developments are:

- **Option 1:** provide room for interim storage of garbage (in MGBs) and recyclables (in MGBs or crates) on each floor in an interim storage area. A caretaker takes garbage and recyclables from the interim storage area to a communal storage area.

  Within the communal storage area, garbage and recycling may be stored in either bulk bins or MGBs (see note).

- **Option 2:** install a chute system for garbage that leads to a central garbage room at the bottom of the building. The chute can empty into either a bulk bin or an MGB carousel. However, there may also be a requirement for the chute to empty into a compactor (see Appendix B for a discussion about chutes).

  Room for interim storage of recyclables is provided in an interim storage area (which also houses the garbage chute inlet hopper) on each floor. A caretaker takes recyclables from the interim storage area to a communal storage area where recyclables may be stored in either MGBs or bulk bins (see note).

Note: bulk bins may be provided for recyclables, such as paper and cardboard, in some council areas, elsewhere the use of 240L MGBs is common for either source separated or commingled recyclables.

In each case, council's waste management unit will advise what the allocation of bins will be, according to available MGB or bulk bin sizes.

The main features of the above systems and their advantages and disadvantages are further outlined in Table 6-1. Note these systems are provided as examples only. Architects and designers who have good innovative ideas that achieve a better outcome should not feel constrained by the following examples.

Table 6-1 High-rise development – better practice examples

Option 1

Provide room for interim storage of garbage and recyclables on each floor in an interim storage area.

A caretaker takes garbage and recyclables from the interim storage area to a communal storage area.

MGBs or bulk bins for garbage and recycling used in a communal storage area, into which waste from interim storage areas is emptied.

Advantages	Disadvantages	System requirements[9]
Simple and easy for residents to use system for both garbage disposal and recycling. Encourages participation in recycling through co-location of garbage and recycling facilities. Interim storage of smaller quantities of recyclables in each of the interim storage areas provides an opportunity for caretakers to more closely monitor system performance, contamination and identify repeat offenders or the need for further education.	Requires regular transfer of garbage and recycling from the interim storage area to the communal storage area. Residents may clutter the interim storage area with bulky unwanted items that then need to be removed by a caretaker or cleaning staff. This system requires a degree of on-going management in transferring bins to and from the collection point on collection day, keeping the interim storage areas and central garbage room clean etc. Recycling bins could be contaminated if there is inadequate disposal capacity provided for garbage in each interim storage area. Residents transporting recycling down main lifts and stairwells if there is no service lift in the building could affect amenity.	**Storage space and location** Locate an interim storage area on each floor that would hold one or more MGBs for garbage and MGBs or crates for recyclables. The space allocated in the interim storage area should allow for the interim storage of at least two days' worth of garbage and recyclables from dwellings on each floor. Ensure adequate garbage capacity is provided to reduce contamination of recycling bins. **Access for residents and caretakers** Access for residents to waste facilities could be limited to the interim storage area on each floor and the bulky items storage area. This would prevent theft and vandalism of bins in communal storage areas, and also prevents residents placing full bags of rubbish and other large items in the recycling bins. **Access for collection** If using MGBs, identify suitable waste collection point(s) to collect the required number of MGBs that are free from potential obstacles, including parked cars (remember on recycling collection days there may be twice as many bins placed out for collection). If using bulk bins, design the development so they can be efficiently collected on-site. Identify suitable waste collection point(s) to collect bulk bins to eliminate or minimise manual handling as appropriate (refer to general requirements in Chapter 2).

9 In addition to the general requirements listed in Chapter 2.

Advantages	Disadvantages	System requirements[9]
	If using MGBs in the communal storage area: ■ A large number of MGBs from high-rise developments are likely to be acceptable to most councils and may be required to service the development. This would require a subsequent large storage area (or a number of smaller areas). It would also require considerable time for ongoing management, including cleaning bins, and moving bins to and from the collection point. ■ Large numbers of bins placed out for collection on the kerbside can reduce amenity and pose risks to passers-by as a result of blocked pathways. It also poses a safety risk to collection operators if they have to manually move bins around cars to the waiting collection vehicle. If using bulk bins in the communal storage area: ■ Decreased ownership as a result of sharing bins between greater numbers of units. ■ Access for safe and efficient emptying of bulk bins may be limited. ■ Bulk bins can be heavy when full and pose a serious health and safety risk if they require to be manually moved. ■ Onsite collection is generally required, which may not be available in some local areas. ■ Potentially higher contamination of recycling if using bulk bins compared with MGBs for recyclables collection. ■ Bulk bins are generally suitable for paper and cardboard collection, but not commingled recyclables or source-separated glass due to glass breakage and safety issues during collection.	**Occupational health and safety** Identify a suitable system to transfer garbage and recyclables from the interim storage areas that minimises occupational health and safety risks and does not reduce amenity. If crates are used for storing recyclables, some kind of trolley may be necessary, and the storage room will need to accommodate manoeuvring the trolley. If the transfer of garbage from MGBs into bulk bins is required the system must minimise or eliminate any OH&S risks (see 6.5.1). **Ongoing management** Employment of a caretaker to regularly remove garbage and recyclables from the interim storage areas and transfer to the communal storage area(s) is vital to the success of the system. Garbage and recycling bins (or crates) will need to be changed regularly and stored in another communal storage area on site between collections. It is recommended that garbage and recyclables be transferred daily. Ensure responsibilities for cleaning communal areas and bins, educating residents in the appropriate use of systems and for moving bins in and out of the storage area for collection are clearly identified. Display clear signs indicating the appropriate use of the recycling systems.

9 In addition to the general requirements listed in Chapter 2.

Option 2

Install a chute system for garbage, leading to a central garbage room at the bottom of the building. The chute can empty into either a bulk bin or an MGB carousel. However, there may also be a requirement for the chute to empty into a compactor (see Appendix B for a discussion about chutes).

Room for interim storage of recyclables on each floor is provided in an interim storage area (that also houses the garbage chute hopper) on each floor.

A caretaker takes recyclables from the interim storage area to a communal storage area.

MGBs or bulk bins for recycling are used in the communal storage area, into which recyclables from interim storage areas are emptied.

Advantages	Disadvantages	System requirements[9]
Simple and easy to use system for both garbage disposal and recycling. Encourages participation in recycling through co-location of garbage and recycling facilities. Interim storage of smaller quantities of recyclables in each of the interim storage areas provides an opportunity for caretakers to more closely monitor contamination and identify repeat offenders or the need for further education. Chutes enable the transfer of garbage from the different floors within a development without the need to manually carry bags and bins up and down stairs and via lifts to the waste storage area. This increases convenience to residents and if well managed can result in improved amenity (due to reduced transfer of garbage in trafficable areas).	Requires the regular transfer of recycling and bulky waste items (unsuitable for disposal in the chute) from the interim storage area to the communal storage area. Residents may clutter the interim storage area with bulky unwanted items that then need to be removed by a caretaker or cleaning staff. Chutes are not suitable to transfer recyclables or bulky items, therefore two means of transferring materials in each development are required (the chute and manual methods)[10]. Recycling bins could be contaminated if bulky items or other items that cannot fit down chutes are placed in the recycling stream. Residents transporting recycling down main lifts and stairwells if there is no service lift in the building could affect amenity. This system requires a degree of ongoing management in transferring bins to and from the collection point on collection day, keeping the interim storage areas and central garbage room clean etc. Regular maintenance, including cleaning and unblocking chutes is likely to be required. Regular inspection of the waste room into which waste discharges is also required to ensure bins do not become overfull.	**Storage space and location** Locate an interim storage area on each floor housing the chute inlet hopper for the garbage chute and MGBs or crates for recyclables. Consult the chute manufacturer about space requirements for the chute opening. The space allocated in the storage area should allow for the interim storage of at least two days' worth of recyclables from all dwellings on the floor. The interim storage area should: ■ be large enough to accommodate sufficient MGBs/crates to store the recyclables generated over the entire period between collection days; or ■ have systems in place to empty the containers and transfer the materials to another area on-site in between collections. It is recommended that recyclables be transferred daily, where possible, to a central garbage area to avoid hygiene and dumping concerns. Locate the garbage chute outlet in the central garbage room. The building caretaker should not be required to transfer garbage from one side of the building to the other to get it from the chute outlet to the garbage room. Where resident access is restricted to the garbage room, locate additional garbage MGBs next to the recycling MGBs to avoid contamination of recyclables.

9 In addition to the general requirements listed in Chapter 2.

10 **Chutes are not suitable to transfer recyclables** because the drop generally results in the damage, or even destruction, of the recyclable material – particularly glass. In addition, cardboard could easily become stuck in the chute and cause a fire hazard. Other recyclables, such as paper and plastics, are also highly flammable. Therefore, having large quantities of recyclables stored at the bottom of a long shaft that runs the height of the building could constitute a fire hazard.

Advantages	Disadvantages	System requirements[9]
	Where chutes discharge into a compaction unit, the compacted waste bins can become very heavy and increase occupational health and safety risks. Compacted waste may also get jammed in the base of the bins making it difficult to empty the contents. If using bulk bins in the communal storage area: ■ Access for safe and efficient emptying of bulk bins may be limited. ■ Bulk bins can be heavy when full and pose a serious health and safety risk if they have to be manually moved. ■ On-site collection is generally required, which may not be available in some local areas. ■ Potentially higher contamination of recycling if using bulk bins compared with MGBs for recyclables collection. ■ Bulk bins are generally suitable for paper and cardboard collection, but not commingled recyclables or source-separated glass due to glass breakage and safety issues during collection.	**Access for residents** For safety reasons, restrict resident access from garbage rooms where chutes empty (if applicable). **Ongoing management** Employment of a caretaker to regularly remove recyclables from the interim storage areas and transfer to the communal storage area(s) is vital to the success of the system. Display clear signs indicating appropriate use of recycling systems. Residents need ongoing eduction in the correct use of the chute, and the need to keep bulky items and recyclables out of the chute system. Ensure if waste compaction of waste is used, it does not overload bins. Regular maintenance, including cleaning and unblocking chutes. Regular inspection of the waste room into which waste discharges is required to ensure bins do not become overfull.

9 In addition to the general requirements listed in Chapter 2.

Storage – space and location

Communal bin areas

It is essential to provide, at appropriate locations in the building, sufficient space to store all garbage and recycling likely to be generated in the period between collection days and the equipment used to manage and store it. There may be more than one storage point.

Consideration needs to be given to how the bins are to be emptied and how much room will be required to manoeuvre the bins to where they will be emptied.

Bulky items storage

Given the number of dwelling units in high-rise buildings, there is an almost constant turnover of residents. Consideration should be given to allowing space for residents to temporarily store unwanted bulky items. Providing storage onsite for the disposal of bulky items is important in guarding against residents illegally dumping this material on the footpath, thus detracting significantly from the quality and appearance of the development. While education about available clean-up services can assist, serious dumping problems can occur if a substantial proportion of the building's population is transient.

The space allocated for bulky items storage should take into account the intended frequency of collection. Bulky items may be collected by council or contractors. Alternatively, tenants or building managers may make arrangements to take excess bulky items to a waste management centre.

If council provides a bulky items collection it is important to check the details of the service as the frequency and the types and sizes of materials collected may differ between Local Government Areas.

Provide space for the temporary storage of bulky items adjacent to the waste storage area.

Where on-site collection is not available, a caretaker should be employed to move bulky items from the interim storage area to the kerbside (or designated collection point).

Supporting infrastructure

Trolleys to accommodate recycling crates

Identify a suitable system to transfer recyclables from the interim storage areas that minimises occupational health and safety risks and does not reduce amenity.

If crates are used for storing recyclables, some kind of trolley may be necessary, and the storage room will need to accommodate manoeuvring the trolley.

Bin lifters

If there is a requirement to empty MGBs containing garbage or recycling into bulk bins, provide equipment to eliminate the need for manually lift and empty the bin.

In this situation the design of waste storage areas needs to incorporate sufficient space to locate and operate the lifting device. Fit the lifting device with safety features to prevent injury to operators, and secure it to prevent use by unauthorised persons (residents).

The cost of procuring and maintaining the bin lifter and employing a caretaker to operate it should be considered and factored into the ongoing management of the development.

A further cost to be considered may be the requirement to purchase an additional set of bins. Most councils will only provide one set of bins to a development (ie MGBs or bulk bins, but not both), therefore if it is proposed to empty waste from MGBs into bulk bins it may require an additional set of bins.

Further information about bin lifters and their potential application in MUDs is included in Appendix B.

Service lifts

Where a development incorporates interim storage areas on each level, it is recommended that a service lift also be provided to enable the transfer of materials from the compartment to the communal storage area.

Access

For residents

Access for residents to waste facilities should be limited to the interim storage area on each floor and the bulky items storage area. This prevents theft and vandalism of bins in communal storage areas, and also prevents residents placing large items in the recycling bins.

If vandalism or waste dumping is likely to be serious problem, consideration should be given to having a secure centralised lockup area for bulky items.

For collectors

If using MGBs, identify suitable waste collection point(s) to collect the required number of MGBs that are free from potential obstacles, including parked cars (remember on recycling days there may be twice as many bins placed out for collection).

If using bulk bins, design the development for their efficient on-site collection. Identify suitable waste collection point(s) to collect bulk bins to eliminate or minimise manual handling as appropriate (refer to general requirements in Chapter 2).

Ongoing management

Employment of a caretaker is vital to the success of waste management systems in high-rise developments. Caretakers are required to manage the regular removal of materials from the interim storage areas and their transfer to the communal storage area(s); transfer receptacles to the collection point; keep waste storage areas clean and free of dumped rubbish; ensure new residents are aware of the waste management arrangements; and liaise with the waste collection contractor.

A dedicated caretaker will need to be employed for these functions, with the cost factored into the ongoing management of the development.

Conditions of consent can require that a development comply with the submitted and approved Waste Management Plan for the development[11]. If a caretaker is required, this may be detailed in the Waste Management Plan and the continuous employment of a caretaker may then form part of the conditions of consent, which must be adhered to.

11 A Waste Management Plan is generally required as part of the documentation supporting a development application. Requirements for Waste Management Plans may vary between Local Government Areas.

Example diagrams

The following figures provide examples of the location of bin storage areas for possible high-rise developments. These examples are provided as a guide only, many other arrangements could be suitable and in accordance with better practice principles. Remember to consult with council engineers, planners and waste managers regarding development requirements specific to a local area.

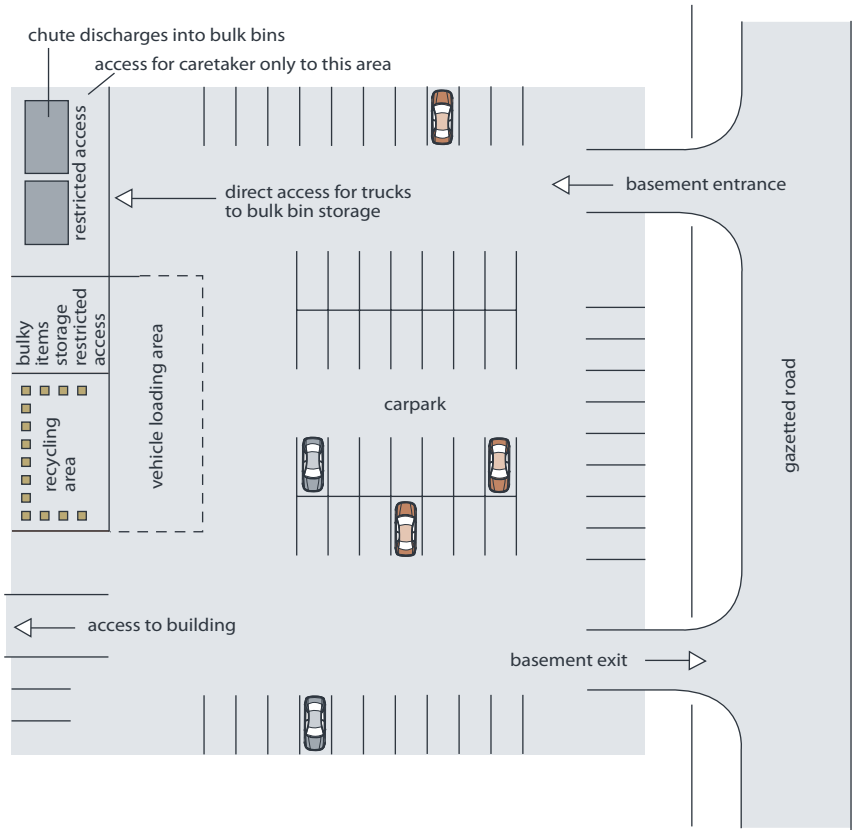


Figure 6-1: Example of Option 1 or Option 2

This example demonstrates onsite collection of either MGBs or bulk garbage bins and MGB recycling bins from the basement of a high-rise building. If a chute system was used, (as in Option 2), there would be no access to the garbage storage area for residents, however, residents could still access the recycling and bulky waste storage areas.

Direct access is provided for the garbage collection vehicle to drive forwards up to the bulk bin storage area and make an overhead lift and empty the garbage. The garbage collection vehicle would then proceed to drive through the car park and leave the basement, always moving in a forward direction.

The recycling collection vehicle would enter the basement and proceed to directly in front of the recycling storage area. Sufficient space has been provided for the collection to be made without obstructing traffic flow through the car park. This example assumes recycling bins are wheeled from the storage area to a rear-loading collection vehicle. The vehicle would then leave the basement car park in a forward direction. Similarly, bulky waste would be moved from the bulky waste storage area to the waiting bulky waste collection vehicle at the time of collection.

***Note:** In the above example, additional MGBs for garbage would be available in the recycling area so they are accessible to residents to prevent contamination of recyclables. In addition, it would be ensured that there was sufficient overhead clearance to allow the garbage truck to operate.*

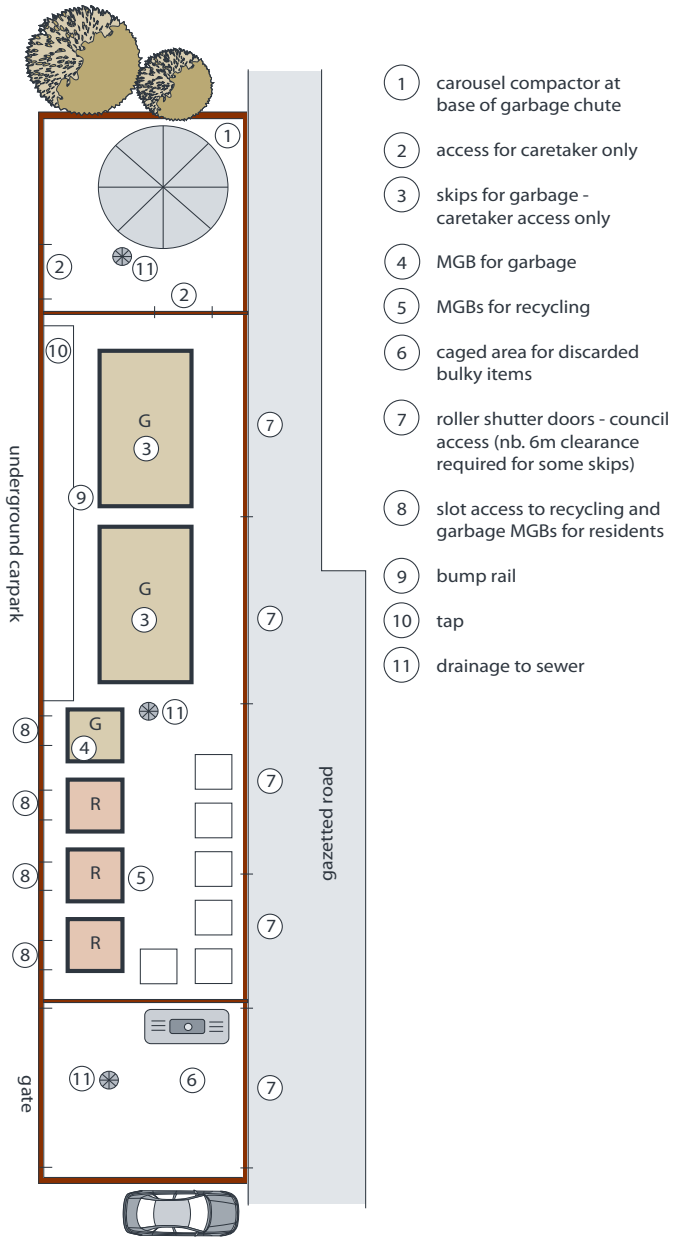


Figure 6-2 Example of Option 2: secure waste storage area for high-rise development

This example demonstrates a possible layout for a secure garbage area for a high-rise development. This type of arrangement may typically be located in a basement or underground car park.

In this example, access for residents to garbage and recycling facilities is limited to the interim storage area and chute inlet hopper on each floor. Access to rooms where the chute empties and extra bins are stored is restricted to the caretaker. This is for safety reasons and to discourage dumping.

Secure recycling bins are also included in the lockable garbage room in an effort to prevent vandalism. In this example the recycling bins are kept in a locked room or cage and access to the recycling bins for residents is by a slot in wall of the room or cage. This prevents theft and vandalism of the bins, and also prevents residents placing full bags of rubbish and other large items in the recycling bins (as they cannot fit through the slot).

Additional storage for bulky waste items and an area to wash down bins are incorporated in the facilities.

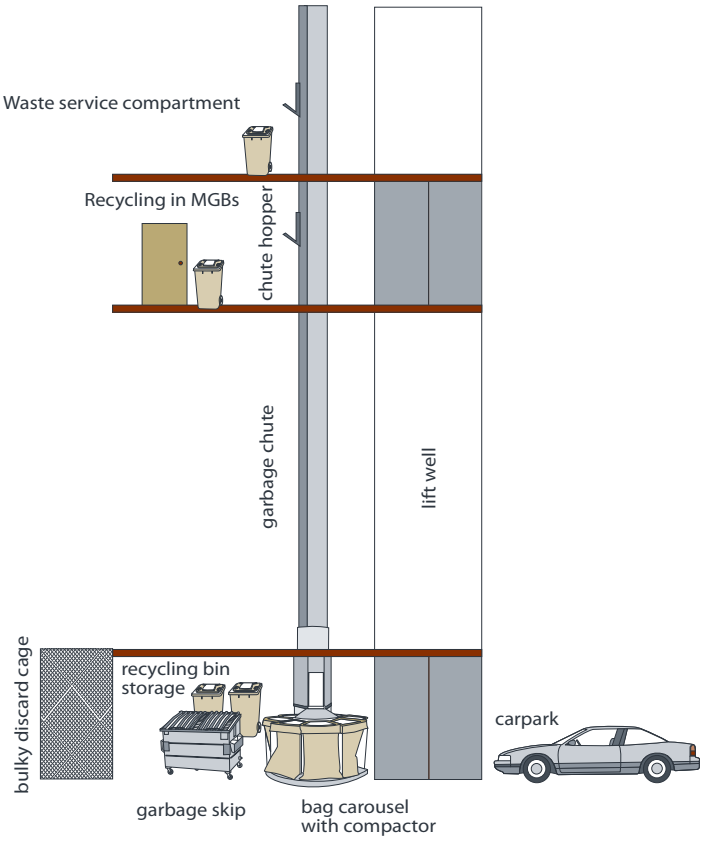
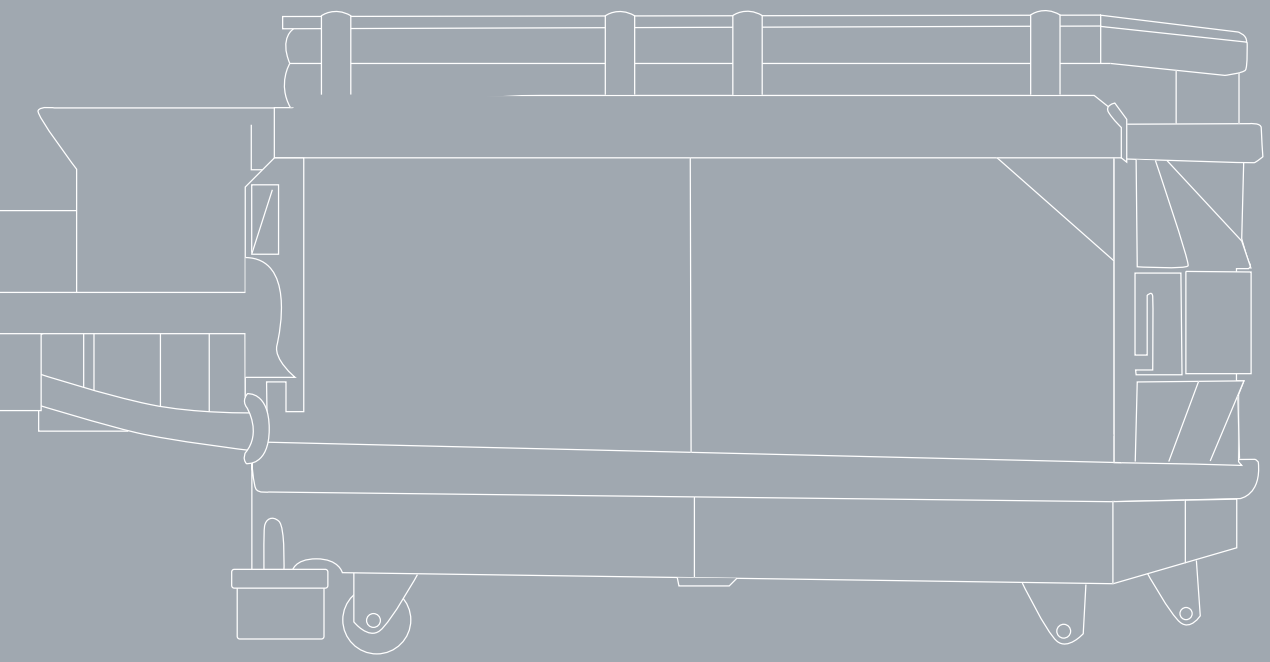


Figure 6-3 Cross-section of Option 2: example interim storage area and chute system

This example demonstrates the general principles and operation of a garbage chute system supported by recycling bins located within the interim storage area on each level. Additional storage for recyclables and bulky waste items is provided in the building's car park. The chute discharges into an MGB carousel (or possibly bulk skips), which are located in a room normally locked and not accessible to residents.

***Note:** In the above example, additional MGBs for garbage would be available in the recycling area to prevent contamination of recyclables.*



7.

Mixed Use Development

Mixed use developments incorporate residential dwellings and commercial establishments within the same development and would include, for example, shop-top housing.

Mixed use developments may be small, for example, two storeys incorporating a residential property on the top floor and commercial outlet on ground level, or they may be large, with one or more levels of commercial property beneath low-rise or larger medium to high-rise residential developments.

Issues for consideration

The issues discussed in this chapter need to be taken into consideration in addition to those applying to all developments (as outlined in Section 2).

Key problems

There are often serious problems with commercial tenants using the residential waste facilities (or vice versa) in mixed use developments, which can cause overloading of the waste management system, unhygienic conditions and disputes over payment for collection.

Better practice waste management in mixed use developments requires the complete separation of the residential and commercial waste facilities. Residential and commercial tenants should be actively discouraged from using each other's waste facilities.

Design garbage and recycling systems for the management of commercial wastes so they reduce potential adverse impacts on residential units within the development.

Provision of services

Councils are not required to provide waste services to commercial businesses, so they may elect to only service the residential dwelling component of mixed use developments. In this situation a private waste contractor would need to remove the commercial waste, or a private waste contractor may be engaged to remove both the residential and commercial garbage and recycling.

It should be noted that if a private contractor were used to provide the garbage and recycling services, residents may still be required to pay a service availability charge to council as stipulated under section 146 of the ***Local Government Act 1993,*** in addition to the contractor's fee.

Waste types and handling methods

Waste materials from residential and commercial properties differ in quantity and composition. In general, commercial properties generate higher yields of waste than residential properties.

In determining waste handling and storage requirements, consideration should be given to:

- The likely types of commercial activities that may occur in the development, and the types of waste they may generate (refer to Appendix A).
- The number of residential dwellings and the quantity of residential waste generation (typical residential waste generation rates are provided in Appendix A).
- The waste infrastructure that will be required to separately manage commercial and residential wastes. For example, commercial units may generate a large volume of cardboard that cannot be accommodated in MGB-based collection systems.
- The need for service lifts (or a goods lift) to transfer waste from the various building floors to the waste storage area(s).

Better practice garbage and recycling systems

Residential

Examples of better practice waste management in the residential component of mixed-use developments include:

- **Option 1:** use MGBs or bulk bins for garbage and recycling, with bins stored in a communal storage area (see note). Residents would be required to carry all waste and recyclables from their unit direct to the communal storage area.
- **Option 2:** provide room for interim storage of garbage (in MGBs) and recyclables (in MGBs or crates) on each floor in an interim storage area. A caretaker takes garbage and recyclables from the interim storage area to a communal storage area.

  Within the communal storage area, garbage and recycling may be stored in either bulk bins or MGBs (see note).

  This is more typical in developments of four residential storeys or more.
- **Option 3:** install a chute system for garbage, leading to a central garbage room at the bottom of the building. The chute can empty into either a bulk bin or an MGB carousel. However, the chute may also have to empty into a compactor (see Appendix B for a discussion about chutes).

  Room for interim storage of recyclables is provided in an interim storage area (which also houses the garbage chute inlet hopper) on each floor. A caretaker takes recyclables from the interim storage area to a communal storage area where recyclables may be stored in either MGBs or bulk bins (see note).

  This is more typical in developments of four residential storeys or more.

Note: Bulk bins may be provided for recyclables, such as paper and cardboard, in some council areas, elsewhere the use of 240L MGBs is common for either source-separated or commingled recyclables.

In each case, council's waste management unit will advise what the allocation of bins will be according to available MGB or bulk bin sizes.

The main features of the above systems and their advantages and disadvantages are further outlined in Table 7-1. Note these systems are provided as examples only and architects and designers who have good ideas should not be constrained by them.

Commercial

The garbage and recycling systems installed in commercial developments will vary according the types and quantities of waste and recyclables generated.

The MUD Guide does not cover specific waste management requirements for commercial developments, other than how the commercial waste management system should integrate with residential services in mixed use developments. In general, however, better practice waste management should be achieved by applying the general principles as outlined in Section 2 to commercial developments. Some indicative commercial waste generation rates are included in Appendix A as a guide.

Table 7-1 Residential component of mixed use developments - better practice examples

Option 1

Use 240L MGBs or bulk bins for garbage and recycling, with bins stored in a communal storage area.

Residents would be required to carry all waste and recyclables from their unit direct to the communal storage area.

Advantages	Disadvantages	System requirement[12]
Simple and easy to use system for both garbage disposal and recycling. Encourages participation in recycling through co-location of garbage and recycling bins. System will still work fairly well in the absence of a full-time caretaker if responsibility for moving bins to and from the collection point is clearly defined.	Less convenient to residents compared with other systems, as they are required to carry all garbage and recyclables down to the storage area. May lead to increased contamination of recyclables as residents often use plastic bags to carry their recycling to the waste area, and place both plastic bags and recycling in the recycling bin. Recycling bins could be contaminated if there is inadequate disposal capacity provided for garbage. Residents carrying garbage and recycling down main lifts and stairwells if there is no service lift in the building may affect amenity. If using MGBs: ■ A large number of MGBs may be required to service the development. This would require a subsequent large storage area (or a number of smaller areas). It would also require considerable time for ongoing management, including cleaning bins, and moving bins in and out from the collection point. ■ Large numbers of bins placed out for collection on the kerbside are unlikely to be satisfactory to most councils, especially where the ground floor areas are for commercial activity. They can reduce amenity and pose risks to pedestrians and motorists by blocking pathways. They also pose a safety risk to collection operators if they have to manually move bins around cars to the waiting collection vehicle.	This option is really only viable in blocks with a smaller number of units. **Storage space and location** Communal storage areas should be conveniently located for residents and servicing arrangements. Ensure adequate garbage capacity is provided to reduce contamination of recycling bins. **Access for residents and caretakers** Design storage areas so that there is easy access for residents and caretakers to all bins without the need to move bins around.

12 In addition to the general requirements listed in Chapter 2.

Option 1 cont...

Advantages	Disadvantages	System requirement[12]
	If using bulk bins: ■ Decreased ownership as a result of sharing bins between greater numbers of units. ■ Access for safe and efficient emptying of bulk bins may be limited. ■ Bulk bins can be heavy when full and pose a serious health and safety risk if they must be manually moved. ■ Onsite collection is generally required, which may not be available in some local areas. ■ Potentially higher contamination of recycling if using bulk bins compared with MGBs for recyclables collection. ■ Bulk bins are generally suitable for paper and cardboard collection, but not commingled recyclables or source-separated glass due to glass breakage and safety issues during collection.	**Access for collection** If using MGBs, identify suitable waste collection point(s) to collect the required number of MGBs that are free from potential obstacles, including parked cars (remember on recycling collection days there may be twice as many bins placed out for collection). If using bulk bins, design the development to enable their efficient on-site collection. Identify suitable waste collection point(s) to collect bulk bins to eliminate or minimise manual handling as appropriate (refer to general requirements in Chapter 2). **Ongoing management** Ensure responsibilities for cleaning communal areas and bins, educating residents in the appropriate use of systems and for moving bins in and out of the storage area for collection are clearly identified. Display clear signs indicating appropriate use of recycling systems.

Option 2

Provide room for interim storage of garbage and recyclables on each floor in interim storage area.

A caretaker takes garbage and recyclables from the interim storage area to a communal storage area.

MGBs or bulk bins for garbage and recycling used in communal storage area, into which waste from interim storage areas is emptied.

Advantages	Disadvantages	System requirement[12]
Simple and easy to use system for both garbage disposal and recycling. Encourages participation in recycling through co-location of garbage and recycling facilities.	Requires regularly transferring garbage and recycling from the interim storage area to the communal storage area. Residents may clutter the interim storage area with bulky unwanted items that then need to be removed by a caretaker or cleaning staff. This system requires a degree of on-going management in transferring bins to and from the collection point on collection day, keeping the interim storage areas and communal storage area clean. Recycling bins could be contaminated if there is inadequate disposal capacity provided for garbage in each interim storage area.	**Storage space and location** Locate an interim storage area on each floor that would hold one or more MGBs for garbage and MGBs or crates for recyclables. The space allocated in the interim storage area should allow for the interim storage of at least two days' worth of garbage and recyclables from dwellings on each floor. Ensure adequate garbage capacity is provided to reduce contamination of recycling bins. **Access for residents and caretakers** Access for residents to waste facilities could be limited to the interim storage area on each floor and the bulky items storage area. This would prevent theft and vandalism of bins in communal storage areas, and also prevents residents placing full bags of rubbish and other large items in the recycling bins.

12 In addition to the general requirements listed in Chapter 2.

Option 2 cont...

Advantages	Disadvantages	System requirement[12]
Interim storage of smaller quantities of recyclables in each of the interim storage areas provides an opportunity for caretakers to more closely monitor contamination and identify repeat offenders or the need for further education.	Residents transporting garbage and recycling down main lifts and stairwells if there is no service lift in the building could affect amenity. If using MGBs in the communal storage area: ■ A large number of MGBs may be required to service the development. This would require a subsequent large storage area (or a number of smaller areas). It would also require considerable time for ongoing management, including cleaning bins, and moving bins in and out from the collection point. ■ Large numbers of bins placed out for collection on the kerbside can reduce amenity and pose risks to passers-by because of blocked pathways. It also poses a safety risk to collection operators if they have to manually move bins around cars to the waiting collection vehicle. If using bulk bins in the communal storage area: ■ Decreased ownership as a result of sharing bins between greater numbers of units. ■ Access for safe and efficient emptying of bulk bins may be limited. ■ Bulk bins can be heavy when full and pose a serious health and safety risk if needing to be manually moved. ■ On-site collection is generally required, which may not be available in some local areas. ■ Potentially higher contamination of recycling if using bulk bins compared to MGBs for recyclables collection. ■ Bulk bins are generally suitable for paper and cardboard collection, but not commingled recyclables or source-separated glass due to glass breakage and safety issues during collection.	**Access for collection** If using MGBs, identify suitable waste collection point(s) to collect the required number of MGBS that are free from potential obstacles, including parked cars (remember on recycling collection days there may be twice as many bins placed out for collection). If using bulk bins, design the development to enable their efficient on-site collection. Identify suitable waste collection point(s) to collect bulk bins to eliminate or minimise manual handling as appropriate (refer to general requirements in Chapter 2). **Occupational health and safety** Identify a suitable system to transfer garbage and recyclables from the interim storage areas that minimises occupational health and safety risks and does not reduce amenity. If crates are used for storing recyclables, some kind of trolley may be necessary, and the storage room will need to accommodate manoeuvring the trolley. If the transfer of garbage from MGBs into bulk bins is required the system must minimise or eliminate any OH&S risks. **Ongoing management** Employment of a caretaker, on a continuous basis, to regularly remove garbage and recyclables from the interim storage areas and transfer to the communal storage area(s) is vital to the success of the system. Garbage and recycling bins (or crates) will need to be changed regularly and stored in another communal storage area on-site between collections. It is recommended that garbage and recyclables be transferred daily. Ensure responsibilities for cleaning communal areas and bins, educating residents in the appropriate use of systems and for moving bins in and out of the storage area for collection are clearly identified. Display clear signs indicating appropriate use of recycling systems.

12 In addition to the general requirements listed in Chapter 2.

Option 3

Install a chute system for garbage, leading to a central garbage room at the bottom of the building. The chute can empty into either a bulk bin or an MGB carousel. However, there may also be a requirement for the chute to empty into a compactor (see Appendix B for a discussion about chutes).

Room for interim storage of recyclables on each floor is provided in an interim storage area (that also houses the garbage chute hopper) on each floor.

A caretaker takes recyclables from the interim storage area to a communal storage area.

MGBs or bulk bins for recycling are used in the communal storage area, into which recyclables from interim storage areas are emptied.

Advantages	Disadvantages	System requirement[12]
Simple and easy to use system for both garbage disposal and recycling. Encourages participation in recycling through co-location of garbage and recycling facilities. Interim storage of smaller quantities of recyclables in each of the interim storage areas provides an opportunity for caretakers to more closely monitor contamination and identify repeat offenders or the need for further education.	Requires regular transfer of recycling and bulky waste items (unsuitable for disposal in the chute) from the interim storage area to the communal storage area. Residents may clutter the interim storage area with bulky unwanted items that then need to be removed by a caretaker or cleaning staff. Chutes are not suitable to transfer recyclables or bulky items, therefore two means of transferring materials in each development are required (the chute and manual methods)[13]. Potential contamination of recycling bins if bulky items or other items that cannot fit down chutes are placed in the recycling stream. Residents transporting recycling down main lifts and stairwells if there is no service lift in the building may affect amenity. This system requires a high degree of ongoing management in transferring bins to and from the collection point on collection day, keeping the interim storage areas and central garbage room clean, etc. Regular maintenance, including cleaning and unblocking chutes, is likely to be required. Regular inspection of the waste room into which the chute empties is also required to ensure bins do not become overfull. Where chutes discharge into a compaction unit, the compacted waste bins can become very heavy and increase occupational health and safety risks. Compacted waste may also get jammed in the base of the bins making it difficult to empty the contents.	**Storage space and location** Locate an interim storage area on each floor that would house the chute inlet hopper for the garbage chute and MGBs or crates for recyclables. Consult the chute manufacturer about space requirements for the chute opening. The space allocated in the storage area should allow for the interim storage of at least two days' worth of recyclables from all dwellings on the floor. A decision needs to be made as to whether the space allocated will allow the MGBs/crates to store the recyclables generated over the entire period between collection days, or whether they will need to be changed over and stored in another area on-site between collections. It is recommended that recyclables be transferred daily to a central garbage area. Locate the garbage chute outlet in the central garbage room. The building caretaker should not be required to transfer garbage from one side of the building to the other so as to get it from the chute outlet to the garbage room. Where resident access is restricted to the garbage room, additional garbage MGBs should be located next to the recycling MGBs to avoid contamination of recyclables. **Access for residents and caretakers** Access for residents to waste facilities could be limited to the interim storage area on each floor and the bulky items storage area. This would prevent theft and vandalism of bins in communal storage areas, and also prevents residents from placing full bags of rubbish and other large items in the recycling bins. Resident access should be restricted, for safety reasons, into garbage rooms where chutes empty.

12 In addition to the general requirements listed in Chapter 2.

13 **Chutes are not suitable to transfer recyclables** because the drop generally results in the damage, or even destruction, of the recyclable material – particularly glass. In addition, cardboard could easily become stuck in the chute and cause a fire hazard. Other recyclables, such as paper and plastics, are also highly flammable. Therefore, having large quantities of recyclables stored at the bottom of a long shaft that runs the height of the building could constitute a fire hazard.

Advantages	Disadvantages	System requirement[12]
Chutes enable the transfer of garbage from the different floors within a development without the need to manually carry bags and bins up and down stairs and via lifts to the waste storage area. This increases convenience for residents and if well managed can improve amenity (due to reduced transfer of garbage in trafficable areas).	If using bulk bins in the communal storage area: ■ Access for safe and efficient emptying of bulk bins may be limited. ■ Bulk bins can be heavy when full and pose a serious health and safety risk if they need to be moved manually. ■ On-site collection is generally required, which may not be available in some local areas. ■ Potentially higher contamination of recycling if using bulk bins compared with MGBs for recyclables collection. ■ Bulk bins are generally suitable for paper and cardboard collection, but not commingled recyclables or source-separated glass due to glass breakage and safety issues during collection.	**Access for collection** If using MGBs, identify suitable waste collection point(s) to collect the required number of MGBs that are free from potential obstacles, including parked cars (remember on recycling days there may be twice as many bins placed out for collection). If using bulk bins, design the development to enable their efficient on-site collection. Identify suitable waste collection point(s) to collect bulk bins to eliminate or minimise manual handling as appropriate (refer to general requirements in Chapter 2). **Occupational health and safety** Identify a suitable system to transfer recyclables from the interim storage areas to the communal storage area that minimises occupational health and safety risks and does not reduce amenity. If crates are used for storing recyclables, some kind of trolley may be necessary, and the storage room will need to accommodate manoeuvring the trolley. **Ongoing management** Employment of a caretaker to regularly remove recyclables from the interim storage areas and transfer to the communal storage area(s) is vital to the success of the system. Display clear signs indicating appropriate use of recycling systems. Provide residents with ongoing education in the correct use of the chute, and the need to keep bulky items and recyclables out of the chute system. Ensure if waste compaction is used, it does not overload bins. Needs regular maintenance, including cleaning and unblocking chutes. Requires regular inspections of the room into which the waste chute empties to ensure bins do not become overfull.

12 In addition to the general requirements listed in Chapter 2.

Storage – space and location

Use separate bins and storage areas to handle domestic and commercial garbage and recycling from mixed use developments.

Allow sufficient space to separate garbage and recycling streams in both the commercial and residential waste storage areas.

Residential waste

Communal bin areas

Provide sufficient space in an appropriate location within the building to store all garbage and recycling likely to be generated in the period between collection days and the equipment used to manage and store it. There may be more than one storage point.

Consideration needs to be given to how the bins are to be emptied and how much room will be required to manoeuvre the bins to where they will be emptied.

Bulky items storage

Consideration should be given to allowing space for residents to temporarily store unwanted bulky items. Providing storage on-site for the disposal of bulky items is important in guarding against residents illegally dumping this material on the footpath, thus detracting significantly from the quality and appearance of the development.

The space allocated for bulky items storage should consider the intended frequency of collection. Bulky items may be collected by council or contractors. Alternatively, tenants or building managers may make arrangements to take excess bulky items to a waste management centre.

If council provides a bulky items collection it is important to check the details of the service as the frequency and the types and sizes of materials collected may differ between Local Government Areas.

Provide space for the temporary storage of bulky items adjacent to the waste storage area.

Where on-site collection is not available, employ a caretaker to move bulky items from the interim storage area to the kerbside (or designated collection point).

Commercial waste

Inside each commercial unit

Each commercial unit should have a clearly defined storage space sized to sufficiently store all the garbage, recyclables and other wastes generated by that unit for at least one day.

Communal storage areas

It is often difficult to predict commercial waste services and infrastructure requirements during the development design stage where the ultimate commercial tenancy of the building is unknown. A further difficulty with sizing communal storage areas is the intended frequency of servicing, which may be daily or less frequent.

You can obtain an indication of the likely commercial tenancy in a mixed use development by referring to relevant planning controls for the proposed development area, and by considering the available floor space of each commercial unit and similar developments elsewhere.

Commercial activities, such as cafes and restaurants, may generate large amounts of putrescible food organics or high volumes of cardboard and paper (for example offices and retail stores). Appendix A provides typical wastes generated from different commercial operations. Where possible, size waste storage areas for commercial units as follows to increase the flexibility and long-term efficiency of servicing:

- Where there are a small (less than five) number of commercial units proposed:

  Estimate waste generation based on worst-case (highest) likely waste generation, ie assume 660L garbage and 240L recycling generated for each 100m^2 of floor area per day.

- Where greater than five commercial units are proposed:

  Estimate waste generation based on the average waste generation rates for various commercial developments. To determine an 'average' waste generation rate:

  - consider the floor space available for each commercial property; and
  - consider a range of both high and low to medium waste generators, such as restaurants, retail (food), retail (non-food), office, and service-based industries (such as hairdressers), which would fit in the available floor space. Refer to Appendix A for a range of commercial waste generation rates.

  Example: to estimate the waste generated from ten commercial units where the available floor space of each unit is 100m^2 or less, the average garbage generation rate is estimated at 200L/100m^2/day and the average recycling generation rate is 60L/100m^2/day based on the following mix of assumed occupancies.

Type of premises	Garbage generation	Recycling generation
Office	40L/100m^2 floor area/day	80L/100m^2 floor area/day
Butcher/deli/fish shop	80L/100m^2 floor area/day	Information not available
Greengrocer	240L/100m^2 floor area/day	120L/100m^2 floor area/day
Restaurant (1)	660L/100m^2 floor area/day	130L/100m^2 floor area/day
Restaurant (2)	660L/100m^2 floor area/day	130L/100m^2 floor area/day
Takeaway	80L/100m^2 floor area/day	Information not available
Shop with less than 100m^2 floor area (1)	50L/100m^2 floor area/day	25L/100m^2 floor area/day
Shop with less than 100m^2 floor area (2)	50L/100m^2 floor area/day	25L/100m^2 floor area/day
Showrooms	40L/100m^2 floor area/day	10L/100m^2 floor area/day
Hairdresser	60L/100m^2 floor area/day	Information not available
Average	**200/100m^2 floor area/day**	**60/100m^2 floor area/day**

Supporting infrastructure

Trolleys to accommodate recycling crates from residential intermediate storage areas

If interim storage areas are used in the residential component of the development, identify a suitable system for transfer of recyclables from the interim storage areas that minimises occupational health and safety risks and does not reduce amenity.

If crates are used for storing recyclables, some kind of trolley may be necessary, and the storage room will need to accommodate manoeuvring the trolley.

Bin lifters

If there is a requirement for MGBs containing garbage or recycling to be emptied into bulk bins, provide equipment to eliminate the need to manually lift and empty the bin.

In this situation, the design of waste storage areas needs to incorporate sufficient space to locate and operate the lifting device. The lifting device should be fitted with safety features to prevent injury to operators, and should be secured to prevent use by unauthorised persons (residents).

The cost of procuring and maintaining the bin lifter and employing a caretaker to operate it should be considered and factored into the ongoing management of the development.

A further cost to be considered may be the requirement to purchase an additional set of bins. Most councils will only provide one set of bins to a development (ie MGBs or bulk bins, but not both), therefore if it is proposed to empty waste from MGBs into bulk bins an additional set of bins may be required.

Appendix B includes further information about bin lifters and their possible application in MUDs.

Service lifts

Where a development incorporates interim storage areas on each level for residents, or where there are commercial units on more than one storey, it is recommended that a service lift also be provided to enable the transfer of materials to the relevant communal storage area.

Access

For residents

Access for residents to waste facilities should be limited to residential services only; there should be no resident access to commercial waste bins and storage areas.

Where interim storage areas are incorporated in residential towers, access for residents to waste facilities should be limited to the interim storage area on each floor and the bulky items storage area. This prevents theft and vandalism of bins in communal storage areas, and also prevents individuals placing full bags of rubbish and other large items in the recycling bins. Resident access should be restricted, for safety reasons, into garbage rooms where chutes empty.

If vandalism or waste dumping is likely to be a serious problem, consideration should be given to having a secure centralised lockup area for bulky items.

For commercial units

Access for commercial operators should be limited to commercial waste bins and storage areas only. There should be no access to residential waste bins and storage areas.

Ongoing management

All waste management systems in mixed use developments will require the services of a caretaker. A caretaker or manager is required to ensure both residents and commercial tenants are educated and informed about the waste management services provided. The caretaker would also be responsible for maintaining the separate residential and commercial waste services, including transferring garbage and recycling receptacles to the collection point, keeping waste storage areas clean and free of dumped rubbish and liaising with the waste collection contractor(s).

A dedicated caretaker will need to be employed for these functions, with the cost factored into the ongoing management of the development.

Conditions of consent can require that a development comply with the submitted and approved Waste Management Plan for the development[14]. If a caretaker is required, this should be detailed in the Waste Management Plan; employment of a caretaker will thus form part of the conditions of consent, which must be adhered to.

Example diagrams

The following figures provide examples of the location of bin storage areas for possible mixed use developments. These examples are provided as a guide only, many other arrangements could be suitable and in accordance with better practice principles. Remember to consult with council engineers, planners and waste managers regarding development requirements specific to a local area.

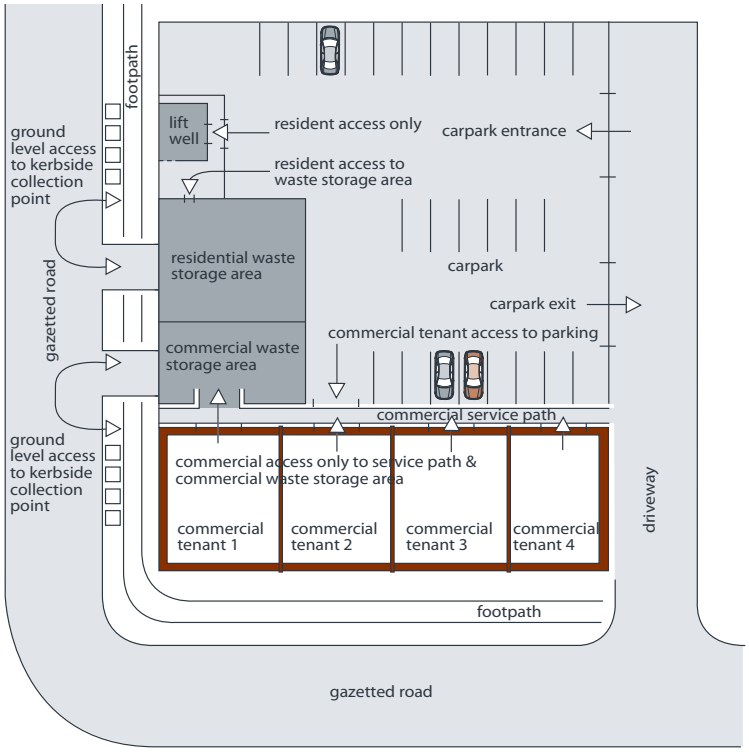


Figure 7-1 Example of Option 1 or Option 2

This example demonstrates separate waste storage areas for residential and commercial waste in a mixed use development. Resident access to the resident communal waste storage area is via a passageway adjacent to the residential lift well. Access to the waste room is limited to residents and caretakers only. Only commercial tenants and caretakers can use the commercial waste storage area, as access is via a service area at the rear of the commercial units.

Caretakers have additional access to each of the waste rooms direct from the parking area. This is normally kept locked and opened only as required, such as to allow regular cleaning and maintenance of the waste storage areas.

There is ground-level access from both the residential and commercial waste storage areas such that bins can be easily wheeled to and from the kerbside for collection. A caretaker would be required to do this.

14 A Waste Management Plan is generally required as part of the documentation supporting a development application. Requirements for Waste Management Plans may vary between Local Government Areas

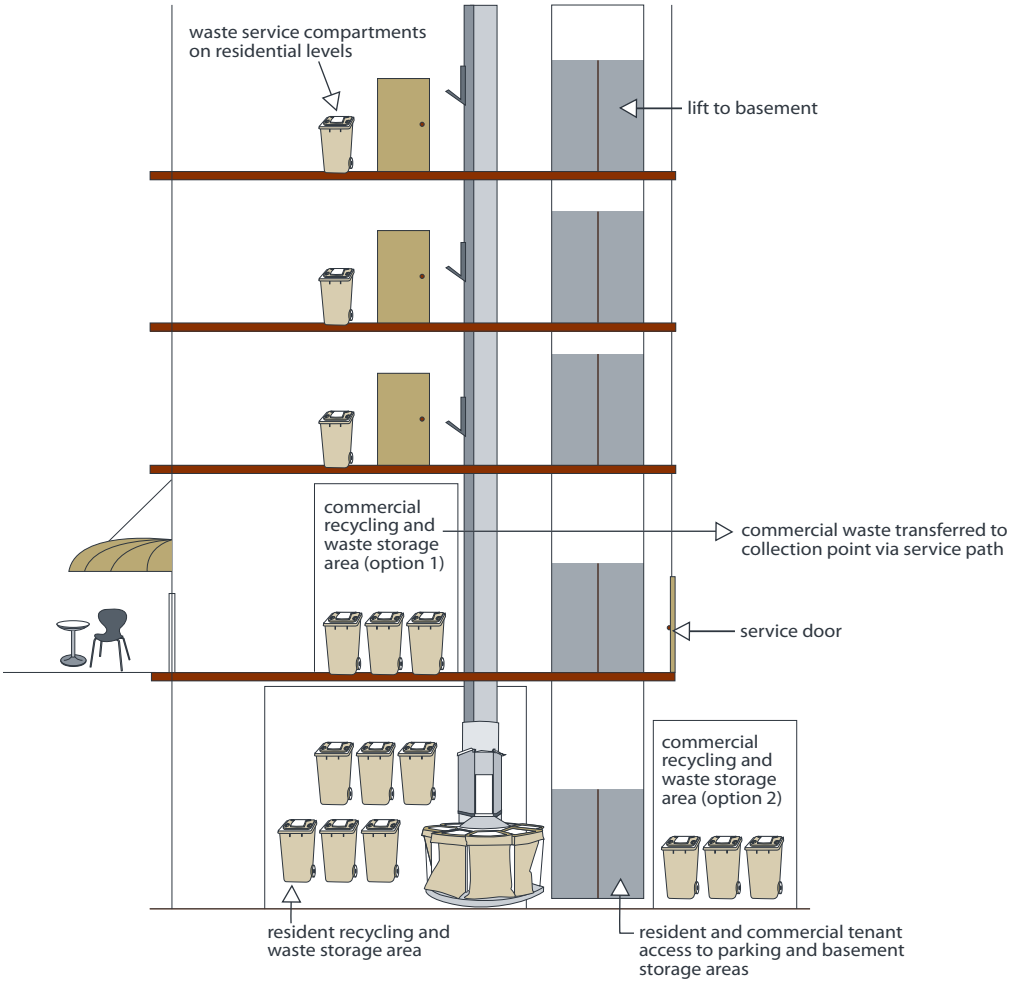
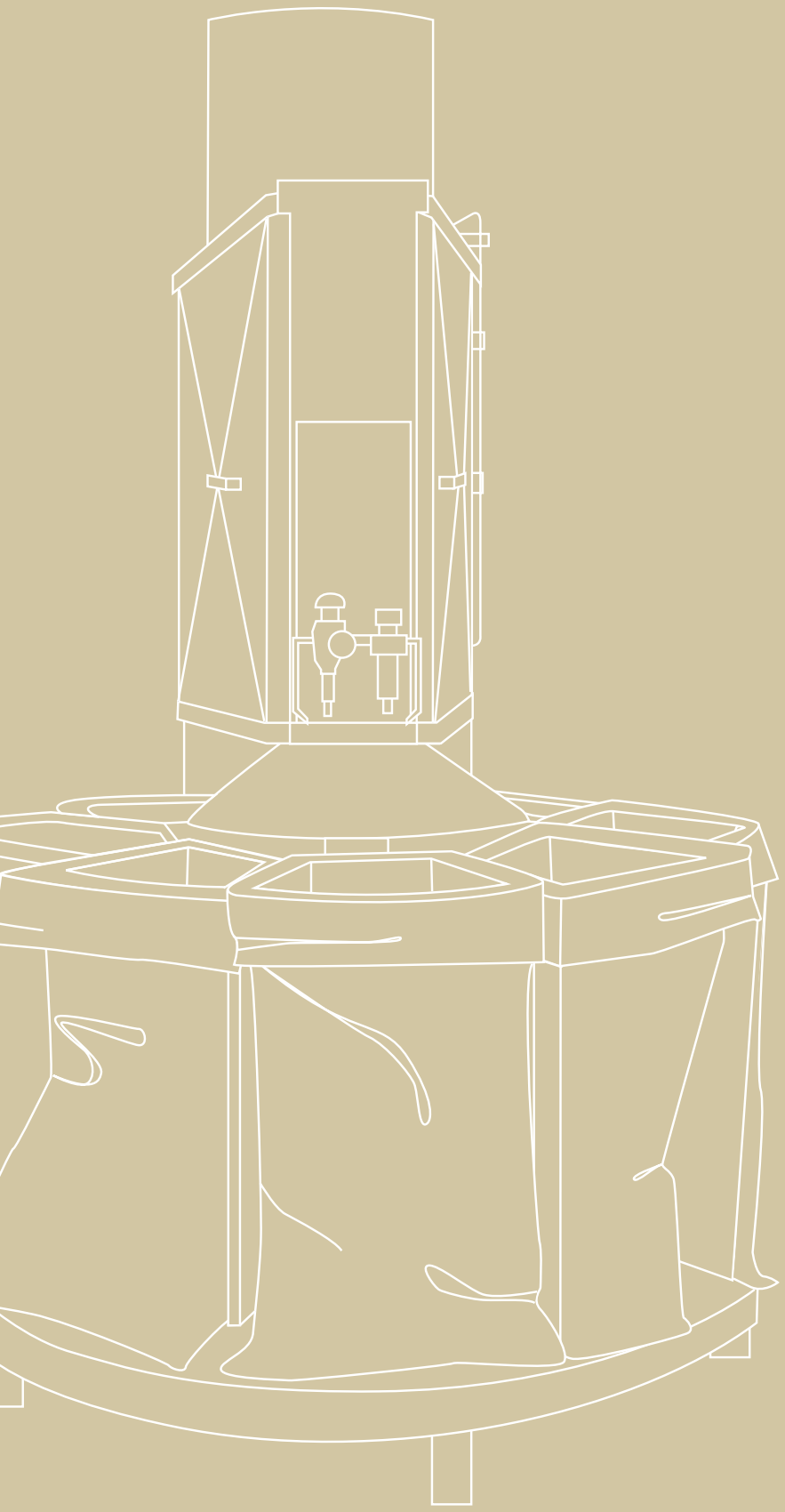


Figure 7-2 Example of Option 3: chute system for residential garbage supported by recycling in MGBs

This example demonstrates the potential layout of a secure waste storage area for residents in the basement of a mixed use development. Access for residents to garbage and recycling facilities is limited to the interim storage area and chute inlet hopper on each residential floor. Access to rooms where the chute empties and extra bins are stored in the basement is restricted to the caretaker. This is for safety reasons and to discourage dumping.

Waste storage areas for commercial developments, located on the ground floor of the building, are provided either at ground level, or in a separate storage area in the building basement.

In the above example, additional MGBs for garbage would be available in the recycling area to prevent contamination of recyclables.



8.

Integrated Housing Developments

Integrated housing developments incorporate different types of residential dwellings or commercial buildings, including individual houses, MUDs and mixed use developments, on one parcel of land. Integrated housing developments often feature internal private access roads and are typically developed into community title type sub-divisions.

Issues for consideration

The issues discussed in this chapter need to be taken into consideration in addition to those applying to all developments (as outlined in Section 2).

The following principles (in regards to access, storage, and ongoing management) should be applied to the integrated housing development as a whole. Please refer to the relevant chapters in this guide for specific requirements for storage as it applies to specific housing types within each of the properties included in the integrated housing development.

Key problems

Integrated housing developments can include a number of different types of residential and commercial properties; they may include private roads and share-ways between properties, and there may be limited public street frontage for servicing the development as a whole.

Problems in integrated housing developments therefore typically occur where:

- There has been a failure to adequately design waste systems to accommodate the required waste storage and handling capacity of the total development.
- Where there are problems with access for tenants and collection vehicles to the various parts of the development and where there is no separation of residential and commercial wastes.

Provision of services

It should be noted that if a private contractor is used to provide the garbage and recycling services, residents may still be required to pay a service availability charge to council as stipulated under section 146 of the ***Local Government Act 1993***, in addition to the contractor's fee.

Waste types and handling methods – general

In identifying waste handling and storage requirements, consideration should be given to:

- The proposed location of residential and commercial properties within the development.
- The likely types of commercial activities that may occur in the development, and the types of waste they may generate (refer Appendix A).
- The number of residential dwellings and residential waste generation (typical residential waste generation rates are provided in Appendix A).
- The waste infrastructure that will be required to separately manage commercial and residential wastes. For example, commercial units may generate a large volume of cardboard that cannot be accommodated in MGB-based collection systems.

Better practice garbage and recycling systems

In addition to the principles outlined in Section 2, better practice waste management in integrated housing developments requires:

- Installing waste systems in each property within the development that meet individual property needs (for example, waste systems for villas and townhouses will differ from those required in high-rise residential buildings).
- Ensuring waste management systems, for each building type in the development, can be effectively serviced and maintained.
- Complete separation of the residential waste system and any commercial waste management facilities. Residential and commercial tenants should be actively discouraged from using each other's waste facilities.
- Designing garbage and recycling systems for the management of commercial wastes that reduce potential adverse impacts on residential units within the development.

Residential

Depending on the size of the development and the types of residential properties that it includes, it may be necessary to use different garbage, recycling and organics services in the different properties. An integrated development may include, for example, a three-story walk-up and a series of villas and townhouses. Waste services used in each of these buildings may be different.

Garbage, recycling and organics services should be incorporated in accordance with the better practice system of both the individual property (as specified in the relevant chapters in this guide) and the development as a whole (as specified in this chapter), particularly in relation to access and servicing. Each resident in an integrated development, regardless of the type of unit complex that they are a part of (villa versus high-rise for example), should have equal and efficient access to garbage and recycling services.

Please refer to relevant chapters in this Guide for further information about better practice systems in different types of residential MUDs.

Mixed use developments

Garbage and recycling systems installed in mixed use developments within integrated housing developments should conform to the principles outlined in Section 7.

Access considerations

Service requirements that influence the design of the integrated housing development as a whole, such as requiring heavy vehicle access through the development to service each building (if applicable), also need to be considered.

Construct any roads or pavements within the development that council garbage and recycling vehicles will drive on to allow for large heavy vehicles (car parking areas, landscaping and overhead construction etc), and design road geometry and strength accordingly, or council will need to be indemnified against potential damages.

Design roads so the collection vehicles do not have to reverse.

Access requirements for vehicles are outlined further in Appendix D.

Storage – space and location

Provide each property within the integrated development with adequate storage inside individual building areas, in communal storage areas, and for bulk items, in accordance with the general guidance principles for the different development categories as outlined in this guide.

Locate storage areas so they are easily accessible by all residents.

Depending on the layout of the integrated development and property management structure, it may be possible to use shared communal storage areas between properties, otherwise provide separate storage within each property boundary. Regardless, storage space and the location of storage should still meet the general principles outlined in Section 2 and other relevant sections of this guide.

Waste collection point

Consideration should be given to identifying suitable waste collection points for the development. Depending on the size of the development, there may need to be a number of collection points that use both kerbside and on-site collection.

In identifying suitable waste collection points, special consideration should be taken to identify if there will be a need for waste collection to access private roads, and design road geometry and strength accordingly.

Lack of footpaths, the presence of narrow streets, and cars parked on internal roads within integrated developments can also be problematic and should be addressed in the development design to enable suitable kerbside collection points (if appropriate).

Take particular care in selecting the location of the collection point(s) where there are narrow or one-way streets throughout the development. Bins presented for collection in one-way streets will need to be presented on the off-side (passenger's side) of the street to enable a side-lift collection vehicle to safely uplift the bins. Parking restrictions may also need to be put in place throughout the development to allow for safe movement of collection vehicles in space-restricted areas.

If bins are to be collected from a communal presentation area located at the entrance to the development, special consideration should be given to:

- the area's visual amenity;
- providing adequate space for the efficient management of services;
- how to collect the bins; and
- how to transport the bins to and from the communal presentation area.

It is recommended you discuss collection requirements for an integrated development with the council at the early planning and design phase.

Example diagrams

The following figures provide examples of the location of bin storage areas for possible integrated developments. These examples are provided as a guide only, many other arrangements could be suitable and in accordance with better practice principles. Remember to consult with council engineers, planners and waste managers regarding development requirements specific to a local area.

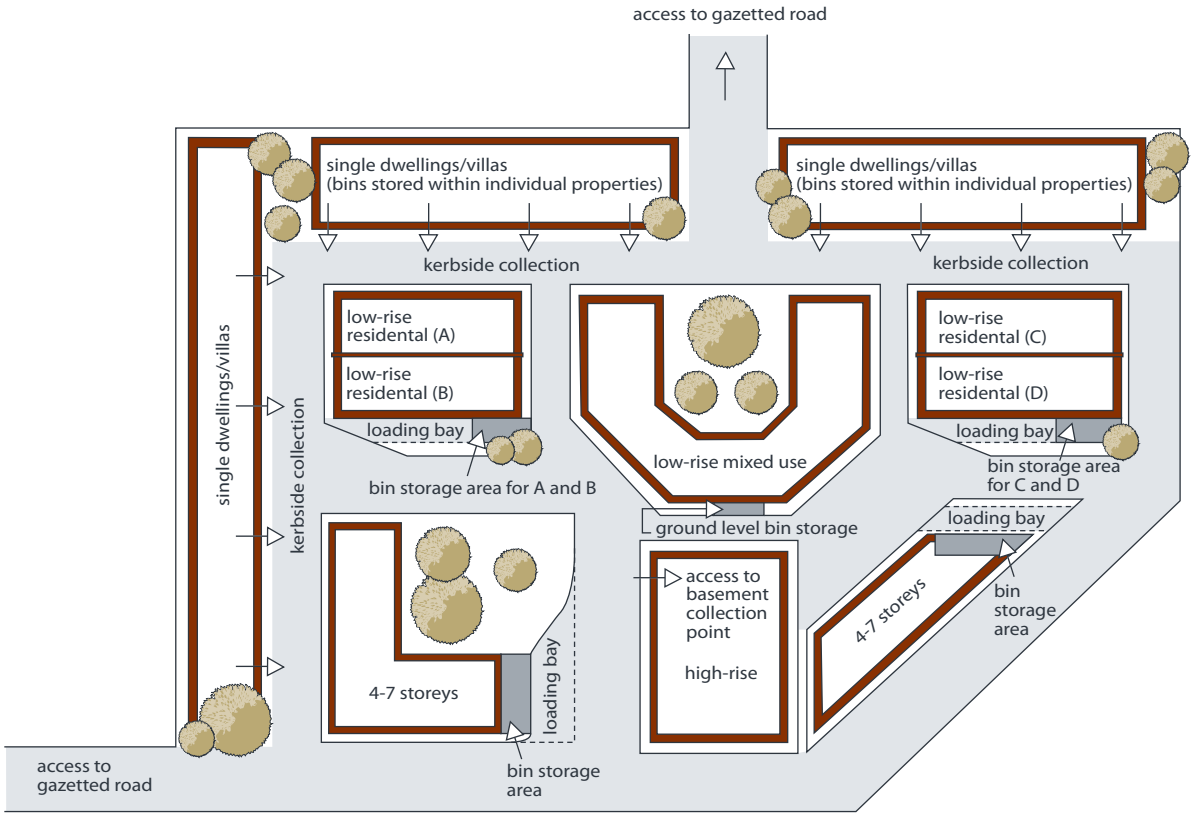


Figure 8-1 Example of possible collection options within an integrated development

This example demonstrates on-site collection of bins from an integrated development that has very limited access and no direct street frontage. The integrated development consists of a number of different residential developments and a mixed-use development.

Bins from the single dwellings and villas located on the northern and western sides of the development are collected from the kerbside of internal roads. Communal bin storage areas have been incorporated into each low-rise and 4-7 storey development, with communal storage areas located adjacent to a dedicated waste loading/unloading bay. This enables collection crews to safely pull up to the property and wheel bins in and out of the adjacent storage area to the waiting vehicle, thus negating the need for kerbside presentation of bins, which would be difficult for this number of units.

Waste from the high-rise development in this example is collected on-site from the basement storage area.

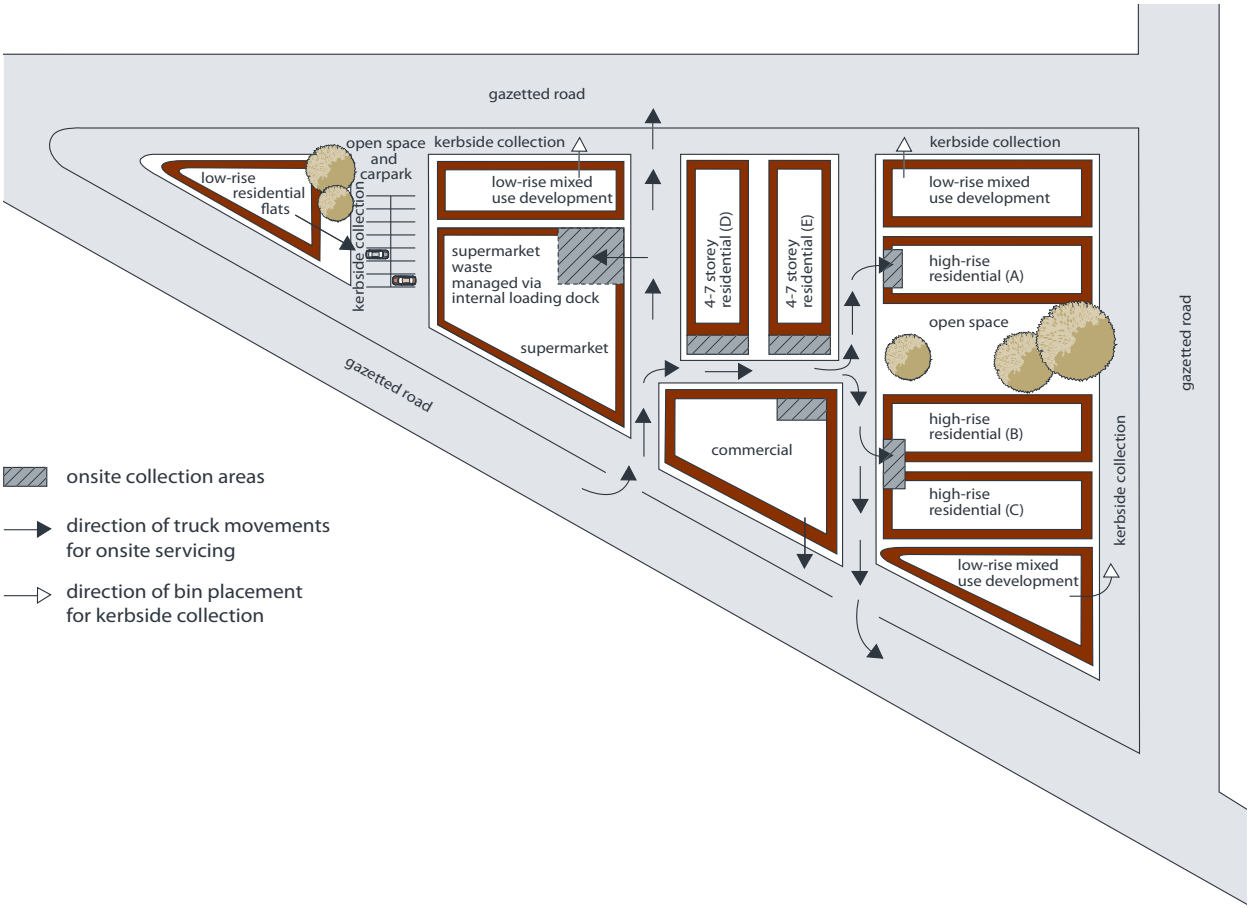
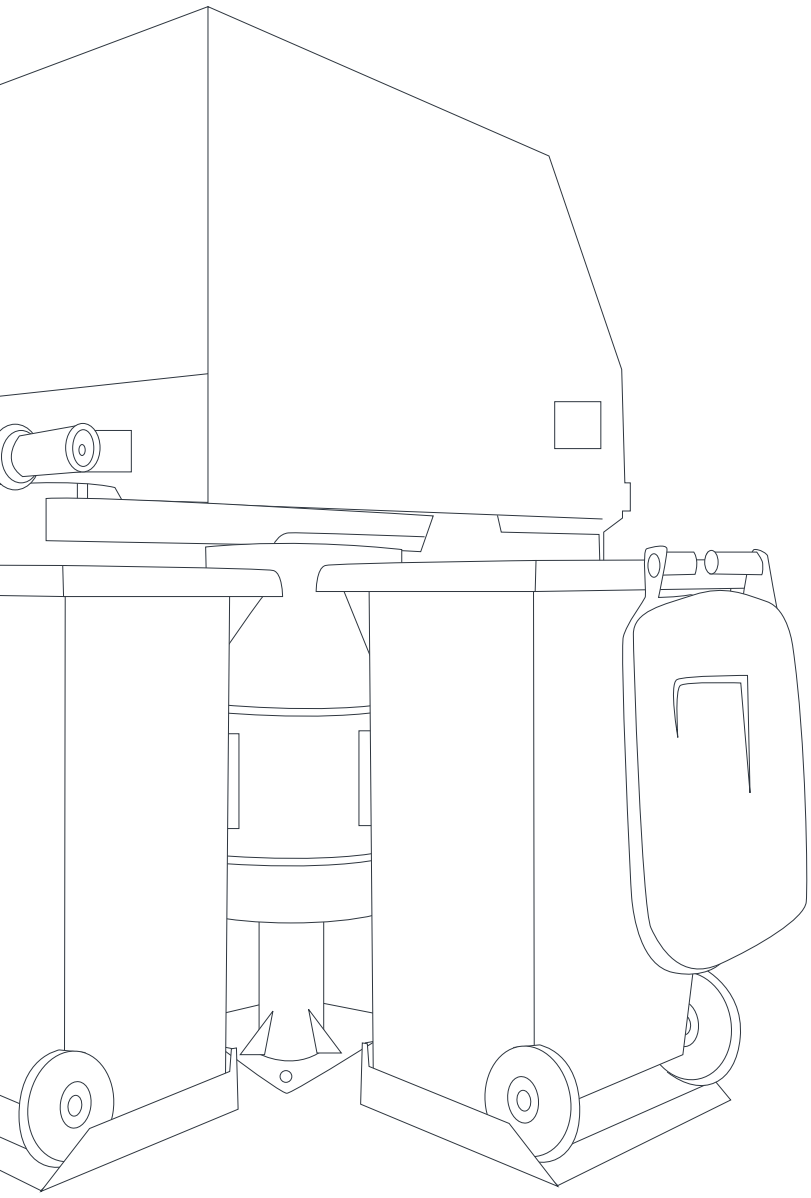


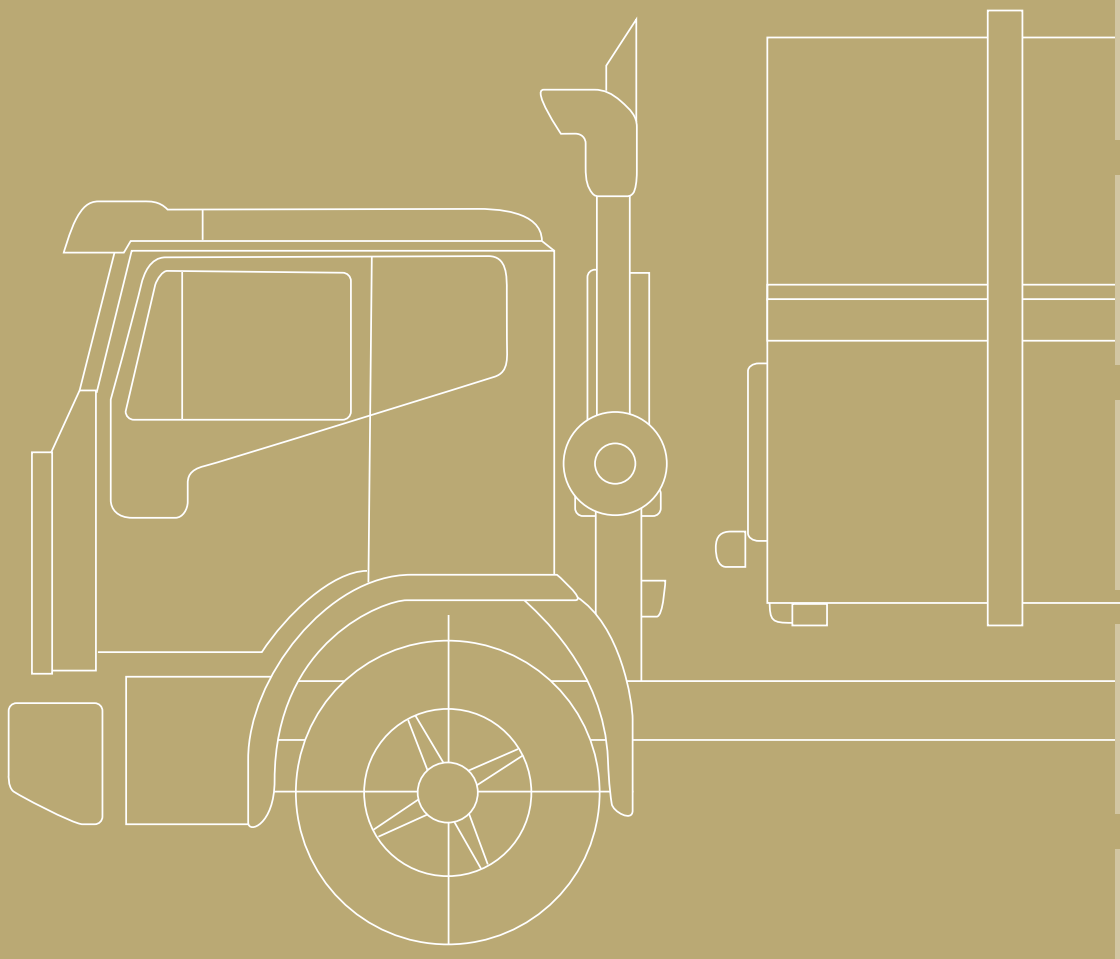
Figure 8-2 Example of possible collection options within an integrated development

This example demonstrates collection of bins from an integrated development that has limited internal access but some street frontage. The integrated development consists of a number of different residential, mixed use and commercial developments.

Collection requirements are met through a mixture of on-site servicing and kerbside collection of bins. The mixture of on- and off-site collection minimises the movement of collection vehicles within the narrow streets of the development.



Appendix



Appendix A

Waste Generation Rates (MUDs)

Domestic waste

A domestic waste study by the Southern Sydney Waste Board in 2001 found that the average total generation of waste per unit per week is approximately 8.5 kg/unit/wk. Of this, about 6.4 kg/unit/wk is garbage and 2.1 kg/unit/wk recyclables.

Volume/weight conversion figures supplied by the NSW EPA are 0.131 tonnes/m^3 for uncompacted domestic waste and 0.262 tonnes/m^3 for compacted domestic waste.

Allowing for variance and increase in waste generation, as a **RULE OF THUMB**, the allowance for waste storage for MUDs should be:

Waste stream	Allowance
Garbage	80 L/unit/week
Commingled recycling	40 L/unit/week
If paper and containers collected separately	
Paper recycling	25 L/unit/week
Containers recycling	15 L/unit/week

For further information on domestic waste generation rates as they become available, please refer to the DECC website www.environment.nsw.gov.au

The current standard NSW commercial waste generation rates are those established by the Combined Sydney Region of Councils[15]:

Type of premises	Garbage generation	Recycling generation
Food premises		
Butcher	80L/100m² floor area/day	Information not available
Delicatessen	80L/100m² floor area/day	Information not available
Fish shop	80L/100m² floor area/day	Information not available
Greengrocer	240 L/100m² floor area/day	120L/100m² floor area/day
Restaurants	660L/100m² floor area/day	130L/100m² floor area/day
Supermarkets	660L/100m² floor area/day	240L/100m² floor area/day
Takeaway	80L/100m² floor area/day	Information not available
Retail (non-food sales)		
Shops with less than 100m² floor area	50L/100m² floor area/day	25L/100m² floor area/day
Shops with over 100m² floor area	50L/100m² floor area/day	50L/100m² floor area/day
Showrooms	40L/100m² floor area/day	10L/100m² floor area/day
Hairdresser	60L/100m² 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/100m²/day	10L/100m²/day
Hotel	5L/bed/day 50L/100m² floor area/day 660L/100m² dining area/day	50L/100m² of bar and dining areas/day
Licensed club	50L/100m² floor area/day	50L/100m² of bar and dining areas/day
Motel (without public restaurant)	5L/bed/day 660L/100m² dining area/day	1L/bed/day

For further information on commercial waste generation rates as they become available, please refer to the DECC website www.environment.nsw.gov.au

15 *'Model Development Control Plan and Local Approvals Policy',* The Combined Sydney Regional Organisations of Councils (1996)

Examples of how to calculate garbage and recycling bin storage area requirements

Note: *Councils may provide a standard number of bins to the development based on the number of units and the bin sizes used for local services. The following examples that calculate the number of bins required are provided as examples only. Consult with council engineers and waste managers to find out about local services and the likely number of bins to be accommodated in waste storage areas.*

Example 1: Sizing of a communal storage area used for garbage and recycling bins that service 12 units.

Standard council services are 240L bins for garbage, a separate 240L bin for paper and cardboard and a 240L bin for containers. The development is also provided with one 240L bin for garden organics.

Garbage is collected weekly. Recycling and organics are collected fortnightly.

1. Estimate number of garbage bins required

Waste generated	= 12 units X 80 L/unit/week = 960L/week
Number of garbage bins required	= 960L/week / 240L/week (weekly garbage collection)
	= 4

2. Estimate number of recycling bins required

Note: *As the 240L recycling bins are collected fortnightly, the equivalent weekly storage capacity is only 120L, hence this figure is used in the calculations to identify the number of recycling bins required.*

Paper and cardboard generated	= 12 units X 25 L/unit/week = 300L/week
Number of recycling bins required	= 300L/week / 120L/week (fortnightly recycling collection)
	= 3

Containers generated	= 12 units X 15 L/unit/week = 180L/week
Number of recycling bins required	= 180L/week / 120L/week (fortnightly recycling collection)
	= 2

3. Estimate number of organics bins required

Garden organics bins required	= 1 (chosen by council in this example)

4. Total number of bins required

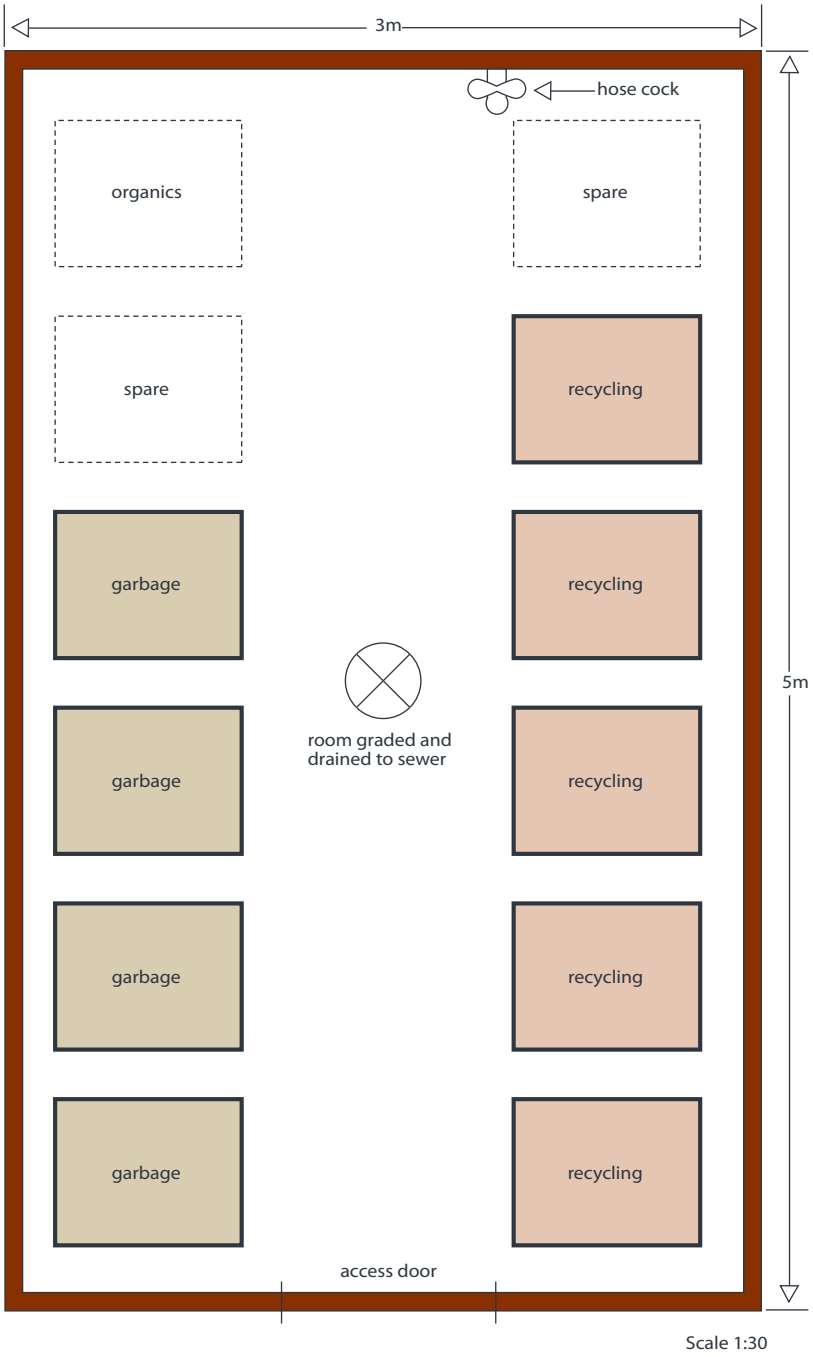
Garbage	4
Recycling – paper and cardboard	3
Recycling – containers	2
Organics	1
Total	**10***

***Note:** this does not include allowance for contingency/spare bins*

5. Bulky items storage

Given the relatively small number of units in the development, it is decided that bulky items storage should not be provided for this development.

Possible communal area layout



Example 2: Sizing of a communal storage area used for garbage and recycling bins that service 24 units.

Standard council services are 240L bins for garbage and 240L bins for commingled recyclables. Garbage and recyclables are collected weekly.

The development is not provided with a garden organics service, as open space and garden areas are limited. A gardening contractor removes from site any garden prunings that are generated during routine maintenance.

1. Estimate number of garbage bins required

Waste generated	= 24 units X 80 L/unit/week = 1920L/week
Number of garbage bins required	= 1920L/week / 240L/week (weekly garbage collection)
	= 8

2. Estimate number of recycling bins required

Commingled recycling generated	= 24 units X 40 L/unit/week = 960L/week
Number of recycling bins required	= 960L/week / 240L/week (weekly recycling collection)
	= 4

3. Estimate number of organics bins required

Garden organics bins required = 0

(Determined by building management in consultation with council.)

4. Total number of bins required

Garbage	8
Recycling	4
Organics	0
Total	**12***

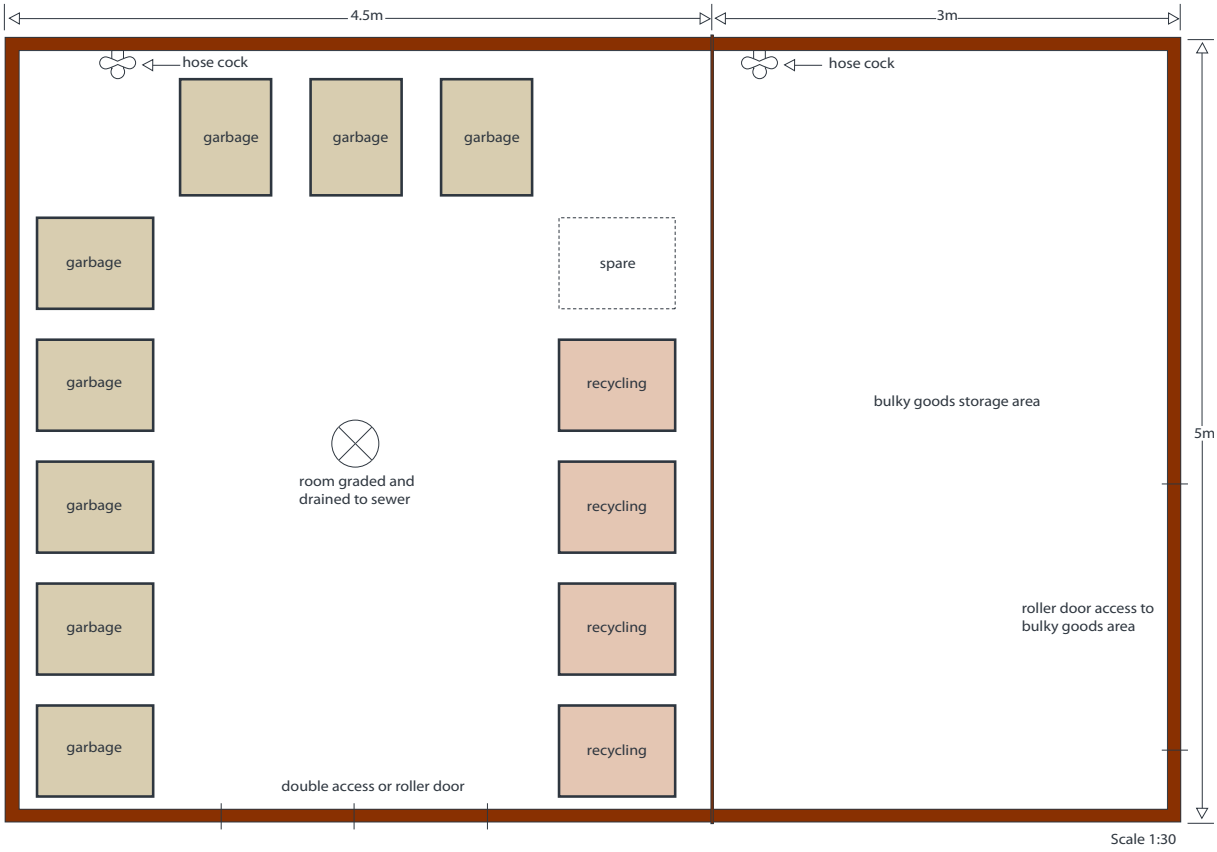
***Note:** this does not include allowance for contingency/spare bins*

5. Bulky items storage

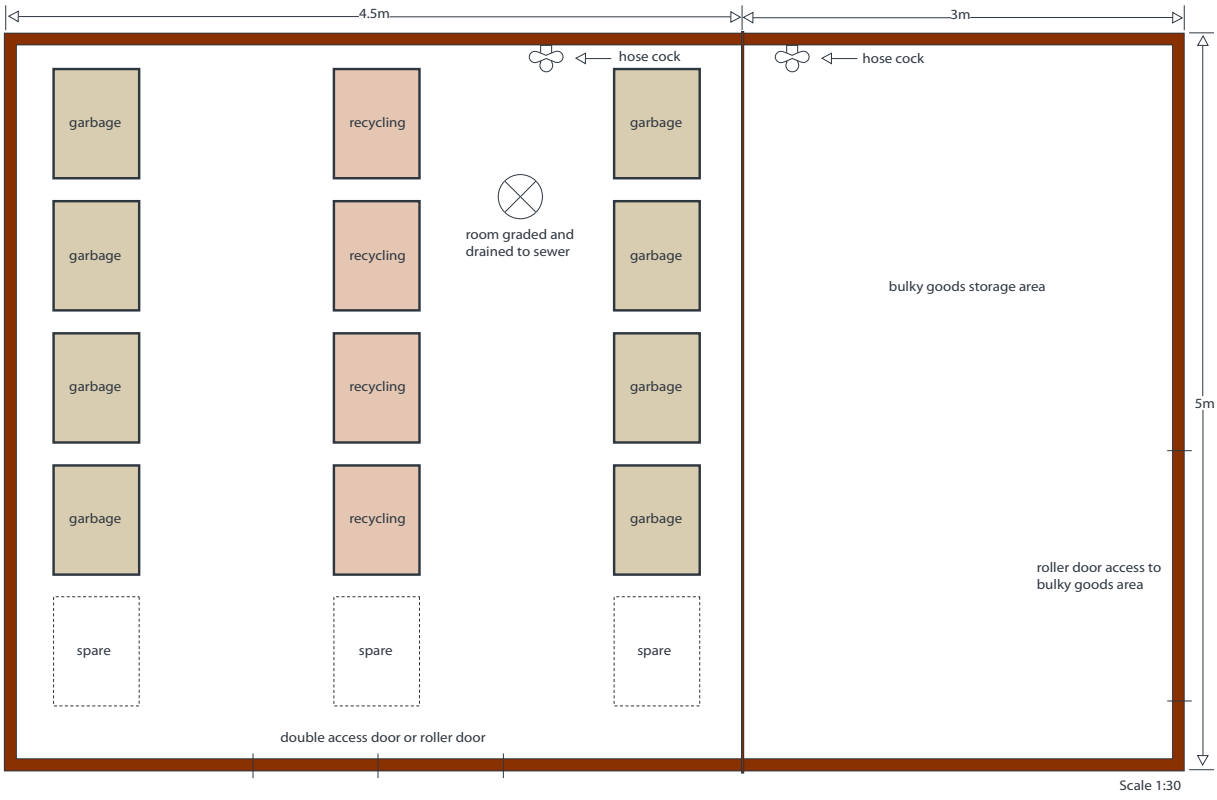
It is decided to provide bulky items storage for this development. An allowance of 15m^2 is there for this purpose.

***Note:** Storage areas for bulky items should be provided in multi-unit dwellings. To calculate the size of the storage area the following factors should be considered: the number of units in the building; the frequency between collections of bulky items; and the anticipated turnover of residents. A figure of 15m^2 is provided here as an example only – this area may not be applicable to all developments accommodating 24 units.*

Possible communal area layout



OR



Example 3: Sizing of a communal storage area used for garbage and recycling bins that service 36 units.

Garbage services to the development will be provided using 1.5m^3 skips. Commingled recycling is collected in 240L MGBs. Garbage and recyclables are collected weekly.

The development is provided with a garden organics service consisting of two 240L MGBs, which are collected fortnightly.

1. Estimate number of garbage bins required

Waste generated	= 36 units X 80 L/unit/week = 2880 L/week
Number of garbage bins required	= 2880 L/week / 1500 L/week (weekly garbage collection)
	= 2

2. Estimate number of recycling bins required

Commingled recycling generated	= 36 units X 40 L/unit/week = 1440L/week
Number of recycling bins required	= 1440 L/week / 240L/week (fortnightly recycling collection)
	= 6

3. Estimate number of organics bins required

Garden organics bins required	= 2 (determined by council in this example)

4. Total number of bins required

Garbage (skips)	2
Recycling (MGBs)	6
Organics (MGBs)	2
Total	**10***

***Note:** this does not include allowance for contingency / spare bins*

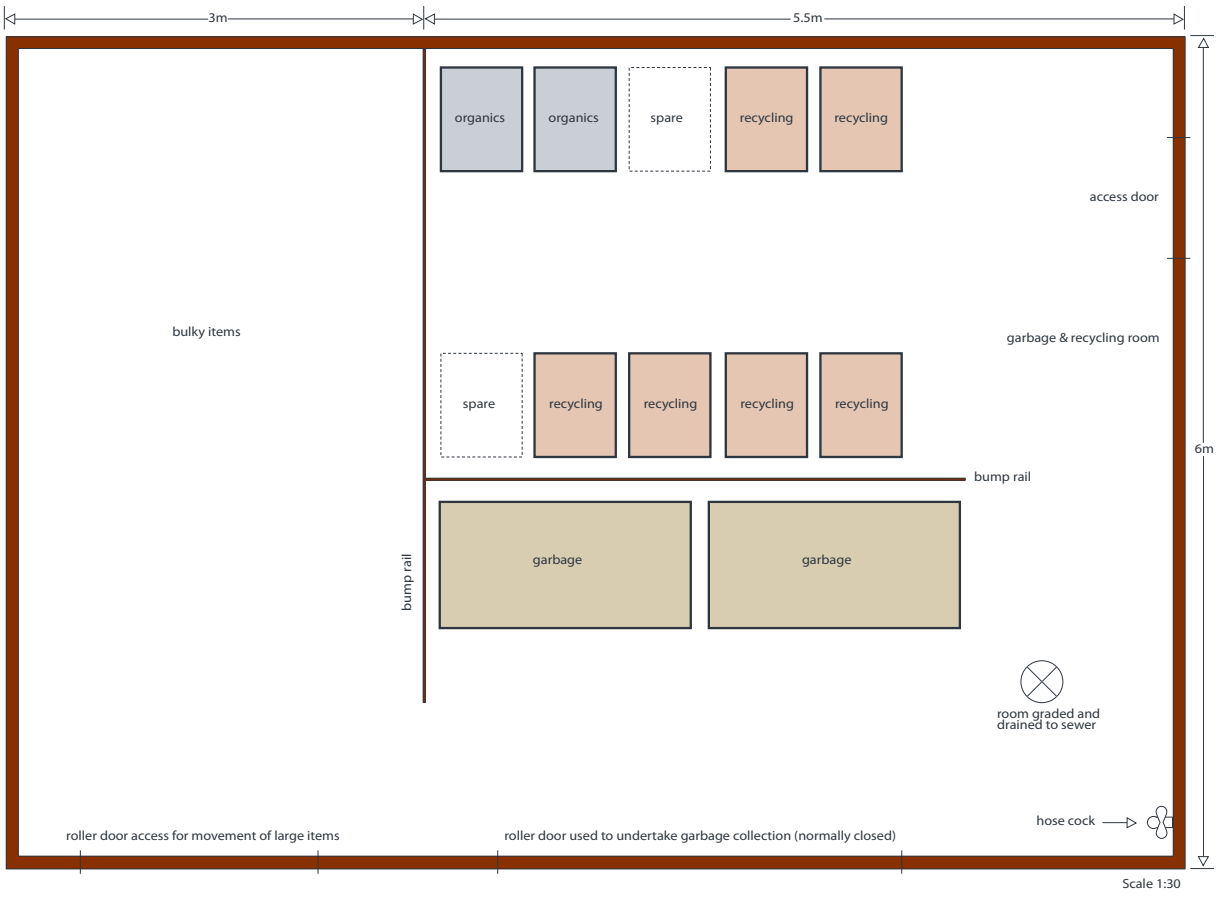
5. Bulky items storage

It is decided to provide bulky items storage for this development. An allowance of 18m^2 is there for this purpose.

***Note:** Storage areas for bulky items should be provided in multi-unit dwellings. To calculate the size of the storage area the following factors should be considered: the number of units in the building; the frequency between collections of bulky items; and the anticipated turnover of residents. A figure of 18m^2 is provided here as an example only – this area may not be applicable to all developments accommodating 36 units.*

Possible communal area layout

OR



Example 4: Sizing of a communal storage area used for garbage and recycling bins that service 50 units.

Garbage services to the development will be provided using 240L MGBs. Garbage is transferred from the development to the communal storage area via a chute. The chute discharges waste into a MGB rotating carousel compactor with a compaction ratio of 2:1.

Commingled recycling is collected in 240L MGBs.

Garbage is collected twice per week. Recycling is collected weekly.

The development is not provided with a garden organics service as limited open space and garden areas are limited. A gardening contractor removes from site any garden prunings that are generated during routine maintenance.

1. Estimate number of garbage bins required

Waste generated = 50 units X 80 L/unit/week = 4000 L/week

Equivalent compacted volume of waste = 4000 L/week / 2 (compaction ratio)
= 2000 L/week

Waste generated between collections = 2000 L/week / 2 collections/week
= 1000 L/collection

Number of garbage bins required = 1000 L / 240 L
= 5

2. Estimate number of recycling bins required

Commingled recycling generated = 50 units X 40 L/unit/week = 2000L/week

Number of recycling bins required = 2000 L/week / 240L/week (weekly recycling collection)
= 9

3. Estimate number of organics bins required

Garden organics bins required = 0 (determined by council in this example)

4. Total number of bins required

Garbage	5
Recycling	9
Organics	0
Total	14*

***Note:** this does not include allowance for contingency/spare bins*

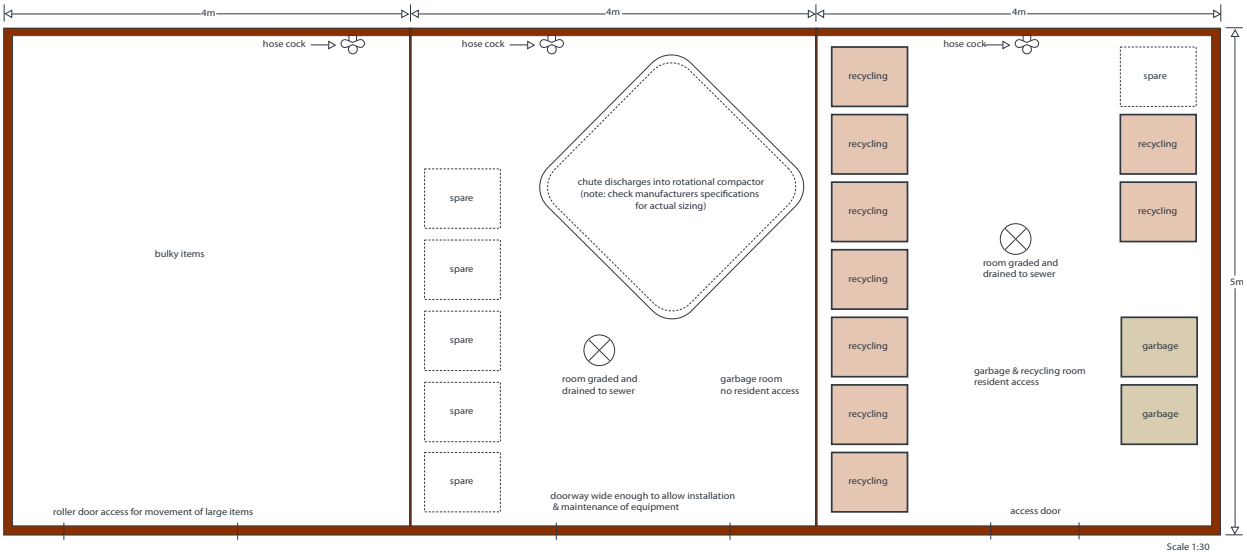
5. Bulky items storage

It is decided to provide bulky items storage should be provided for this development. An allowance of 20m^2 is there for this purpose.

***Note:** Storage areas for bulky items should be provided in multi-unit dwellings. To calculate the size of the storage area the following factors should be considered: the number of units in the building, the frequency between collections of bulky items and the anticipated turnover of residents. A figure of 20m^2 is provided here as an example only – this area may not be applicable to all developments accommodating 50 units.*

Possible communal area layout

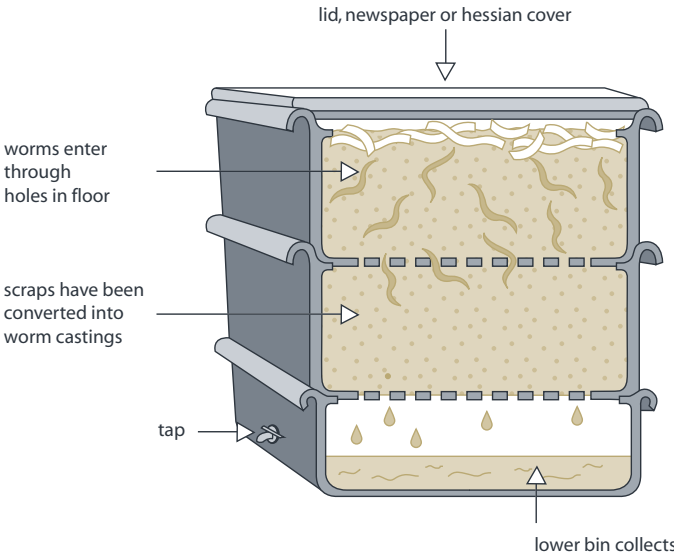
Note: In the above example resident access is restricted to the room housing the garbage chute and rotational compactor. Additional garbage MGBs are therefore provided next to the recycling MGBs to avoid contamination of recyclables. Spare garbage MGBs are also located adjacent to the rotational compactor so the caretaker can replace the full garbage bins (under the compactor unit) as required.



Appendix B

Waste Management Equipment

Worm farms



Space requirements for a typical worm farm for an average household:

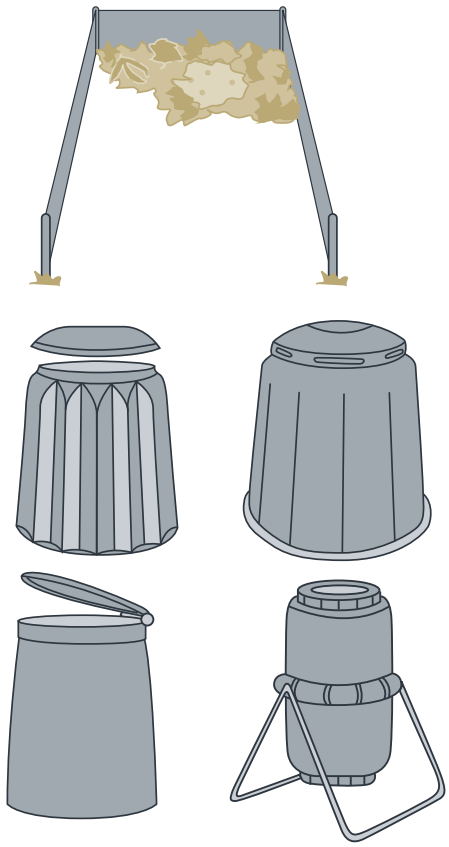
Height – 300mm per level

Width – 600mm

Length – 900mm

There are many worm farm arrangements. The above dimensions are indicative only.

Compost bins and piles

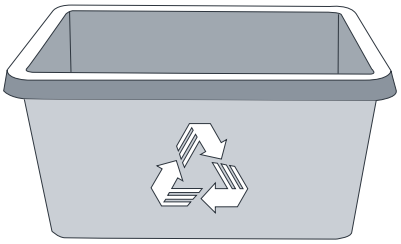


The footprint area requirement for a typical compost pile is 1000m x 1000m.

A variety of compost bins are available from manufacturers or through many local councils.

There are many compost bin and compost pile arrangements. The above dimensions are indicative only.

Crates



Crate size	50L Crate	70L Crate	90L Crate
Height	320 mm	395 mm	420 mm
Length	575 mm	575 mm	450 mm
Width	445 mm	445 mm	450 mm

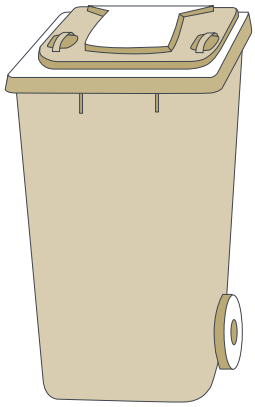
The above dimensions are indicative only of common crate sizes

Mobile garbage bins (MGBs)

MGBs with capacities up to 1700L should comply with the Australian Standard for Mobile Waste Containers (AS 4123). AS 4123 specifies standard sizes and sets out the colour designations for bodies and lids of mobile waste containers that relate to the type of materials they will be used for.

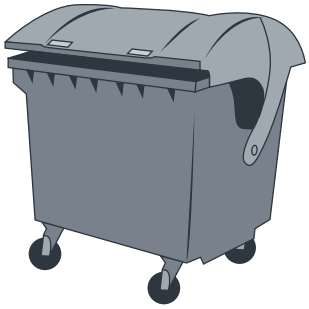
Indicative sizes only for common MGB sizes are provided below. Note that not all MGB sizes are shown; the dimensions are only a guide and differ slightly according to manufacturer, if bins have flat or dome lids and are used with different lifting devices. Refer to AS 4123 for further detail.

Mobile containers with a capacity from 80L to 360L with two wheels



Bin Type	80 Litre MGB	120 Litre MGB	140 Litre MGB	240 Litre MGB	360 Litre MGB
Height	870 mm	940 mm	1065 mm	1080 mm	1100 mm
Depth	530 mm	560 mm	540 mm	735 mm	885 mm
Width	450 mm	485 mm	500 mm	580 mm	600 mm

Mobile containers with a capacity from 500L to 1700L with four wheels

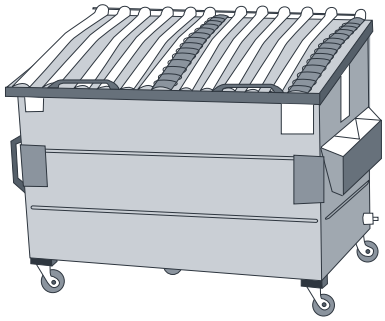


Dome or flat lid containers

Bin Type	660 Litre MGB	770 Litre MGB	1100 Litre MGB	1300 Litre MGB	1700 Litre MGB
Height	1250	1425	1470	1480	1470
Depth	850	1100	1245	1250	1250
Width	1370	1370	1370	1770	1770

Bulk bins greater than 1700L capacity

The following bulk bin dimensions are a guide only and may differ slightly according to manufacturer.
Not all available bulk bin sizes are shown.



Bin Type	2.0 m^3 Skip	3.0 m^3 Skip	4.5 m^3 Skip
Height	865 mm	1225 mm	1570 mm
Depth	1400 mm	1505 mm	1605 mm
Width	1830 mm	1805 mm	1805 mm

Underground bins

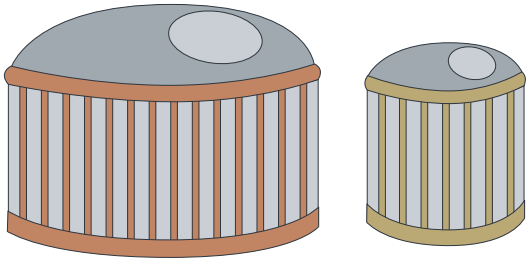
Underground bins use hidden capacity by installing large collection containers below ground level. The general user does not see the container but simply a small portion of the container or a small bin above ground.

Underground bins are available in sizes up to 5,000L or more. These bins offer the advantage of having a large storage capacity that can effectively manage the waste from many dwellings, with a small, above ground footprint requirement. Below ground storage of waste is an advantage, particularly in summer as the waste is kept cool. The frequency of bin collection may also be reduced significantly, subject to appropriate control of odour and leachate.

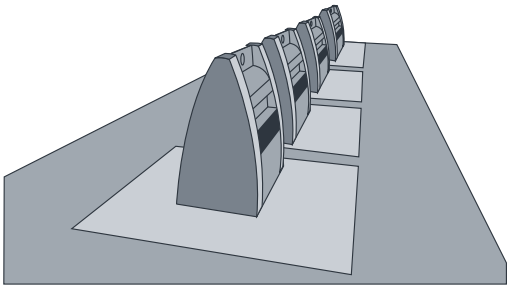
A waste collection vehicle that has been modified with a hook-arm or crane typically collects waste from underground bins. The hook attaches to the bin and draws it from the ground. The bin is held over the hopper of the waste collection vehicle and emptied by a trap-door system or by pulling a cord holding the lining at the base of the bin (this differs between bin manufacturers). An appropriate location for the bin and access for collection vehicles are therefore very important due to the servicing method.

Underground bins are well suited to collect garbage. However, depending on the bin capacity, they may not be as suitable for collecting recyclables as the greater the depth of the bin, the greater the risk of glass breakage when recyclables are dropped in. The bulky nature of cardboard and the weight of source-separated paper may also detract from the potential suitability of underground bins for recycling. Information and further details of potential materials that can be managed using this type of bin should be sought from manufacturers.

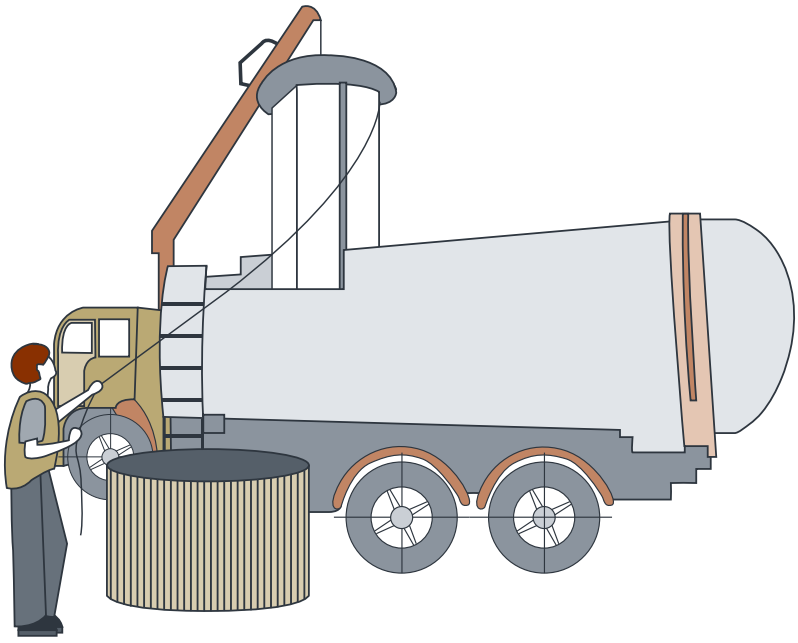
Note: both dome and litter-bin-type underground bins are collected using a similar overhead crane mechanism. The connection of the bin to a rope (as shown above) may not be required for some automated systems.



Dome/round type underground bins



Litter bin-type underground bins



Collection of underground bins.

Chutes

Chutes are only suitable to transfer garbage, and are not suitable to transfer recyclables. Firstly, the drop generally results in the damage, or even destruction, of the recyclable material – particularly glass. Secondly, cardboard could easily become stuck in the chute and cause a fire hazard. Other recyclables, such as paper and plastics, are also highly flammable. Therefore, having large quantities of recyclables stored at the bottom of a long shaft that runs the height of the building could constitute a fire hazard.

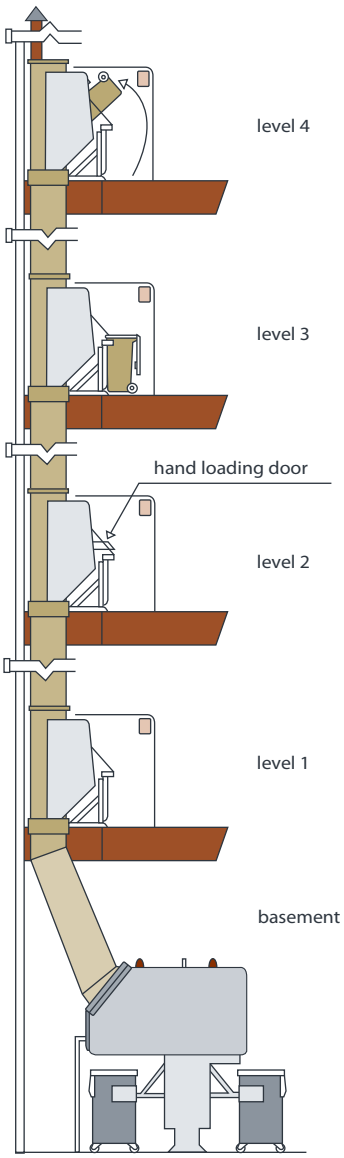
Chutes should be designed to reduce noise and fire risks associated with their use. They should be cylindrical in section to avoid waste being caught within the chute, and with a diameter of 500mm or greater.

A service room (or compartment) needs to be provided on each floor of the development to allow access to the garbage chute. Chutes should not open onto any habitable or public space. Hopper doors are to have an effective self-sealing system.

Chutes should terminate in a garbage and recycling room and discharge directly into a receptacle or waste compactor in a manner that avoids spillage and overflow.

Chutes should be completely enclosed in a fire-rated shaft constructed of an approved material and fitted with sprinklers in accordance with the Building Code of Australia.

See manufacturer(s) for exact specifications.



Service lifts

A service lift (or service elevator) may be appropriate in place of a waste chute in developments where a caretaker will be employed.

A service lift is dedicated to the transport of garbage and recycling containers and other equipment required for the operation of the development.

Provide an interim storage room on each floor of the development to allow residents to store waste and recyclables. Residents place their waste and recyclables in bins provided and these are transported daily by the caretaker to the waste storage room. Each service room needs to be designed with sufficient space for the storage of one day's garbage and recycling for all residents on that level.

Developers will need to check with council whether this option is acceptable.

Compactors

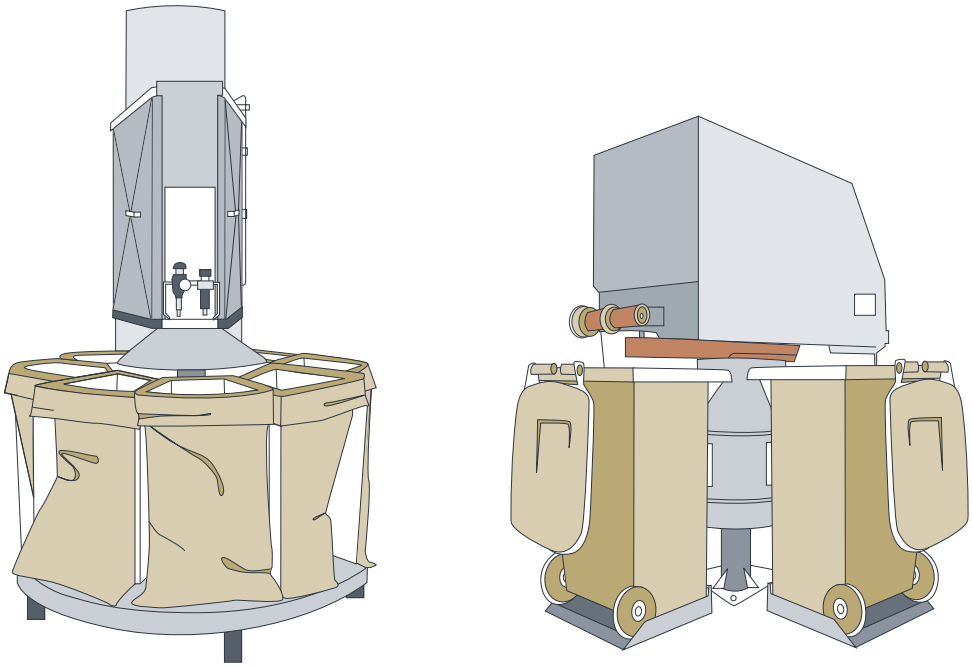
Compactors are used to compress the waste (or recyclables) into smaller collection containers. The compaction ratio is typically set at around 2:1. Higher ratios are not used as they may result in heavier bins, causing OH&S problems, mechanical damage and may break recyclable materials. They may also cause compacted waste to get jammed in the base of the bins, making it difficult to empty the contents.

Better practice compaction systems compact directly into a 240-litre MGB or a skip, reducing the requirement to manually load the compacted waste into bins or skips.

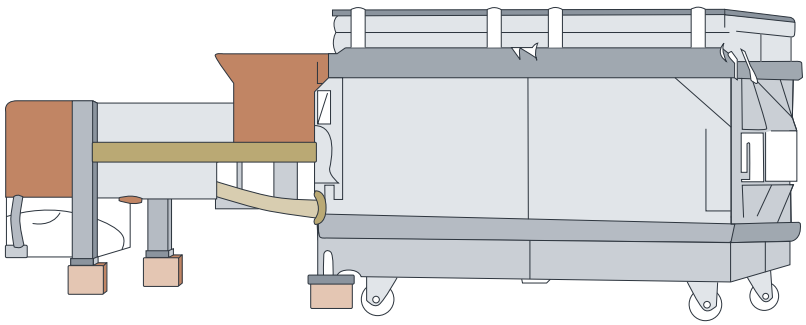
Compactors are extremely useful for mixed garbage or cardboard/paper or plastic/aluminium containers. They are less useful for steel containers and should not be used for glass.

Compactors require regular maintenance. In particular, systems fed from a chute can be prone to blockages or failure of the 'electronic eye', which can result in garbage overflowing or backing up the chute.

The 2:1 compaction ratio will halve the requirement for garbage storage bins.



Rotational (carousel) compactors

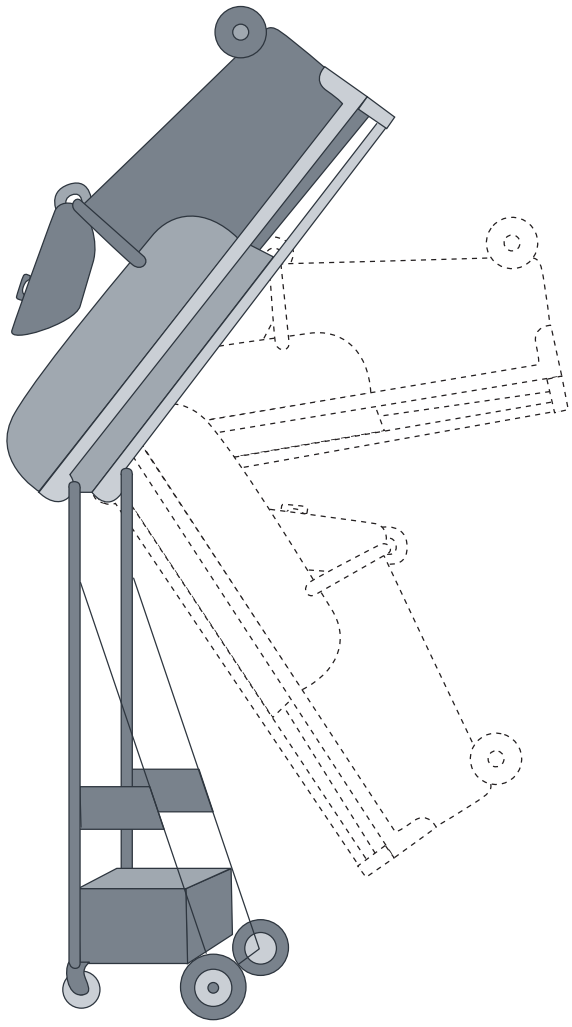


Static compactors

Bin lifters

If there is a requirement to empty MGBs of waste into bulk skips or compactors, a hydraulic bin-lifting device should be provided to eliminate the need for manual lifting.

Bin lifters are available for a variety of tipping applications, including various size bins and containers, and designed to tip into containers of various heights. They can be battery powered or connected to mains power. Some models also come with safety cages.



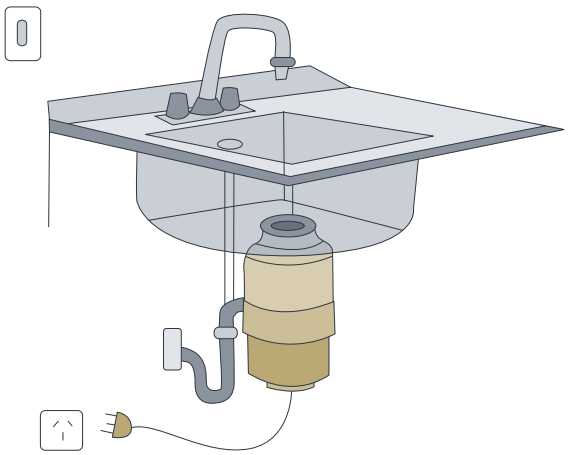
In-sink food waste disposer units

An in-sink food waste disposer unit is an electrical and mechanical appliance that is installed under the kitchen sink and connected to the drain. Food waste is fed into the unit. The disposer grinds the food waste until it is liquid enough to flow through the pipes and into the sewage system or septic tank.

Some councils and local water authorities do not support the use of this technology due to the increased load they place on the sewage system and because they could detract from organics recovery objectives.

Before incorporating an in-sink food waste disposer unit in MUDs:

- liaise with council to investigate what garden and/or food organics collection service will be available to the development; and
- consult with the local water authority and council to find out if it is permissible to install this technology in the local area.



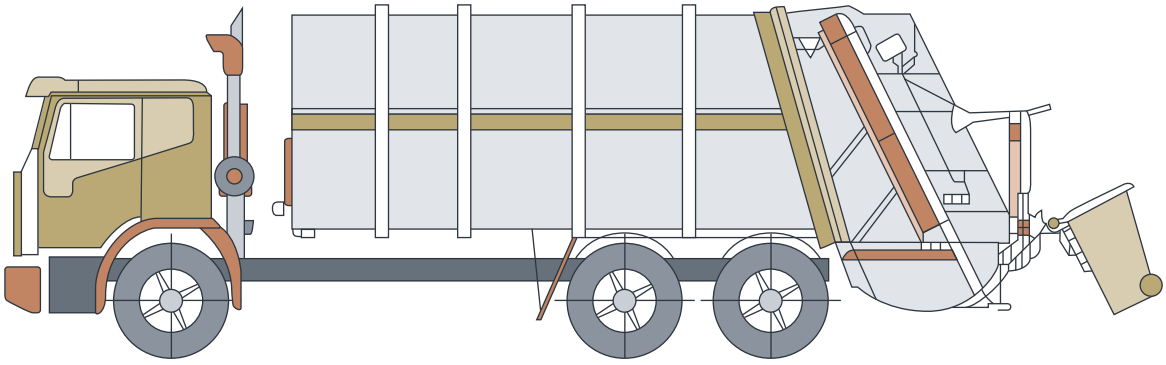
Appendix C

Collection vehicles

Waste collection vehicles may be side loading, rear-end loading, front-end loading or crane trucks. The size of vehicle varies according to the collection service. Thus it is impossible to specify what constitutes the definitive garbage vehicle. Developers should consult the local council and/or relevant contractors regarding the type of vehicle used in that area.

The following characteristics represent the typical collection vehicle, however, these are only for guidance.

It may be possible to engage a collection service provider to use smaller collection vehicles to service developments with narrow roadways and laneways, or for on-site collections. However, as the availability of smaller vehicles to make services varies between councils and private contractors, wherever possible the development should be designed to accommodate vehicles of a similar size to that reported below.

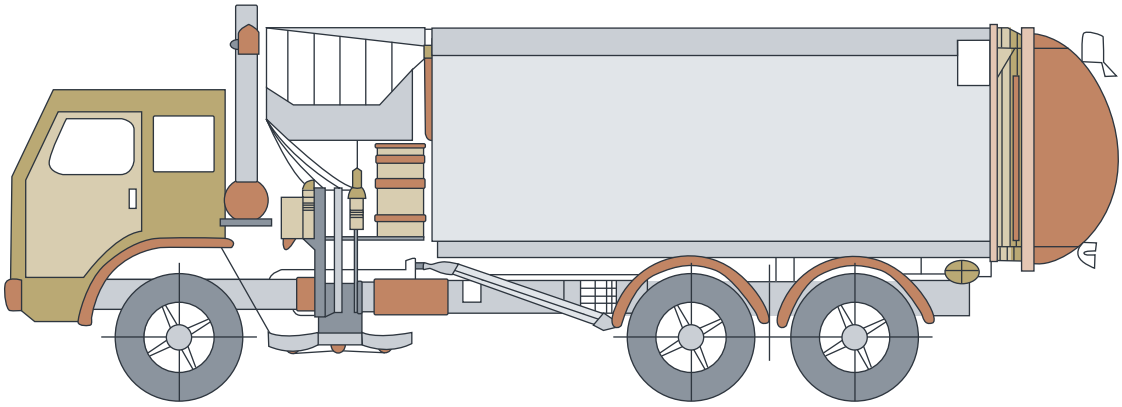


Rear loading collection vehicle

This is commonly used for domestic garbage and recycling collections from MUDs. It can be used to collect waste stored in MGBs or bulk bins, particularly where bins are not presented on the kerbside.

Rear loading collection vehicle	
Length overall	10.24m
Width overall	2.5m
Operational height	3.5m
Travel height	3.5m
Weight (vehicle only)	12.4 tonnes
Weight (payload)	9.5 tonnes
Turning circle	18.0m

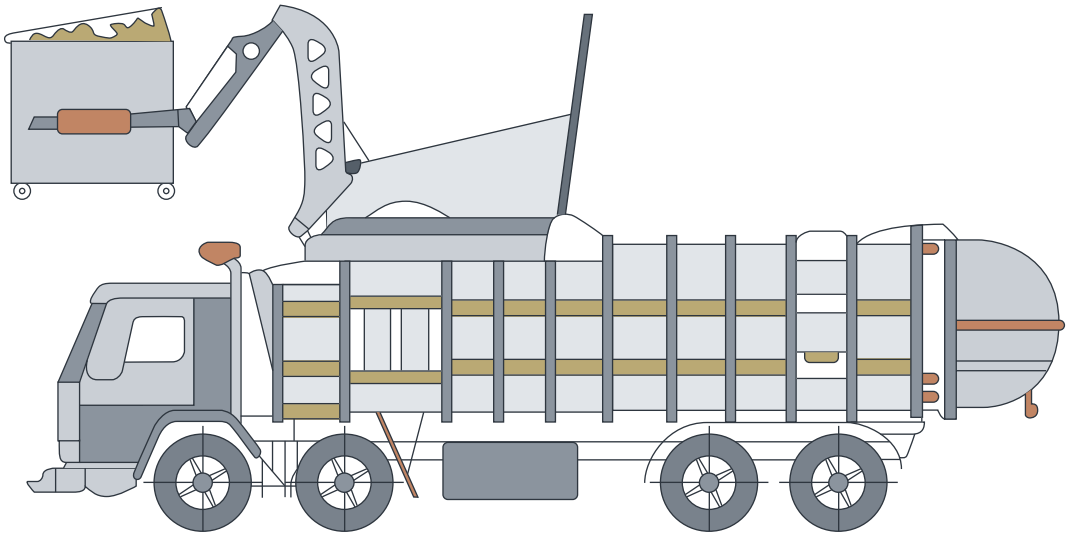
Side-loading collection vehicle



Side-loading collection vehicle	
Length overall	9.64m
Front overhang	1.51m
Wheelbase	5.20m
Rear overhang	2.93m
Turning circle kerb to kerb	17.86m
Turning circle wall to wall	20.56m
Front of vehicle to collection arm	3.8m
Maximum reach of side arm	3.0m
Travel height	3.63m
Clearance height for loading	3.9m

This is the most commonly used vehicle for domestic garbage and recycling collections. It is only suitable for collecting MGBs up to 360 litres in size.

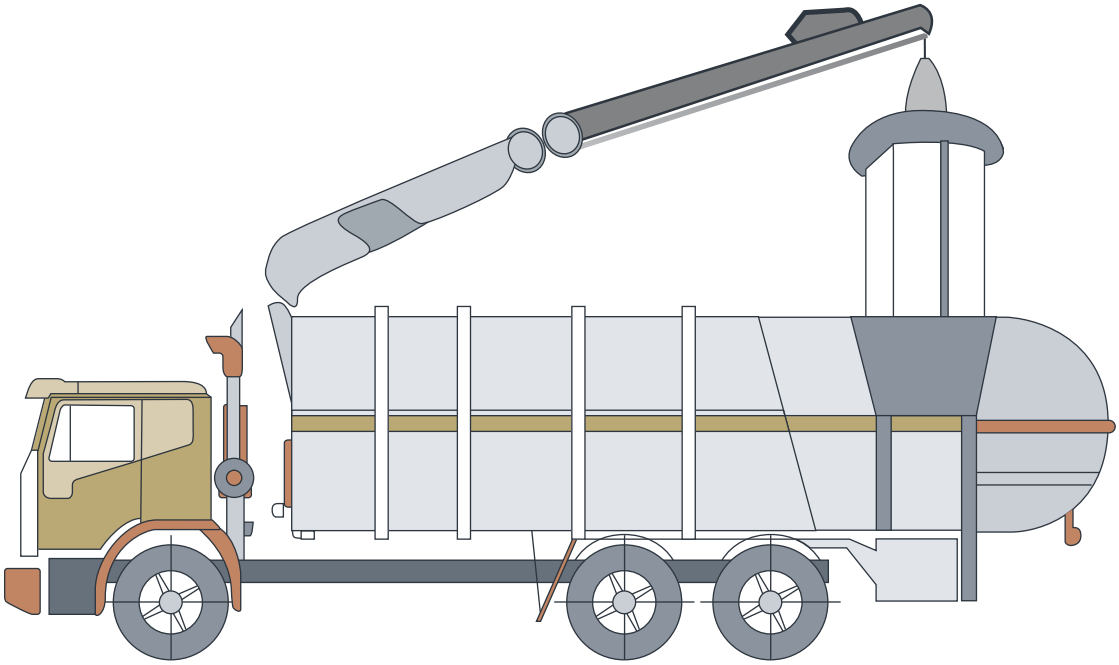
Front-lift loading collection vehicle



Front-lift loading collection vehicle	
Length overall	10.52m
Front overhang	1.51m
Wheelbase	5.84m
Rear overhang	3.17m
Turning circle kerb to kerb	22.10m
Turning circle wall to wall	23.66m
Travel height	3.82m
Clearance height for loading	6.1m

This is mainly used for collecting commercial and industrial waste, and is only suitable for bulk bins with front lift pockets (not MGBs).

Crane trucks



Crane truck collection vehicle	
Length overall	10.0m
Width overall	2.5m
Weight (vehicle only)	13.0t
Weight (payload)	9.5t
Turning circle	18m
Travel height	3.8m
Clearance height for loading	8.75m

This type of truck is used to collect underground bins.

Appendix D

Vehicle access/Turning circles

General

Appropriate heavy vehicle standards should be incorporated into the development design including those specified in Acts, regulations, guidelines, and codes administered by Austroads, Standards Australia, the NSW Roads and Traffic Authority, NSW WorkCover and any local traffic requirements.

Designers are encouraged to consult with council and other relevant authorities prior to the design of roads and access points to ascertain specific requirements for the proposed development.

Road and driveway construction and geometry

Roads and driveways must be designed and constructed in accordance with the relevant authority requirements to allow the safe passage of a laden collection vehicle in all seasons.

Factors to be considered in design include:

- gradients for turning heads;
- longitudinal road gradients;
- horizontal alignments;
- vertical curves;
- cross-falls;
- carriageway width;
- verges;
- pavement widths;
- turning areas (see below);
- local area traffic management requirements (for example speed humps);
- sight distance requirements;
- clearance heights (for example a vertical clearance of 6.5m is required to load front-lift vehicles);
- manoeuvring clearance; and
- road strength (industrial-type strength pavement required, designed for a maximum wheel loading of seven tonnes per axle to accommodate garbage and recycling collection vehicles).

Collection from basements

Collection vehicles may enter building basements to collect waste and/or recyclables provided the following requirements are met:

- compliance with Australian Standard AS 2890.2 Parking Facilities: Off-Street Commercial Vehicle Facilities;
- the height to the structural members and upper floor ceiling should allow for a typical collection vehicle travel height/operational height consistent with the type of vehicle employed;
- adequate provision of space clear of structural members or vehicle parking spaces to allow a typical three-point turn of collection vehicles; and
- the basement floor should be of industrial-type strength pavement and designed for a maximum wheel loading of seven tonnes per axle to accommodate garbage and recycling collection vehicles.

Vehicle turning circles

Turning circles and clearances to kerbs, existing buildings or other obstructions should be designed to accommodate the largest size collection vehicle that could service the property.

Any turning circle considerations must also include allowances for driver steering error (manoeuvring clearance) and overhangs.

As a guide, a turning circle of 25m diameter kerb to kerb (27.8m diameter wall to wall, swept circle)[16] would accommodate most standard waste collection vehicles. A manoeuvring clearance of at least 0.3 metres (absolute minimum) on both sides of the theoretical swept circle path should be accommodated.

Better practice design for access and egress from a development calls for a separate entrance and exit to allow the collection vehicle to travel in a forward direction at all times. Where there is a requirement for collection vehicles to turn at a cul-de-sac head within a development, the design should incorporate either a bowl, T- or Y-shaped arrangement. Vehicles should only be expected to make a three-point turn to complete a U-turn.

Vehicle turning circles can be reduced from that listed above (or as noted in the table below) by using a mechanical turntable (or similar) equipment. However, this type of equipment comes at an associated cost and requires regular maintenance to ensure it remains in good operating condition.

16 Kerb-to-kerb measurements are based on the movement of the front outside tyre. Wall-to-wall (swept circle) measurements consider vehicle overhang and are based on the outermost extremity of the vehicle as it corners.

Templates

Turning circle templates and reverse entry templates for medium and heavy rigid vehicles are provided below.

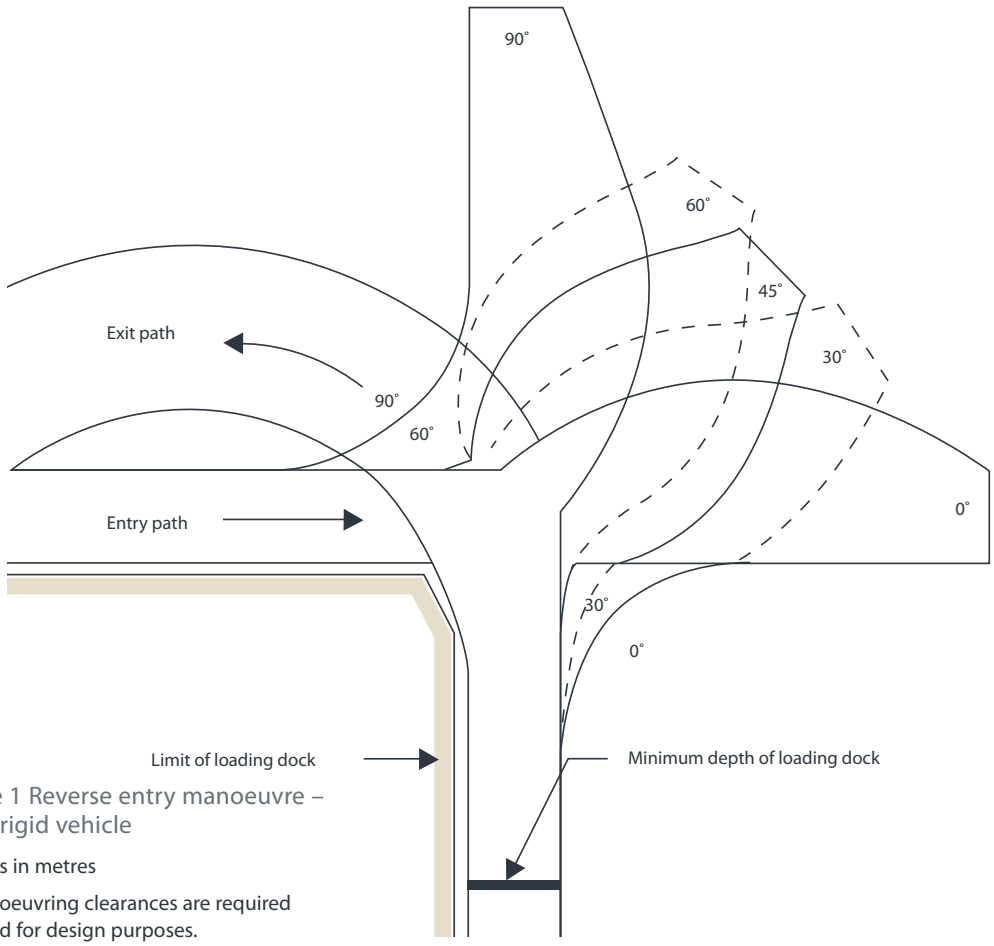
- Turning path templates – should be used in the design of access driveways and circulation roadways, and in checking on the path of vehicles leaving service bays.
- Reverse entry templates – should be used in the design of service bays and service area aprons to accommodate the backing manoeuvres required to undertake a Y-shaped turn.

These templates can be printed and copied onto a transparent medium or imported into computer drawing packages to check vehicle paths on intersection layout drawings.

These templates are applicable for the following vehicle dimensions:

Vehicle class	Overall length (m)	Design width (m)	Design turning radius (m)	Swept circle (m)	Clearance (travel) height (m)
Medium rigid vehicle	8.80	2.5	10.0	21.6	4.5
Heavy rigid vehicle	12.5	2.5	12.5	27.8	4.5

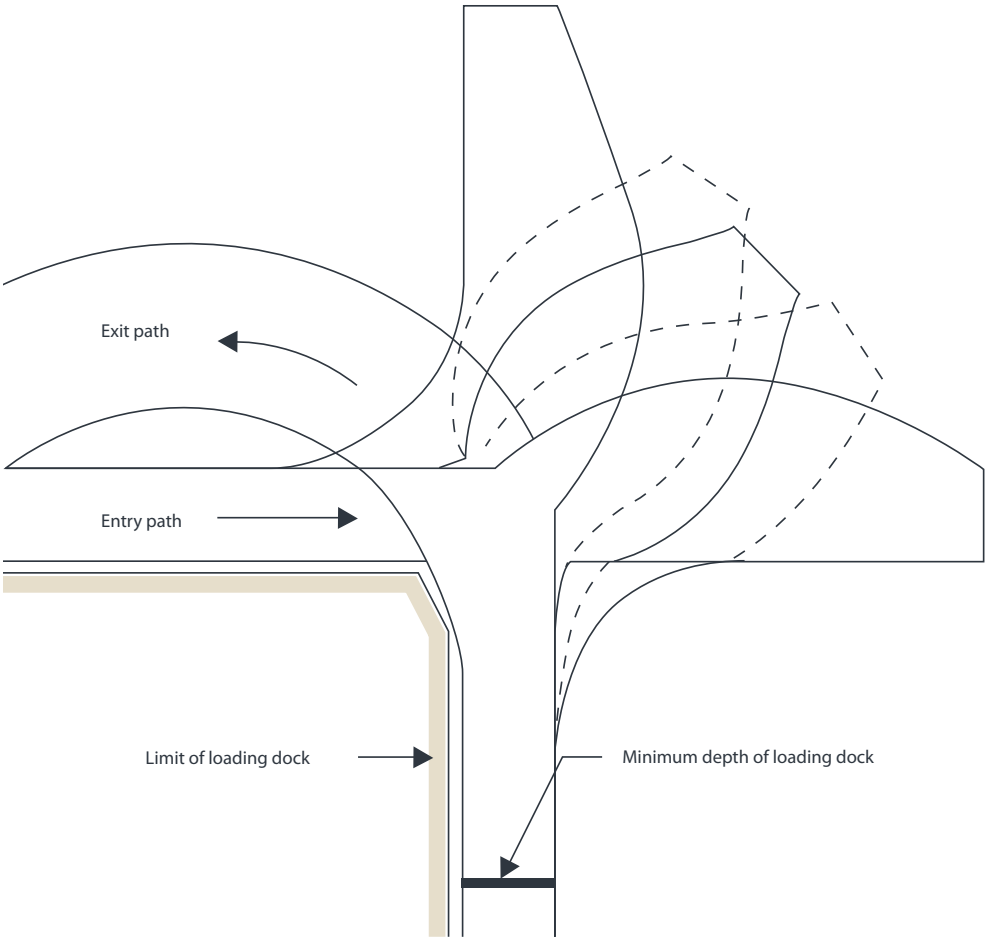
Templates have been sourced from AS 2890.2 Parking Facilities: Off-Street Commercial Vehicle Facilities. Please refer to this standard for the latest vehicle access requirements. This standard is available from SAI Global (www.saiglobal.com) through its webshop.



Template 1 Reverse entry manoeuvre – medium rigid vehicle

Dimensions in metres

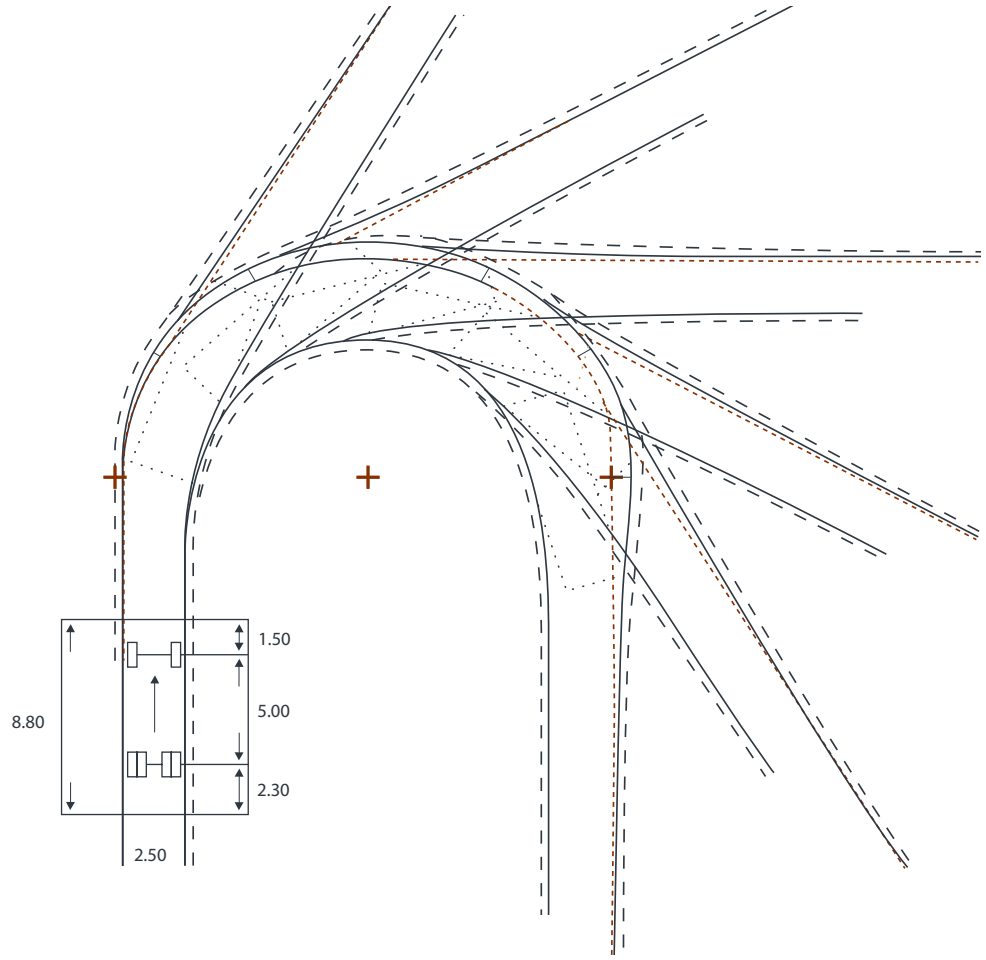
Note: manoeuvring clearances are required to be added for design purposes.



Template 2 Reverse entry manoeuvre – heavy rigid vehicle

Dimensions in metres

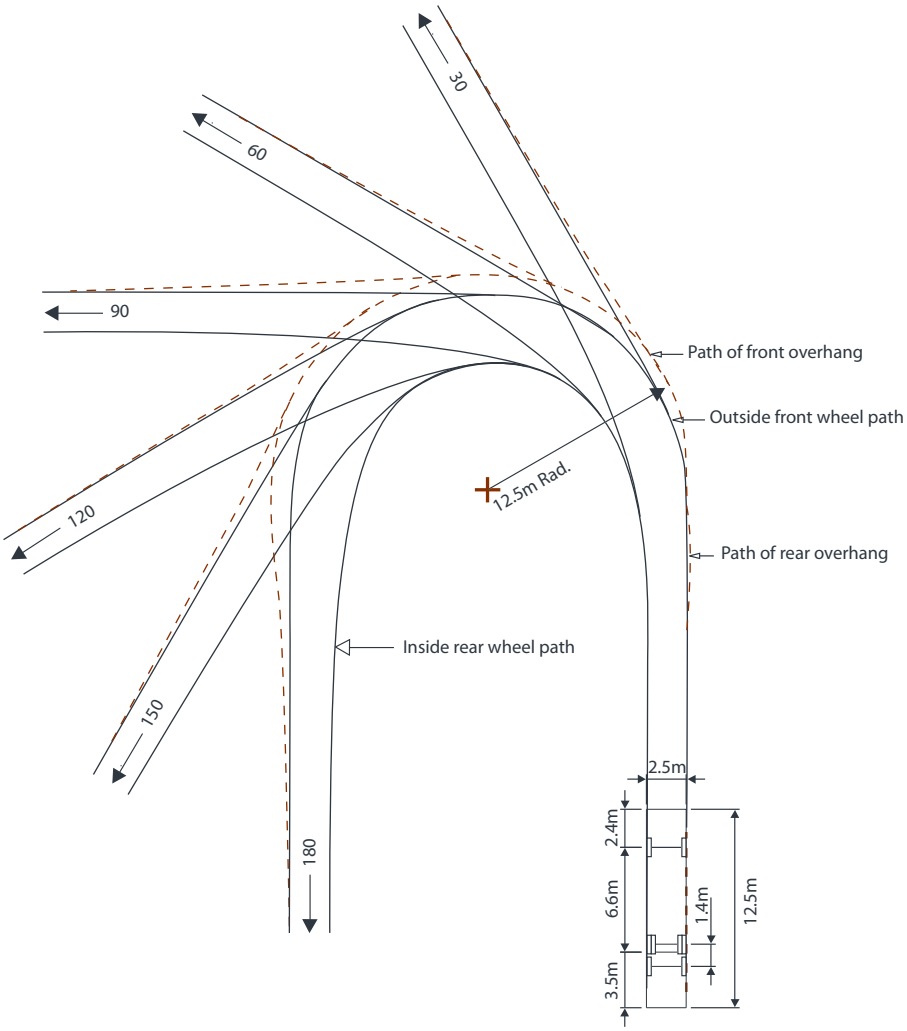
Note: manoeuvring clearances are required to be added for design purposes.



Template 3 Turning path template – medium rigid vehicle

Dimensions in metres

Minimum radius turn 10m



Template 4 Turning path template – heavy rigid vehicle

Dimensions in metres

Minimum radius turn 10m

Appendix E

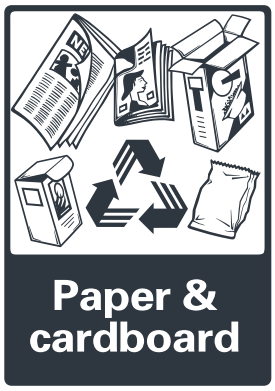
Standard signage

Waste signs

Signs for garbage, recycling and organics bins should comply with the standard signs promoted by the DECC.

Standard wall posters and bin lid stickers are available for download and printing from the Local Government section of the DECC website www.environment.nsw.gov.au, in black and white and appropriate coloured versions where applicable.

Example wall posters



Example bin lid stickers

Safety signs

The design and use of safety signs for waste rooms and enclosures should comply with AS 1319 Safety signs for the occupational environment. Safety signs should be used to regulate and control safety related to behaviour, warn of hazards and provide emergency information, including fire protection information. Below are some examples. Each development will need to decide which signs are relevant for its set of circumstances and services provided.

Examples of Australian Standards:

Australian Standards are available from the SAI Global Limited website (www.saiglobal.com).

Appendix F

Checklist

The following checklist has been developed to confirm that the main issues essential for waste management have been considered in the building design. Use this checklist as a tool to ensure better practice principles have been considered in the design of proposed garbage and recycling facilities.

Key issues	Completed	Not applicable
Initial planning		
■ Have you consulted planning authorities and council to find out what planning regulations, codes and policies apply to the development?	✶	✶
■ Have you talked to council to find out available garbage and recycling services and identify future service requirements?	✶	✶
Selected garbage and recycling systems (general)		
■ Does the development incorporate sufficient provisions to meet the garbage and recycling requirements for each tenant (both residential and commercial)?	✶	✶
■ Are systems easy to use and intuitive?	✶	✶
■ Will waste bins and containers conform to relevant design standards?	✶	✶
■ Will waste handling equipment, including chutes and compactors, conform to the relevant design and safety standards?	✶	✶
Storage space		
■ Is there sufficient space within each residential unit to accommodate interim storage of at least two days' segregated garbage and recycling?	✶	✶
■ Is there sufficient space within the property boundary to store, in separate bins or containers, the volume of garbage and recycling (and garden organics where appropriate) likely to be generated at the development during the period between collections?	✶	✶
■ Is bulky waste storage space required and has it been allowed for, taking into account potential servicing requirements specific to council?	✶	✶
■ Have storage areas been designed to accommodate easy access for manoeuvring bins and cleaning the storage area(s)?	✶	✶
■ Have storage areas been designed to allow space for signs and education materials to be displayed?	✶	✶
■ Is there allowance for future service flexibility incorporated in the design?	✶	✶
■ In communal storage areas, if applicable, has the design taken into account the need to separate services (such as meter boards) from waste storage areas? Where this is not possible, has additional space been allowed to prevent potential damage to services?	✶	✶
■ Is there room for each unit to have a home worm farm or compost bin?	✶	✶

Key issues	Completed	Not applicable
Storage location		
■ Are storage locations conveniently located for residents?	★	★
■ Are storage areas located in a high pedestrian traffic area?	★	★
■ Are storage areas out of sight or well screened from the street?	★	★
■ Are storage areas located an appropriate distance from dwellings to reduce potential amenity impacts?	★	★
■ Are communal composting areas, if appropriate to the development, located with consideration for the potential amenity and environment impacts?	★	★
Waste collection points		
■ Have collection points been identified that are **not** located:		
near intersections;	★	★
near roundabouts or slow-points;	★	★
along busy arterial roads;	★	★
in narrow lanes;	★	★
near possible obstructions, including trees, overhanging buildings and overhead powerlines; or	★	★
where they pose a traffic hazard.	★	★
■ Is on-site servicing required? If so, have you talked to council to find out if it provides this service?	★	★
■ Where there is agreement for on-site collection with the service provider, has an on-site collection point(s) been identified so that:		
Collection vehicles do not interfere with the use of access driveways, loading bays or parking bays during collections.	★	★
They will be in a position that enables collection vehicles safe access to the collection point and has adequate clearance and manoeuvring space.	★	★
There is clear vision of oncoming traffic as the collection vehicle leaves the property.	★	★
■ Are collection point(s) located on a level surface away from gradients and vehicle ramps?	★	★
■ Where MGBs are to be used and collected from the kerb, is there sufficient space on an adjacent street for them to be lined up neatly in (preferably) a single row?	★	★
Transfer of bins to the collection point		
■ Is the bin transfer route free of steps?	★	★

Key issues	Completed	Not applicable
■ Where bins of 360L need to be wheeled to the collection point, are the following criteria met:		
The distance should not exceed 75m in all circumstances.	✶	✶
the distance should be limited to 50m where elderly persons will be moving bins.	✶	✶
the bin transfer grade should not exceed 1:14.	✶	✶
■ Are the following criteria met where bins or skips of greater than 360L capacity need to be wheeled from the intermediate storage point to the collection point:		
If less than or equal to 1.0m^3 in capacity, should not need to be wheeled more than 5m from the intermediate storage point to the collection point.	✶	✶
If greater than 1.5m^3 in capacity, manual manoeuvring of bins should be avoided wherever possible. Where it cannot be avoided (for example if bins are stored in a room or enclosure), the bins should not need to be wheeled more than 3m from the intermediate storage point to the collection point.	✶	✶
The bin transfer grade should not exceed 1:30.	✶	✶
Access for collection vehicles		
■ Does the design allow for the waste collection vehicle to move in a forward direction with no (or minimal) need to reverse?	✶	✶
■ Does the design accommodate access for heavy vehicles to collection points in accordance with relevant acts, regulations, guidelines, and codes administered by Austroads, the NSW Roads and Traffic Authority, NSW WorkCover and any local traffic requirements?	✶	✶
Occupational health and safety		
■ Has there been a preliminary risk and hazard analysis to identify potential OH&S risks associated with the proposed services and design layout?	✶	✶
■ Has the design been modified to eliminate or minimise wherever possible the identified risks?	✶	✶
Noise		
■ Has the development design considered better practice measures to minimise noise associated with use and servicing of the waste management facilities?	✶	✶
Odour		
■ Does the design incorporate ventilation for enclosed storage areas?	✶	✶
■ Does ventilation comply with the relevant codes and standards?	✶	✶
■ Are ventilation openings located as near the ceiling and floor as possible, but away from the windows of dwellings?	✶	✶
■ Are ventilation openings protected against flies and vermin?	✶	✶

Key issues	Completed	Not applicable
Hygiene		
■ Have storage areas been designed to prevent the entry of vermin?	✶	✶
■ Are provisions for a tap and hose and correct drainage to sewer incorporated in communal bin storage areas?	✶	✶
Amenity		
■ Does the design of waste storage areas blend in with the development?	✶	✶
Security		
■ As far as possible, does the design allow easy access for residents but not non-residents to waste services?	✶	✶
■ Are bin areas sufficiently open and well lit to allow their use after dark?	✶	✶
■ Are all internal garbage and recycling rooms and storage areas fitted with fire sprinklers, and rated to fire safety according to the Building Code of Australia?	✶	✶
Signage and education		
■ Does the design specify the need for signs in public areas of the building identifying the location of garbage and recycling bins and storage areas?	✶	✶
■ Does the design specify requirements for signs providing instructions on how to use the garbage and recycling facilities, including identifying what is and isn't recyclable?	✶	✶
■ Have requirements for safety signs been identified?	✶	✶
Ongoing management		
■ Is there a need to employ a building manager/caretaker and/or gardener:		
To manage communal composting or worm farms?	✶	✶
For transporting bins to the collection point?	✶	✶
■ Has an ongoing management plan been developed that identifies responsibilities for:		
Moving bins to and from the storage point to the collection point (if required) on collection day?	✶	✶
Washing bins and maintaining storage areas?	✶	✶
Arranging for the prompt removal of dumped rubbish?	✶	✶
Arrangements for consistent signs on all bins and in all communal storage areas?	✶	✶
Ensuring all residents are informed of the garbage and recycling arrangements?	✶	✶