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South Australia
Better Practice Guide Waste Management
for Residential and Mixed Use Developments

Zero Waste SA

Zero Waste SA, established by the *Zero Waste SA Act 2004*, provides strategic policy advice and direction to government and stakeholders. It undertakes programs and projects that maximise waste reduction and promote recycling and sustainability. It engages with the community, business and government, building partnerships for change.

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Renewal SA

Renewal SA is charged with leading urban renewal activities on behalf of the Government of South Australia, including key priorities around affordable housing, renewal of social housing stock, and significantly contributing to achieving outcomes sought for urban development through the *30-Year Plan for Greater Adelaide.*

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Property Council of Australia

Property Council of Australia is a leading advocate for Australia's property industry fostering a more informed, connected and professional property marketplace. It serves the interests of companies across all spheres of property investment activity as well as property developers and managers.

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Foreword

We are pleased to present this guide for developers, project managers, planners, architects, facilities managers and the waste industry.

Developed in partnership with Zero Waste SA, Renewal SA and the Property Council, this guide is an important step towards encouraging good practice in managing waste in new residential and mixed use developments.

South Australia's increasing population and the way that people are choosing to live is increasing the need to plan for smarter growth, particularly in metropolitan Adelaide. Sustainable development, through a greater emphasis on infill growth, is an emerging trend in South Australia and has been presenting new challenges.

Residents and tenants expect efficient and convenient waste and recycling services as a minimum service. With space at a premium, innovative and efficient waste management systems need to be incorporated during the design of the development to ensure service needs can be met.

Well designed developments need to consider how wastes and recyclable materials flow from within the property to a disposal point and through to where waste is collected. This guide provides valuable assistance in the design and operation of a waste management system for different types of development ranging from small townhouses to inner-city apartments and mixed use developments.

Affordable solutions to manage waste through functional and convenient systems will encourage greater recovery of resources and enhance the quality of life for the community.

By linking land use planning with best practice information for waste and recycling in new urban communities and mixed use developments we can achieve a clean, safe and attractive environment to live and work in.

We commend this publication for its practical guidance and expect it will become the authoritative resource for the property industry.

Hon John Rau MP
Deputy Premier
Minister for Planning
Minister for Housing and Urban Development

Hon Ian Hunter MLC
Minister for Sustainability, Environment and Conservation

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1 Introduction

1.1 Purpose

This Waste Management Better Practice Guide for Residential and Mixed Use Developments (the Guide) is intended to help organisations and businesses involved in planning and designing waste management systems for medium to high density and mixed use developments.

It is hoped that the Guide will be a reference for all the stakeholders in this field in South Australia, encouraging a performance based approach to design better Waste Management Systems (WMS).

The Guide presents design objectives, advice, and information to support better waste management outcomes. It is not prescriptive and it is not a design manual.

In particular, building designers/developers, property owners, business operators, local councils and State Government agencies may refer to the Guide when:

- providing advice on expected requirements for a WMS
- proposing or designing a WMS for a development
- commenting on or assessing an application for development approval.

1.2 Context

For the past decade South Australia has been a leader in waste management reform and resource recovery in Australia and is recognised as such internationally. South Australia is now more resource efficient, recovering and recycling more materials and reducing greenhouse gas emissions from landfill.

South Australia's successes have been solidly based on a source separation model. Waste is sorted into key waste streams (such as food organics, cardboard, paper and metals) by householders and businesses at their premises (at the source). This diverts useful materials away from landfill. Waste materials are then collected, generally by councils or waste contractors, for recycling, energy recovery or disposal.

New developments in South Australia need to accommodate this source separation during design activities.

1.3 Changing urban form

More people in urban environments want to live and work near education, shops, entertainment, open space and public transport. Medium to high density and mixed use buildings are becoming a common feature in metropolitan Adelaide and in some regional centres. Conventional kerbside collection systems may be not be practical or cost-effective.

Poor or inadequate waste management can quickly reduce the appeal of a site and lead to ongoing problems. Developers can support the needs of future owners and tenants in order to increase the attractiveness of the development, contributing to positive market perceptions.

Setting agreed expectations of a well-designed and operated Waste Management System will:

- allow developers to meet requirements early in the design process and offer clarity to all parties
- promote waste minimisation, reuse and recycling
- define responsibility for waste transfer from the point of generation to centralised storage to point of removal
- contribute to the public realm as a safe and secure and attractive environment for pedestrian movement and social interaction.

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1.4 Design objectives and outcomes

The following are a set of recommended design objectives. When setting an objective it is good to understand what outcomes will identify whether the objective has been met.

Design Objective 1: Environmental Sustainability

Design outcomes

Developments have regard to the long term sustainability of the environment when:
- (a) resource recovery is maximised and waste to landfill is minimised
- (b) occupant waste and recycling service requirements are met satisfactorily
- (c) statutory obligations of any predicted waste streams are met.

Design Objective 2: Effective Waste Resource Management

Design outcomes

Developments achieve effective waste resource management when:
- (a) occupants and building managers have functional and convenient separation and disposal of waste and recycling streams (including universal access)
- (b) trip generation and pedestrian travel distances to the point of disposal are minimised
- (c) flexibility in the system's capacity allows for changes in land use and/or generation rates
- (d) storage areas are convenient to primary pedestrian movements (main walking routes through the area)
- (e) collection zones are designed so that waste can be removed from the site safely and conveniently.

Design Objective 3: Clean and Healthy Living Environments

Design outcomes

Developments protect and enhance the quality of life for the community when:
- (a) negative impacts on amenity for residents, neighbours and the public are minimised (visual, noise, traffic, odour, litter and illegal dumping potential)
- (b) waste disposal and collection is hygienic and safe.

Design Objective 4: Affordability

Design outcomes

Developments provide affordable living and working, when:
- (a) up-front investment during construction is optimised
- (b) ongoing waste management is cost effective for residents and tenants.

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2 How to plan for your WMS

2.1 When to start

The design of a new development's Waste Management System should be considered early in the planning process along with other space, infrastructure and activity requirements.

2.2 What constitutes a Waste Management System?

A waste management system includes both the physical infrastructure and operational activities that control or connect how waste and recyclable materials flow through a development. This process includes the point of waste disposal by the tenant/ resident to the collection zone where waste is collected by a truck for off-site disposal or recovery (refer to Figure 2.1).

2.3 The design stages

Like other planning activities, a WMS is normally planned through a staged process until a final and satisfactory detailed design is achieved (Refer to Figure 2.2).

The design process typically involves regular review of design requirements or constraints, which may include ongoing consultation with stakeholders (Refer to Appendix A).

Outcomes from each design stage can be used to prepare a Waste Management Plan (WMP) that Planning Authorities may request (Refer to Section 7 and Appendix D).

Waste Management System		
Step	Operational Activity	Physical Infrastructure
Tenancy / Dwelling	Source separation into waste and recyclables by tenants or residents	Local storage bins or areas in dwelling or tenancies
↓		
Disposal Point	Disposal by tenants or residents into larger bins or waste chutes	Access routes, bins, chutes, disposal or storage rooms or areas, etc.
↓		
Aggregation and Storage	Storage and/or volume reduction in larger bins and/or using equipment	Bins, compactors, balers, storage rooms or areas
↓		
Bin Presentation	Relocation of storage bins or waste/ recycling to collection point or area	Access routes, lifts, trolleys, presentation rooms or areas
↓		
Collection	Collection or emptying of bins for disposal at external location	Collection vehicles, access roads, turning areas, loading areas

Figure 2.1: Key steps, operational activities and associated physical infrastructure in a Waste Management System for a medium to high density residential or mixed use development

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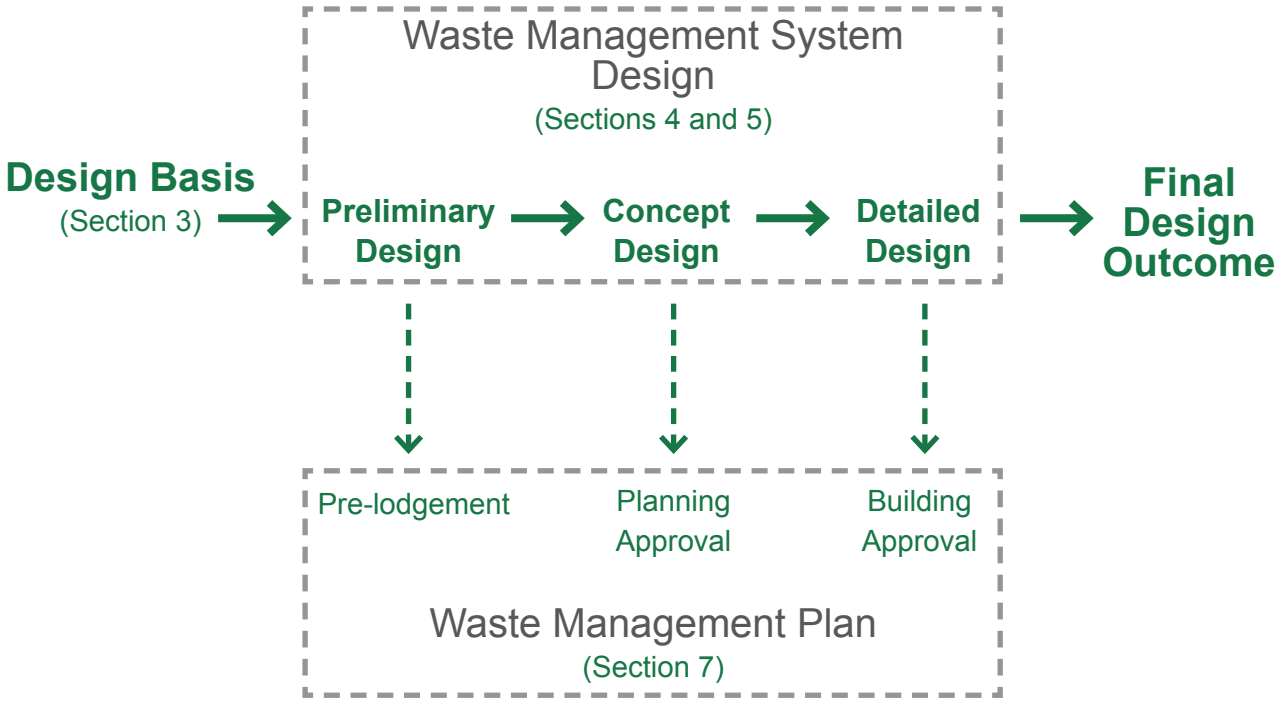

Figure 2.2: Staged design process for a Waste Management System

2.4 How can the Guide help?

The Guide offers advice that you can consider when you are planning, designing, analysing or approving the WMS for a particular development.

Section 3 asks you to consider how the site and the nature of the development will impact on the waste issues and therefore on the WMS design. It explains the three main system types (Simple, Intermediate and Complex) and how to choose which type you need.

Section 4 steers the design towards better practice and offers a series of clauses that can be used to improve, assess or to discuss the WMS design. It gives guidance appropriate to all developments.

Section 5 gives specific guidance on designing the selected type of system.

Section 6 focuses on how to review a design.

Section 7 gives advice on content for Waste Management Plans at different stages in a development's planning.

Sections 8 and 9 point you in the direction of more information and other advice.

Supporting information is provided in the Appendices.

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3 Understanding the nature of the development

In the design of a WMS, it is important to consider:
- *the development's built form and site circumstance*
- *the service level required by the development*
- *expected waste and recycling streams and expected volumes.*

Examples of important information typically needed for planning and designing a Waste Management System are provided in Appendix A, Table A.1)

3.1 Built form and site circumstance

Whether to choose a Simple, Intermediate or Complex WMS is based on a development's built form and the site circumstance. These types of systems are explained in Table 3.1. Further examples of how built form and site circumstance influence the design of a WMS are provided in Appendix B1.

3.2 Knowing the service level needed

Some developments need a range of waste services, so the design has to consider how many local disposal points will be needed and the size and number of storage areas, and what truck movements will be needed to manage the different predicted waste streams.

These requirements will depend on:
- expected waste and recycling streams and volumes (Section 3.4)
- requirements mandated by local councils or State Government (Appendix A, Table A.1)
- the type and scale of land use activity because
  - larger developments may support more recycling services than smaller developments
  - commercial tenants may demand additional recycling services
  - market requirements or demands from tenants/residents may want additional recycling services in premium developments
- other desired recycling services that achieve an environmental performance standard such as Green Star or NABERS.

Appendix B2 lists common service requirements and expectations according to the land use activity. The design may also need to consider which types of waste collection services are available in the area.

3.3 Selecting a Waste Management System

Table 3.1 indicates the type of system that may suit different types of development. Understanding general requirements is useful during preliminary planning and then a Waste Management Plan (Section 7) and performance based assessment is recommended to determine system compatibility more accurately.

3.4 Estimating waste and recycling streams and volumes

Knowing how much and what type of waste and recycling material is likely to be generated allows designers to estimate the type and number of bins and/or the area of hardstand needed. This will determine the space needed for waste and recycling storage areas and collection zones.

Waste Resource Generation Rates (WRGRs) for development land use activities help to identify expected volumes.

WRGRs can be found in published literature or reports and/or should be identified by consultation with local council and relevant State Government agencies.

Appendix C lists recommended WRGRs for South Australia together with a worked example.

A Waste System Calculator Tool to assist with the estimation of waste storage requirements can be downloaded from the Zero Waste SA website.

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Table 3.1: Quick reference guide to align developments with Waste Management Systems

	Development Type		
	Type A: Simple	**Type B: Intermediate**	**Type C: Complex**
Built Form	Single dwellings, row houses, small townhouse development	Large townhouse development, low rise apartment complex, mixed use tenancies such as café and retail	Medium-high rise residential development, mixed use tenancies such as supermarkets, retail and restaurants
Site Circumstances	Frontage per dwelling adequate for bin presentation on kerb	Narrow access roads, limited frontage per dwelling	Narrow access roads, limited frontage per dwelling, no street parking for collection, on-property collection needed
Typical Waste Management System	Use of 140, 240 and/or 360 litre bins Standard 3 bin system (waste, recycling and organics) Residents/tenants manage operation of waste system Bins are presented and collected on kerbside Side lifting collection vehicle used	Combination of 140, 240, 360, 660 and/or 1100 litre bins Manual handling systems without significant infrastructure Shared bin system using common bin storage areas Waste system may be managed by building management Additional and/or separate storage areas may be needed for hard waste, e-waste and difficult waste streams. Bin presentation for collection either: • within a designated compound on the development site • moved to the road at the time of collection • moved to a previously designated collection zone Rear lift collection vehicle used	Highly site-specific design which may include high volume manual and automated handling systems including: • Waste chutes for residents to dispose of waste and recyclables • Compaction equipment to reduce waste volume and decrease storage area size and/or collection frequency • Additional and separate storage areas for hard waste, e-waste items and difficult waste streams Larger capacity four wheel bins or bulk bins (660 L, 1100 L, 1.5 m^3 or 3 m^3) Specialised waste collection equipment such as bin lifters, trolleys and/or other Bin presentation for collection within a designated compound on the development site Building management required to manage waste systems Rear lift and/or front-lift collection vehicles used

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4 Design guidance for all developments

The design of waste management systems needs to be compatible with waste management practices and commercial recycling infrastructure in South Australia and must be compliant with the Building Code of Australia and all relevant Australian Standards.

How to meet objective 1: environmental sustainability

Environmental sustainability

Design outcomes

Developments have regard to the long term sustainability of the environment when:

(a) resource recovery is maximised and waste to landfill is minimised

(b) occupant service requirements are met satisfactorily

(c) statutory obligations of any predicted waste streams are met.

4.1 System design considerations

4.1.1 Developments should have regular collection services for waste and recyclables.

4.1.2 Systems should support occupants to meet SA State targets for levels of resource recovery.

4.1.3 Design should provide adequate floor grading and drainage to sewer to prevent spillages entering stormwater systems.

How to meet objective 2: effective waste resource management

Effective waste resource management

Design outcomes

Developments achieve effective waste resource management when:

(a) occupants and building managers have functional and convenient separation and disposal of waste and recycling streams (including universal access)

(b) trip generation and pedestrian travel distances to the point of disposal are minimised

(c) flexibility in the system's capacity allows for changes in land use and/or generation rates

(d) storage areas are convenient to primary pedestrian movements (main walking routes through the area)

(e) collection zones are designed so that waste can be removed from the site safely and conveniently.

4.2 System design considerations

4.2.1 How the system will be managed should form part of the initial design. Waste Management Systems should support source separation of typical recyclable materials generated by residential and mixed use developments.

4.2.2 Resource recovery systems, including storage areas, should be flexible to allow for likely future mixes of land uses and adaptation and reuse of buildings.

4.2.3 Systems and supporting infrastructure should:

(a) be designed to store and handle the estimated waste of future building occupants safely, efficiently and conveniently

(b) incorporate conveniently located access

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points for waste disposal, such as a separate room or storage area
(c) need minimal maintenance and be easy to clean
(d) minimise potential for noise disturbance to occupants, and
(e) allow adequate access to install, maintain and/or repair equipment.

4.2.4 Selecting the type and size of bins should be based on:

(a) estimated waste and recycling volumes calculated on a per capita or per floor area basis
(b) both design and expected occupancy of all premises in the development
(c) the desired waste collection frequency
(d) available waste collection services and vehicles for the location
(e) clearances and floor surfaces to allow safe movement of bins along the system's transfer pathways.

4.2.5 Filed bylaws for community/strata title developments should set out management responsibilities for the waste and recycling system on a property.

4.3 Operational considerations

How parties will understand and use the system is a key consideration for a WMS.

4.3.1 Colour designations for all supporting infrastructure including bin lids, chute openings and labelling should align with Australian Standards AS4123.7-2006 mobile waste containers. Colours and markings are:

Resource Type	Body	Lid
Waste to Landfill	Dark Green or Black	Red
Dry Comingled Recyclables for Recycling	Dark Green or Black	Yellow
Green Organics for Composting (including food organics)	Dark Green or Black	Lime Green
Paper/Cardboard	Dark Green or Black	Blue

4.3.2 All parties using the system need to understand who is responsible for owning and safely managing the WMS and for delivering waste and recycling collection services. Responsibilities should be outlined in an Operations and Maintenance manual and in the resident/tenant's handbook.

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4.4 Local storage (in dwelling tenancy)

All dwellings/tenancies should have adequate space for storage of waste and recyclables to minimise trip generation to the disposal point.

4.4.1 For commercial tenancies local storage of waste and recyclables should:

(a) allow access by cleaners, building management and/or waste contractors

(b) suit the type of premises, the material generated and the cleaning/collection needs and may include

– in tenancy utility or bin stations/positions

– in tenancy room or rooms in the building, and/or

– on-property external (outside) areas.

4.4.2 For residential dwellings the system should:

(a) Make adequate provision for a kitchen (waste and recycling) bin station that provides a general waste bin (at least 20 L), a co-mingled recycling receptacle (at least 30 L) and a food organics receptacle (at least 10 L).

Figure 4.1: Elements of a kitchen waste bin station

4.5 Transfer pathways design

Developments should allow the safe movement of separated materials from private areas into and through common property areas to the bin storage area and collection zone.

4.5.1 To minimise risks to persons and property, the bin storage area should be located at ground level.

4.5.2 Transfer pathways from the dwelling/tenancy to the local disposal point should ensure dignified access and use of the bins by people with a disability.

4.5.3 Common disposal points should:

(a) be conveniently and equitably accessible for users and waste collection staff

(b) be no more than 30 metres from front door to disposal point

(c) minimise carting of bins to the collection point

(d) provide appropriately paved and graded transfer routes to avoid water pooling from rain or irrigation.

4.5.4 Transfer routes from the bin storage area to the collection zone should be free of obstructions and steps, at least 1.25 m wide, have a slope of no more than 1:10 and not pass through living areas of any dwelling. This is to allow all residents/tenants, including the aged or persons with limited mobility impairment, to cart the bins easily and safely.

4.5.5 Moving bins safely and conveniently to a collection zone may need vertical lifting equipment, a power trolley or other equipment.

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4.6 Bin storage area design

Bin storage areas need to be appropriately sized, designed and located to support consolidation of dwelling/tenancy waste into larger storage bins before collection.

4.6.1 Bin storage areas and access, including lifting waste bin lids, should be convenient for waste disposal and maintenance.

4.6.2 Designers should consider providing a secure bin storage area to prevent interference with the bins and equipment by the general public.

4.6.3 Sufficient space should be provided for any equipment needed to handle or manage estimated waste and recycling between collections.

4.6.4 The location of the bin storage area should balance the aesthetic needs of residents/tenants with the functional requirements of the waste management service provider.

4.6.5 The designated bin storage area should be external to living areas, either assigned to dwellings or tenancies and located within the property boundaries or in a designated part or areas of the Common Property.

4.6.6 Storage areas should be sized to store, in separate containers, the volume of waste and recycling likely to be generated between collections and minimise potential for waste to spread outside the designated area. (Refer to Figure 4.2)

4.7 Collection zone location

Collection zones may be on the property or on the street (kerbside or roadway). The following guidelines will facilitate the transfer of waste from the storage area to the collection zone.

4.7.1 Design for on street collection zones should consider:

(a) local council and planning requirements
(b) the balance of collection needs with aesthetics and public realm needs
(c) existing and potential traffic controls
(d) possible disruptions to local pedestrian and vehicle movements
(e) possible impact upon noise sensitive adjacent land uses
(f) that carting distance from bin storage area to collection zone (where a rear-lifting truck would pick up the bin) does not exceed 15m
(g) adequate street access for the waste collection vehicle.

4.7.2 Design for on-property collection should ensure:

(a) access for trucks to enter and exit the property in a forward gear (refer Figure 4.3)
(b) the need for reversing is minimised
(c) that interference with pedestrian or vehicular movements is minimised
(d) adequate design of pavement or roadway on-property to support collection vehicles
(e) adequate clearance and lifting heights for bin servicing
(f) suitable positioning and collection times to minimise adverse impacts on the amenity for residents, neighbours and the public arising from noise or odour associated with bin collection.

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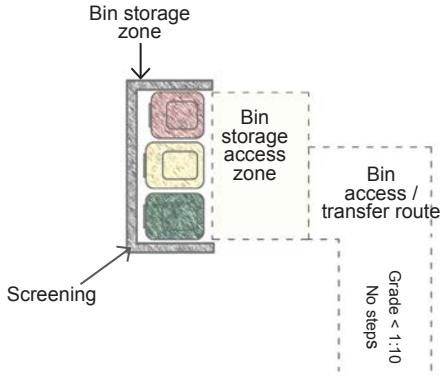
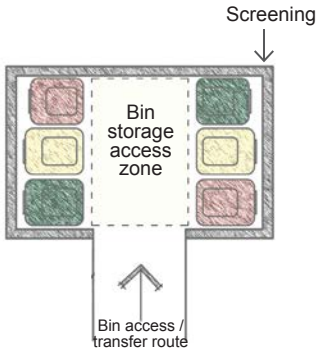
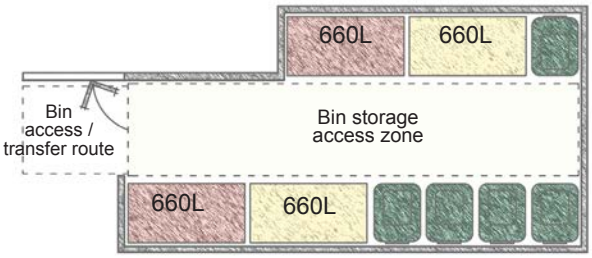


Single dwelling property - 140L and 240L bins



Two dwellings with common bin storage area



600L bins for putrescibles/comingled recycling and 240L for organics

Figure 4.2: Examples of potential arrangements and dimensions for bin storage areas.

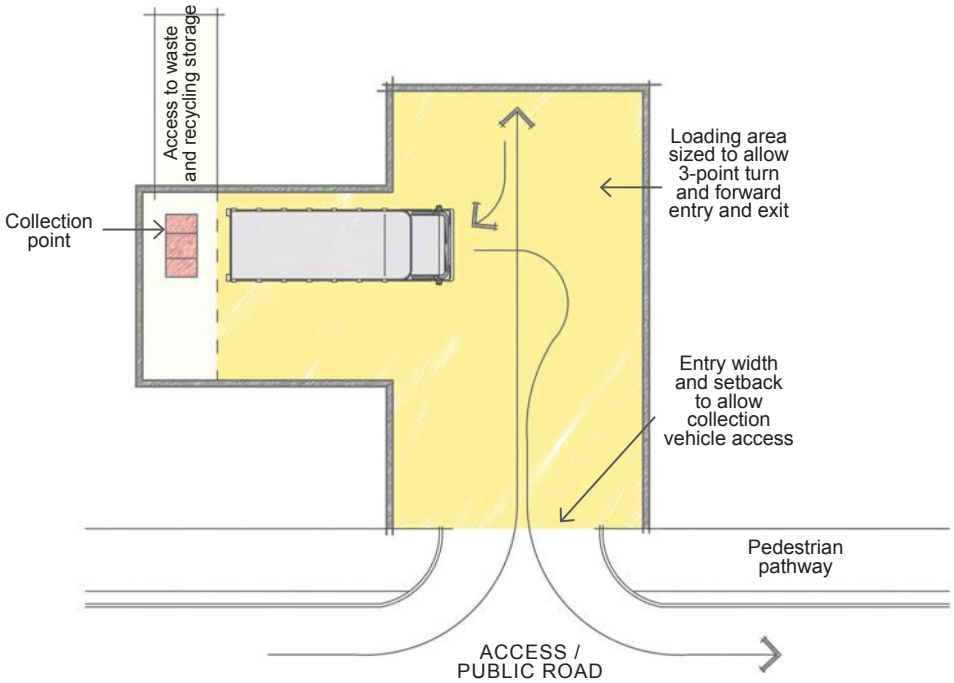


Figure 4.3: Example where reversing has been minimised for on-property collection.
This example illustrates that design of these areas need to provide adequate space to allow entry, exit and manoeuvring of the collection vehicle, and also ensure proper clearances at entry/exit point and in the loading area.

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4

How to meet objective 3: clean and healthy living environment

Design outcomes

Developments protect and enhance the quality of life for the community when:

(a) negative impacts on amenity for residents, neighbours and the public are minimised (visual, noise, traffic, odour, litter and illegal dumping potential)

(b) waste disposal and collection is hygienic and safe.

4.8 Designing for safety and amenity

Effective waste management systems protect and enhance the quality of life for the community.

4.8.1 Storage area design should:

(a) comply with the Building Code of Australia and all relevant Australian Standards

(b) prevent and mitigate fire risks

(c) prevent entrapment areas for residents/ tenants, staff and visitors.

4.8.2 For health reasons, the design should:

(a) minimise potential for and/or mitigate odour and noise nuisances

(b) consider and preserve visual amenity for residents/tenants, neighbours and the public

(c) prevent waste spreading beyond the defined location

(d) specify washable surfaces and drainage systems that support periodic cleaning

(e) provide adequate ventilation, particularly if indoors or near windows or balconies.

4.8.3 For safety and security reasons, storage area design should:

(a) make provision for safe handling and transporting of waste

(b) prevent interference with bins and equipment

(c) include a separate adequately sized service lift if storage areas are on higher levels.

4.8.4 Waste collection timing and frequency should minimise traffic and noise impact on residents, neighbours and the public.

4.8.5 Storage areas should be monitored to ensure residents/tenants are storing waste safely and that no risk to safety or access is caused.

4.8.6 Storage areas should be cleaned regularly to minimise odour, pests and nuisances and preserve visual amenity.

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How to meet objective 4: affordability

Design outcomes

Developments provide affordable living and working, when:

(a) up-front investment during construction is optimised

(b) waste management is cost effective for residents and/or tenants.

4.9 Designing Waste Management Systems affordably

A good WMS can be affordably designed and operated by balancing all of the design elements with the built form and the site considerations.

4.9.1 Up-front investment should be balanced against ongoing operational and maintenance costs to optimise the infrastructure needed while minimising service costs for residents/tenants.

4.9.2 Design should aim to optimise the number of service collections needed for the expected quantities.

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The advice in this section is a supplement to the general guidelines in Section 4. It offers specific advice on designing the type of system (Simple, Intermediate and Complex). An explanation of these is provided in Table 3.1.

5.1 Simple Waste Management Systems

5.1.1 The kerbside area in front of a development must be able to accommodate the bins that are presented and allow the bins to be safely accessed and picked up by the collection vehicle.

5.1.2 The presentation zone in the frontage of a development should:

(a) retain a 1.5 m wide (min.) pedestrian path in front of property whilst providing a kerbside verge area that can accommodate a bin presentation zone for each dwelling

(b) ensure that the zone is satisfactorily offset from trees, street furniture, tree canopies, and other items

(c) ensure that on-street parking arrangements do not restrict access by a side loading collection vehicle.

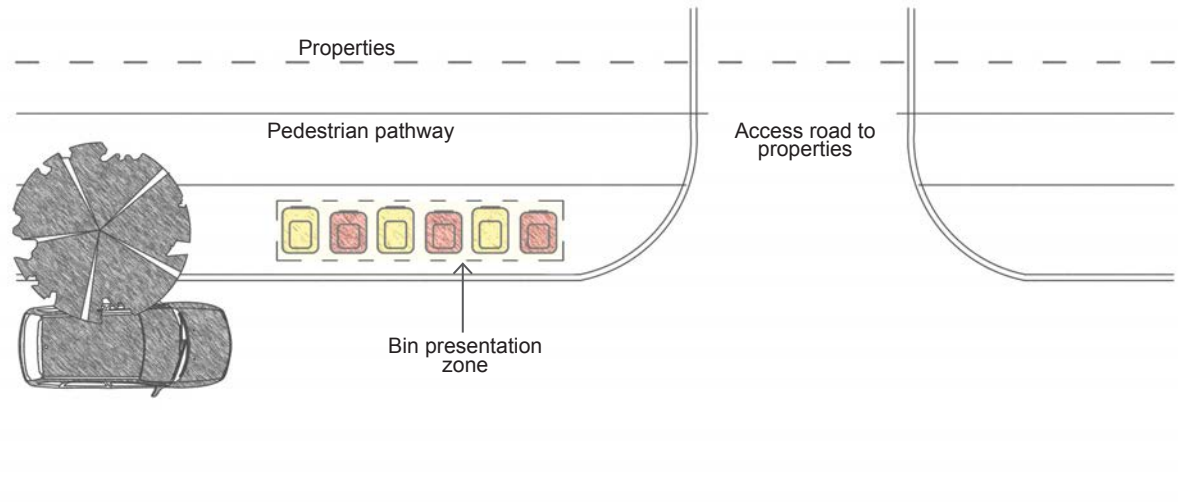

Figure 5.1: Example of an acceptable presentation zone at front of properties for collection of 140/240/360 L bins by side-loading waste collection trucks.

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5.2 Intermediate and complex Waste Management Systems

Environmental sustainability

5.2.1 Provision should be made for the storage and periodic collection of hard waste, e-waste and other difficult waste streams.

For illustrated examples of a Waste Management System for a townhouse development and office and retail premises see Figures 5.2 and 5.3.

Effective waste resource management

5.2.2 When locating local disposal points, priority should be given to the convenient disposal of recycled materials. This may involve recycling stations and food organics bins in or adjoining entry foyers, near lifts or at pedestrian entry points to car parks.

5.2.3 Where a rear-lifting waste collection vehicle will collect the material, designers should liaise with the local council on vehicle specifications and access requirements.

5.2.4 Shared bin storage areas should meet requirements for larger capacity four wheel bins, including positioning, set-back, access, noise suppression, and screening.

5.2.5 Where the bin storage area and collection zone are separated by a change in floor/ground levels, the system should:

(a) provide for manual carting or, if required, mechanical assisted carting

(b) restrict the size and weight of bins to ensure safe operation and handling

(c) ensure the egress route is clearly marked and free of obstructions

(d) avoid kerbs or provide ramps of an adequate width, non-slip surface and gradient (≤1:10)

(e) ensure service-lifts or mechanised lifting platforms are of an adequate size and load capacity.

5.2.6 Where using mechanically assisted carting due to change in floor/ground level

(a) the lifting equipment or trolley should be appropriately sized and designed to manoeuvre within the access areas and lift the bins, and

(b) a secure storage area for lifting equipment or trolley should be provided to prevent theft or damage by third parties.

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5.2.7 Storage areas should be secure, well illuminated, visually permeable and enable passive surveillance.

5.2.8 Common bin storage areas should be monitored to ensure residents are meeting building fire safety requirements.

5.2.9 Storage areas should be kept tidy and must not obstruct passages and fire exits.

5.2.10 Periodic risk assessments should be undertaken by the Property Manager to ensure safe storage and handling of waste resources.

Clean and healthy living environment

5.2.11 Effective building management systems should aim to optimise administration and maintenance activities and costs

Affordability

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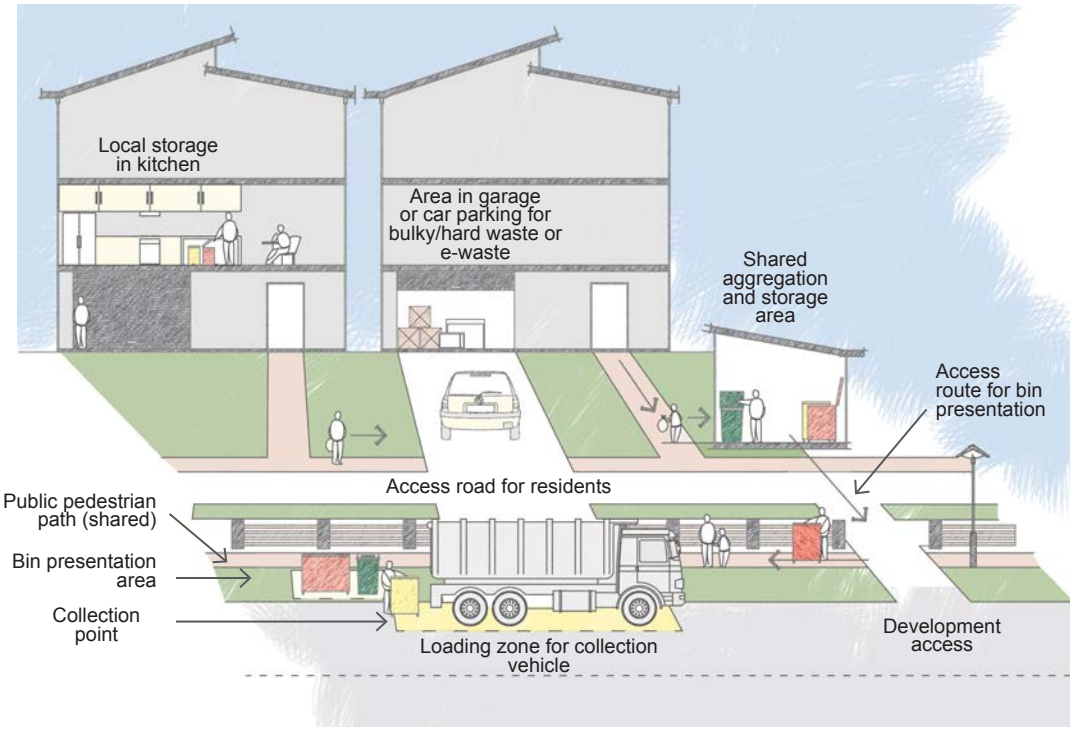

Figure 5.2: Example of on street collection zone for townhouse development. This Waste Management System includes local waste storage (in dwelling), an external shared storage area containing bulk bins and mobile garbage bins and presentation of bins on kerb for collection using a dedicated loading zone. This Waste Management System also includes separate storage area for hard waste.

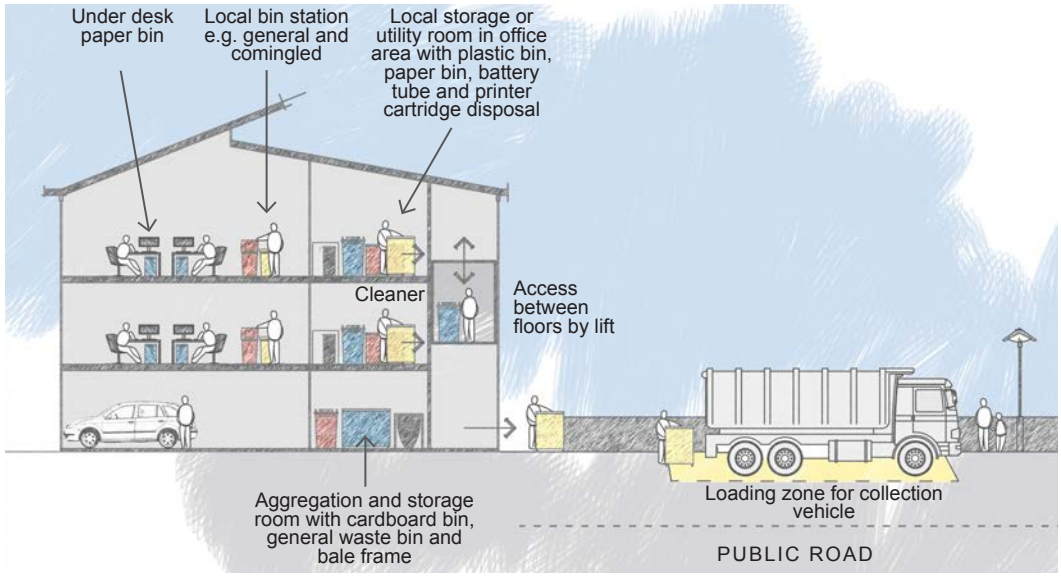

Figure 5.3: Example layout of Waste Management System for offices and retail premises in mixed use development. Waste Management System includes local waste storage in tenancies, 'pull-in pull-out' collection service by waste contractors using lifts, collection vehicle access using slipway adjacent development. The Waste Management System also includes shared cardboard bin and hard waste collection area in the basement, accessible using service lifts by tenants and lift platform by waste contractors.

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5.3 Complex Waste Management Systems

This additional advice is specific to Complex WMS and should be read with Section 4 and Section 5.2.

For an example of a Waste Management System for a multi level apartment see figures 5.4 and 5.5.

5.3.1 Recyclable wastes such as newspaper, cardboard, plastics, glass and metals could be separated for individual collection. Single stream collections may be more cost effective as these recyclables can be cheaper to collect and will reduce the volume of a more costly co-mingled dry recyclable collection.

5.3.2 Development should consider chutes, compactors, carousels and similar infrastructure solutions to:

(a) reduce the volume, allowing less frequent collections and lower collection costs
(b) reduce time required to manage the WMS, reducing operational costs
(c) increase ease of participation, recycling opportunities and maintenance
(d) minimise system footprint improve aesthetics and amenity
(e) improve safety.

5.3.3 Waste chutes should:

(a) be designed with specialised field and expert input from equipment suppliers and building engineers
(b) be suitable for disposal of non-bulky waste and recycling materials where breakage is not a concern
(c) be located generally near the existing building core
(d) minimise potential for blockages
(e) consider contingency measures in the case of a blockage and access for cleaning and inspection
(f) consider ongoing maintenance.

5.3.4 Installation of chutes require:

(a) ventilation shafts to the top of the chute creating a slight vacuum to minimise odour problems at the local disposal point
(b) water/cleaning solution spray points
(c) fire-rated ducts with suitable clearances allowed from walls
(d) consideration of acoustic insulation in duct walls
(e) consideration to additional space for chute re-alignment above exit points in the aggregation and/or storage area.

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5.3.5 Compaction/aggregation equipment design should:

(a) involve specialised field and expert input from equipment suppliers and building engineers

(b) include additional space as required for the equipment

(c) consider additional vertical clearances (generally greater than or equal to 4 m) to accommodate height and/or associated equipment installation

(d) incorporate power and water supply needs

(e) allow access for installation, repair and maintenance

(f) allow for additional floor loadings or support frames for suspended equipment

(g) select and design equipment to suit the capabilities of the intended users (resident, cleaner, building manager, other).

5.3.6 Designing for direct collection from an on site bin storage area should allow:

(a) adequate vertical clearance for a truck to traverse the site to and from the bin storage area

(b) space allowance to manoeuvre the vehicle into position with limited need to reverse

(c) space allowances to minimise any potential risk of damage to the building or other property

5.3.7 Consideration should be given to:

(a) a minimum vertical clearance greater than or equal to 4m wherever the collection truck will move on the site including collection zone, manoeuvring areas and ramps

(b) the capabilities of the waste collection vehicle on ramps, and

(c) the load capacity of the surfaces on which the truck will move.

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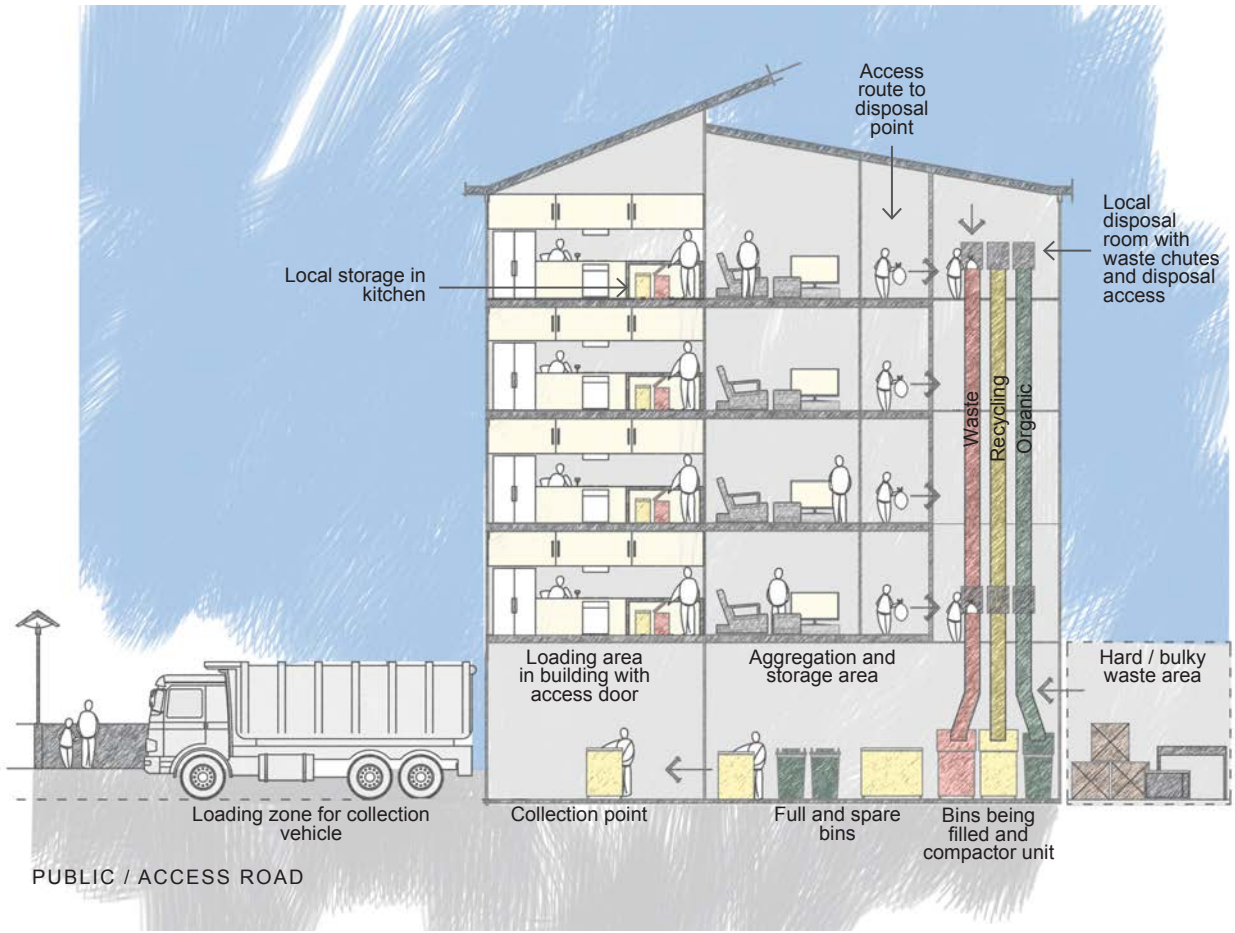

Figure 5.4: Example Waste Management System in a multi-level apartment building. WMS includes local storage in kitchens, local disposal rooms on each level for waste and recycling disposal through waste chutes, a waste storage room with compactors and bulk bins for aggregation and centralised storage, 'pull-in pull-out' collection service by waste contractor, on site collection vehicle access and parking, plus separate hard waste collection storage area for residents.

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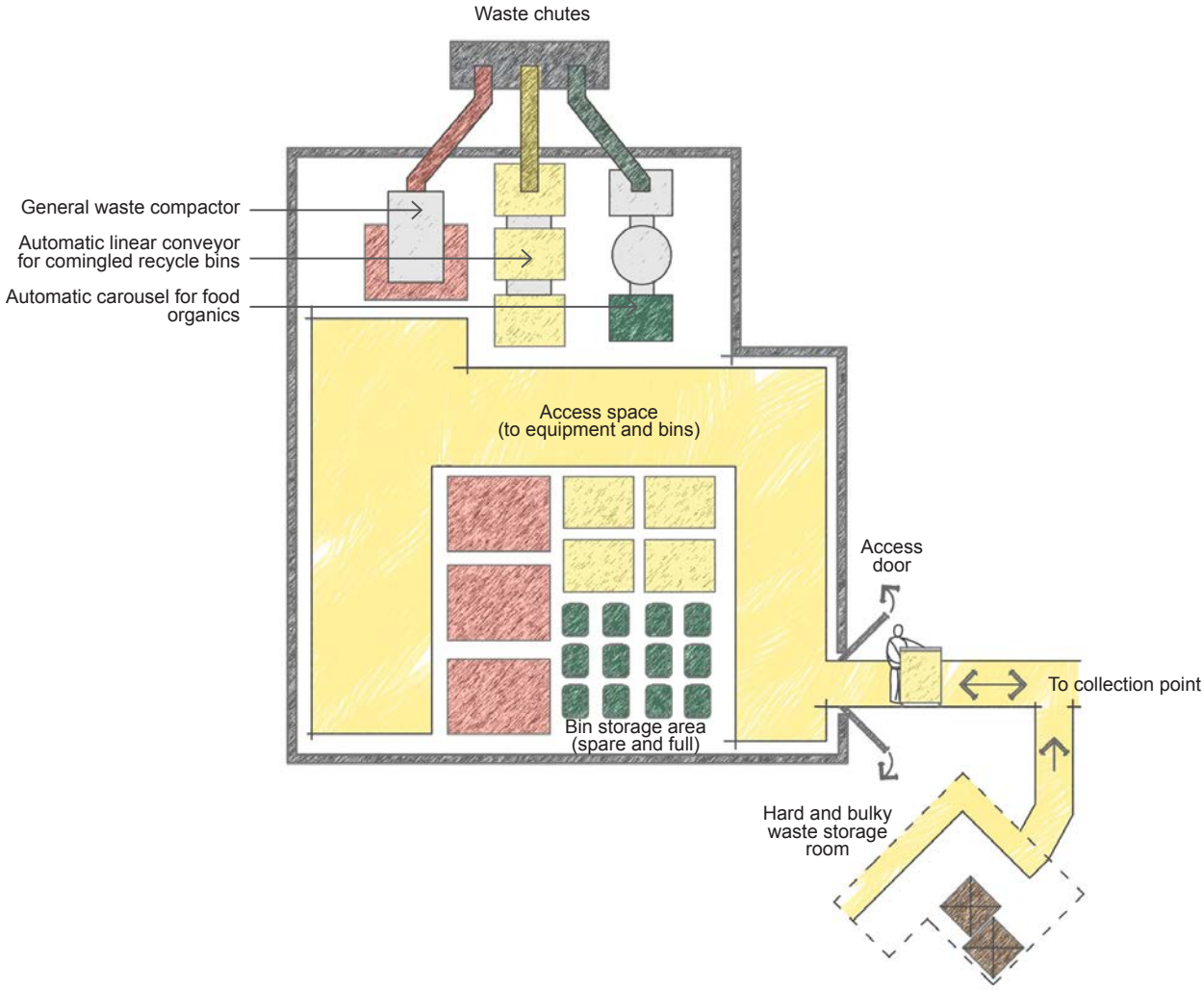

Figure 5.5: Example layout for storage area where waste chutes are used in a multi-level building. This area includes space for a compactor for general waste, a linear bin conveyer for comingled recycling, and bin carousel for food organics. A separate room is also provided as a hard stand area for cardboard, hard waste, e-waste and difficult waste streams.

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6 Design review

As with any other design process, a full design review is needed at each design phase before approval.

Key areas for the review are presented in Table 6.1.

Planning authorities may also use similar or more detailed checklists for reviewing and approving a proposed WMS design. The design review may involve consultation with stakeholders to confirm that design of the WMS is appropriate and suitable. It may also lead to revision or refinement of the WMS design.

Table 6.1: Design review checklist

Step	Stage	
Planning		
Stakeholder consultation	Undertaken and documented stakeholder consultation (Appendix A)	☐
Design objectives/outcomes	Understood design objectives and outcomes (Section 1.4)	☐
Built form and site circumstance	Identified development built form and site circumstance (Section 3.1)	☐
Waste and recycling services	Identified waste and recycling services required for residents and/or tenants and relevant land use activities (Section 3.2)	☐
WMS design selection	Selected Simple, Intermediate or Complex WMS type (Section 3.3)	☐
Waste and recycling volumes	Estimated and justified waste and recycling volumes (Section 3.4 and Appendix C)	☐
WMS design advice	Read and understood design advice based on WMS design selection (Section 5)	☐
Service collection providers	Identified and matched service collection providers to the above volumes and service requirements (Appendix A)	☐
Concept and/or Preliminary Design of Waste Management System		
Systems and supporting infrastructure	Systems and supporting infrastructure considers design advice (Sections 4 and 5)	☐
Local storage (in dwelling / tenancies)	Local storage (in dwelling/tenancies) considers design advice (Sections 4 and 5)	☐
Storage areas	Storage areas considers design advice (Sections 4 and 5)	☐
Transfer pathways	Transfer pathways considers design advice (Sections 4 and 5)	☐
Collection zone	Collection zones considers design advice (Sections 4 and 5)	☐

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Step	Stage	
Review of Waste Management System Design against Objectives and Outcomes		
Objective 1: environmental sustainability	Reviewed WMS design against Objective 1 and design outcomes	☐
Objective 2: effective waste resource management	Reviewed WMS design against Objective 2 and design outcomes	☐
Objective 3: clean and healthy living environments	Reviewed WMS design against Objective 3 and design outcomes	☐
Objective 4: affordability	Reviewed WMS design against Objective 4 and design outcomes	☐
Detailed Design of Waste Management Systems		
Design and construction	Detailed technical specifications and drawings prepared and complete	☐
Waste service procurement plan	Service providers identified and service procurement plan developed	☐
Operations and maintenance manual	Draft frameworks or documents provided and acceptable	☐
Tenant/resident guide	Draft frameworks or documents provided and acceptable	☐

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7 Preparing the Waste Management Plan

A Waste Management Plan (WMP) is normally required by the Planning Authority at each stage of the development planning process.

The size and content of a WMP varies depending on the type of development and the Planning Authority's requirements.

Table 7.1 outlines typical content in a WMP at the different stages of planning. More detail is presented in Appendix D.

Table 7.1: Content of WMP typically expected at different stages of the development planning process

Development Planning Stage	Expected Waste Management Plan Content
Pre-lodgement/ preliminary (if applicable)	Development details, including a description of the development and occupancy data Preliminary design of a WMS including: • waste and recycling service(s) to be provided and how this will achieve market needs • waste and recycling service provider • waste and recycling system sizing • design assumptions or specifications for local storage, transfer pathways, bin storage location and collection zones • proposed WMS equipment and infrastructure • preliminary assessments of traffic, noise odour, amenity, etc. Relevant preliminary building plans Proposed operational management arrangements and plan for WMS Stakeholder consultation undertaken (Appendix A, Figure A.1)
Planning consent	All of above but to concept design level with finalisation of proposed WMS concept design plus completion of associated assessments
Building consent	All of above updated and cross-referencing the: • detailed design and/or construction specifications for WMS • WMS service procurement plan • WMS operations and maintenance plan • tenant/resident guide for WMS

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8 Looking for more advice?

8.1 Publications

Adelaide City Council 2013, Adelaide City Council Design Guide for Residential Waste Resource Recovery, SA

British Standard (BS) 1703:2005 Refuse chutes and hoppers

British Standard (BS) 5906:2005 Waste management in buildings

City of Charles Sturt 2010, City of Charles Sturt Residential Waste and Recycling Guidelines for New Developments, SA

Department of Environment and Climate Change NSW 2008 NSW Better Practice Guide for Waste Management in Multi-unit Dwellings, NSW

Council of the City of Sydney (nd), Sydney City Council Policy for Waste Minimisation in New Developments, NSW

Sustainability Victoria 2010, Victorian Draft Best Practice Guide for Waste Management in Multi-unit Developments, VIC

Facilities Management Association of Australia 2012, Facilities Management Good Practice Guide, Multi Unit Residential

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8.2 Contacts

There is help available to interpret information in this guide. Other resource materials are available. The following organisations can help and can also refer you to appropriate waste management advisors.

Local councils	www.lga.sa.gov.au/
Zero Waste SA	www.zerowaste.sa.gov.au/
Local Government Association – South Australia (LGS-SA)	www.lga.sa.gov.au/
Waste Management Association of Australia (WMAA) – SA/NT Branch	www.wmaa.asn.au/
Property Council of Australia – SA Division	www.propertyoz.com.au/SA/Division/
South Australian Government Department of Planning, Transport and Infrastructure (DPTI)	www.dpti.sa.gov.au/

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9 References

Adelaide City Council 2013, Design Guide for Residential Recycling, SA

City of Charles Sturt 2010, Residential Waste and Recycling Guidelines for New Developments, SA

Council of the City of Sydney (nd), Policy for Waste Minimisation in New Developments, NSW

Department of Environment and Climate Change NSW June 2008, Better Practice Guide for Waste Management in Multi-Unit Dwellings. Sydney South, NSW

Sustainability Victoria 2010, Guide to Best Practice for Waste Management in Multi-unit Developments, VIC

Zero Waste SA 2014, Review of Waste Resource Generation Rates, SA

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A

Appendix A: Stakeholder consultation and data collection

Stakeholder consultation is needed to clarify design requirements and constraints. This consultation may need to include a number of stakeholders (Table A.1) and collection of a range of data (Table A.2).

Consultation may include:

- Site-specific conditions and/or requirements for waste management (local collection services, vehicular access, bin presentation areas and more)
- Regulatory/development requirements (mandated waste collection requirements, noise limits, building standards, road standards)
- Market requirements and relevant standards for waste and recycling services (such as tenant service expectations, and building environmental performance requirements).

Table A.1: Stakeholders in planning and designing a Waste Management System

The Proponent	Local Government or Council	State Government
Developer(s) Project manager Architects Planners Building engineers Waste design experts or consultants Marketing and/or real estate consultants	Planning and/or development Waste management Traffic and/or roads Public infrastructure	Environmental protection Development and/or planning Other relevant development planning statutory referral agencies
	Future owner / occupier	**Service provider(s)**
	Building owner Residents Commercial tenants Facility managers	Council(s) Private contractors

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Table A.2: Examples of important information typically needed for planning and designing a Waste Management System

Site Conditions and/or Circumstances
Development site location, size and plan/footprint
Proposed development built form and concept layout plan
Number, size and type of residential dwellings or commercial tenancies
Number of car parks and associated access requirements and locations of these areas
Proposed provision for waste management, including storage area and collection zones
Proposed site access for waste collection, including suitability of public roads and onsite access
Existing/past waste management services provided/available to site (if any)
Integration with other building service requirements (access lifts, service access, power and so on)
Responsibility for management and operation of the WMS such as cleaners, building manager, tenants
Regulatory/Development Requirements
Minimum requirements for waste collection (3-streams plus hard waste, e-waste and difficult waste), including performance benchmarks if applicable
Bans on landfill prohibited materials in waste collection (South Australian Government *Environment Protection (Waste-to-Resources) Policy 2010*)
Requirements of relevant council development plan
Requirements of Building Code of Australia
Requirements of South Australian Government *Public and Environmental Health (General) Regulations 2006*
Limits on site access for waste collection
Design requirements for waste system design (considering waste generation rates)
Building requirements for waste management
Noise, aesthetic or other environmental requirements
Public road suitability and/or traffic requirements
Social/community requirements (mobility impaired, public waste bins, service cost to tenants/residents)
Information requirements for WMS or in WMP during development planning approval process
Market Requirements and Relevant Standards
Resident/tenant expectations for WMS (features, facilities, costs, access)
Build cost requirement or limitations
Voluntary environmental performance ratings, such as NABERS or Green Star
Standards for bin colours (AS 4123.7—2008: Mobile waste containers)

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B1 Built form and site circumstance

Tables B.1 and B.2 give common examples of how built form characteristics or site circumstances influence WMS design. Refer to Appendix E Case Study 2 to see how such issues influenced the WMS design for a high-density development at Whitmore Square, Adelaide.

Table B.1: Potential Waste Management System design outcome and/or consequence resulting from built form characteristic

Built form Characteristic	Potential Design Outcome/Consequence
High-density development with no separate garage for dwellings or outside space for storage	Communal storage with separate common storage for hard waste, e-waste and difficult waste may be required on the site.
Multi-level (≥4 levels) residential building with more than one apartment on each level	Waste chutes with separate disposal room on each level may be considered for tenant disposal point.
Multi-level (≥4 levels) residential building with ≥ 20 dwellings	Consider compaction of waste to minimise waste storage space needed and collection frequency.
Townhouse development with off-street townhouse and limited site frontage	Communal waste storage area with larger bins located on site could be needed to avoid excess bins on road verge or street.
Row cottages	Frontage (for each dwelling) may not be adequate for kerb-side presentation and collection.
Small development site (≤100 m^2)	On site vehicular access for collection may not be feasible, street collection with 'pull-in pull-out' service may be needed.
Mixed use development	Separate waste disposal, storage and collection services for tenants could be needed. Bins and equipment will be different from those for residential collection and separate access arrangements might be required.
Type of commercial development	Supermarkets and cafes generate more substantial waste volumes per unit area than most other commercial developments, which may influence space and equipment required for WMS. This could include large volumes of food waste.

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Table B.2: Potential Waste Management System design outcome and/or consequence resulting from site circumstance

Site Development/Circumstance	Design Outcome/Consequence
Narrow access roads	Narrow roads may dictate the type of waste vehicle able to access the site to collect waste. This will determine the types of bins that will be used onsite and their associated equipment. Roads may need to be widened and upgraded to enable collection vehicle access and/or on site collection may be required.
On site waste collection proposed or needed	Depending on the configuration of the site, this may require a slipway or separate access at ground-level or basement access with enough space to allow vehicle to enter, park, turn-around, and exit.
Close proximity of WMS and/or associated access to residents/tenants or neighbours	Assessment and design to minimise or avoid noise, aesthetic and traffic impacts could be particularly important.
Rear lane bin presentation for street collection	Rear lane access, width and/or parking access need to accommodate collection vehicles and avoid blocking resident access to properties.
Development fronts main street/ commercial precinct area	On site access for collection trucks could be needed if parking or bin presentation on street is not acceptable.
No verge for bin presentation on frontage	On site collection of bins, 'pull-in pull-out' or collection vehicle access, could be needed.
Private road access	Private road and access design and width will need to accommodate collection vehicles.

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B2 Waste and recycling services required by the development

Modern waste services collect waste for disposal to landfill and have collection services for recyclables. Services may also be needed to safely dispose of waste where landfill disposal is prohibited and recycling is unfeasible.

Table B.2 lists the services typically required, expected or desirable by land use activity.

The availability of these services and collection frequencies will depend on whether the service is provided by local government or private waste contractors.

These service providers may dictate the:

- types of waste and recycling services
- types and size of collection/storage bins
- frequency of collections
- type and size of collection vehicles.

Table B.2: Potential waste and recycling services that are typically required, expected or desired by developments in SA. 'X' – required or expected, 'D' – desirable (usually depends on scale of development)

Waste or Recycling Service	Land Use Activity			
	Residential	Retail	Office	Restaurant
Landfill disposal				
General waste/residual	X	X	X	X
Recyclable materials				
Comingled (mixed recyclables)	X	X	X	D
Organics (garden and/or food)	X	D	D	X
Hard waste	X	X	X	X
Recycled deposit containers (CDL)				X
Cardboard		D		X
Paper			X	
Confidential paper			D	
Plastics (soft, hard or mixed)		D	D	D
Landfill prohibited materials				
Electronic waste (e-waste)	X	X	X	X
Difficult waste	X	X	X	X

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Table B.3 summarises key attributes and differences between the services traditionally provided. Higher density or mixed use developments are complex and are usually serviced by private waste contractors, which generally offer a wider and more flexible range of services.

Table B.3: Typical attributes and differences between waste and recycling collection services provided by councils and private waste contractors

Service Attribute	Council	Waste Contractor
Services offered	Usually limited selection: • General waste – weekly • Comingled – fortnightly • Organics – fortnightly (can be optional) • Hard waste – on call or area wide campaign	All types of waste and recyclables. (Service availability can be limited in regional areas)
Collection zone	Kerb-side or drop off at transfer station	Street, on site/property
Types of bins	Mobile garbage bins (MGBs) – 140, 240 and/or 360 L. Select metropolitan councils may offer 660 or 1100 L mobile bulk bins.	MGBs, bulk bins, cages, all types and sizes available
Collection vehicles (truck)	Side-lifting, flat-bed, rear-lift (where mobile bulk bin service is offered)	Rear-lift, front-lift, flat-bed, roll-on, roll-off (for larger bins)
Collection frequency	Weekly or fortnightly, usually fixed day and time	May prefer regular day and frequency, but flexibility on time and day can usually be arranged
Additional collection services	Select councils may provide 'pull-in pull-out' services to bins located on site/property where special needs have been examined. Stringent conditions apply.	Flexibility to provide almost whatever service the client wants, including 'pull-in pull-out' service arrangements

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C1 How to use Waste Resource Generation Rates

Waste Resource Generation Rates (WRGRs) are metrics that have been identified through waste audits. The WRGRs indicate how much waste and recycling is generated by a specific type of land use activity such as a residential dwelling, an office or a cafe.

A WRGR is usually expressed as the:

- amount (kg or litres) of waste and recycling generated
- per unit time (day or week), and
- per unit quantity (or attribute) of a land use activity such as m^2 floor area or number of bedrooms

WRGRs can be highly specific to the type of development, proposed land use activities and type and number of recyclables being collected for each land use activity.

It should be noted that some published WRGRs are for 'average' generation rates, whilst others are for 'peak' situations observed during a year. Whether the WRGR is an 'average' or 'peak' value can affect assessment of space requirements for waste and recycling storage and/or collection zones.

Where 'average' generation rates have been used, extra bin capacity may be needed to manage waste and recycling in 'peak' generation times such as holidays, Christmas or lease expiry periods. Alternatively, more frequent waste collections may be scheduled at such times.

The following diagram illustrates how a WRGR can be used to estimate the generation rate for a single waste or recycling stream, including a simple worked example. This worked example estimates the weekly generation of general waste in a high density residential building with 10 apartments, each with 2 bedrooms (20 bedrooms in total). The method in this worked example could be repeated for other waste and recycling streams.

Calculation Procedure

WRGR	x	No. units	x	Time period	=	Generation rate

Example: General waste generated by 20 bedrooms in an apartment building

20L/ week/ bed-room	x	20 bed-rooms	x	1 week	=	400L/week

Figure C.1: How to use a Waste Resource Generation Rate to estimate waste or recycling volume generation rate included worked example for high density building containing 20

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C2 Waste Resource Generation Rates

Table C.2 below lists Waste Resource Generation Rates (WRGR) by land use. These rates are for design purposes and may be used to estimate expected waste volumes generated at a development and:

- assumes best practice levels of participation and separation in recycling for all the waste streams included in the table. Best practice recycling may not occur until several years after a waste collection service commences, this may affect the required mixture of bins and collection frequency per service initially used
- may require additional collections to be included to manage waste at peak generation times
- does not take into account compaction rates which can reduce storage space requirements.

A Waste System Calculator Tool to assist with the estimation of waste storage requirements can be downloaded from the Zero Waste SA website.

Table C.2: Waste Resource Generation Rates (WRGRs) by land use type

Land Use Type		Waste Resource Generation Rate				
		General Waste	Recycling	Organics	Metric	Other
Residential	Low Density Residential Building	40	35	40	L/bedroom/wk	Hard and Electronic Waste 0.77m³/ household/year
	Medium Density Residential Dwelling – with garden[1]	35	30	20	L/bedroom/wk	Hard and Electronic Waste 0.77m³/ household/year
	Medium Density Residential Dwelling – no garden[1]			10		
	High Density Residential Dwelling	30	25	10	L/bedroom/wk	Hard and Electronic Waste 0.77m³/ household/year
Commercial	Serviced Apartment, Backpacker or Boarding Houses[2]	30	20	10	L/bedroom/wk	Hard and Electronic Waste 0.77m³/ household/year
	Hotel or Motel accommodation[3]	5	3	1.5	L/bedroom/ day	
	Hotel or Motel - Bar Areas	5	5	0.25	L/10m² bar area/day	
	Hotel or Motel - Dining Areas	30	5	40	L/10m² dining area/day	
	Hotel or Motel - Combined Bar and Dining Areas	30	10	40	L/10m² combined bar and dining area/day	
	Licenced Entertainment Premises or Community Club (bar floor only)	5	5	0.25	L/10m² bar floor area/day	

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C

	Land Use Type	Waste Resource Generation Rate				
		General Waste	Recycling	Organics	Metric	Other
Commercial	Licenced Entertainment Premises or Community Club (combined bar and dining area)	30	15	40	L/10m^2 combined bar and dining floor area/day	
	Offices or Consulting Rooms	15	15	2.5	L/10m^2/week	
	Showrooms	4	1	0.25	L/10m^2/day	
	Butcher[4]	30	7	50	L/10m^2/day	
	Delicatessen	5		5	L/10m^2/day	
	Seafood Retailer[4]	30	7	50	L/10m^2/day	
	Fruit and Vegetable Retailer	15	12	16	L/10m^2/day	
	Hairdresser	3.5	3	1	L/10m^2/day	
	Café/Restaurant	30	20	40	L/10m^2/day	
	Supermarket	18	20	18	L/10m^2/day	
	Takeaway	3	3	3.5	L/10m^2/day	
	Retail (less than 100m^2)	5	2.5	0.25	L/10m^2/day	
	Retail (greater than 100m^2)	6	6	0.3	L/10m^2/day	

The WRGR are based on the Zero Waste SA, Review of SA Waste Resource Generation Rates (April 2014).

Notes:

1. Medium density dwelling organics should be calculated at 20L per bedroom per week if the dwelling has a garden. 10L organics per bedroom per week enables provision for food waste organics and should only be used to calculate WRGRs for medium density dwellings with no garden.

2. WRGRs for Services Apartment, Backpacker or Boarding Houses is for accommodation only and kitchen, catering areas, garden organics or other shared spaces in a development will require separate assessment.

3. Hotel or Motel accommodation – WRGRs are for accommodation only and do not include other areas within the hotel or motel which will require a separate assessment.

4. Butcher & Seafood WRGRs assume onsite preparation of products and may be lower for shop-front only butchers.

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D Appendix D: Waste Management Plan content

Table D.1: Waste Management Plan content

Contact details	Name of the developer and contact details
Land use details	Location and land use zoning
Development details	Description of the development: • number of floors • number of dwellings and occupancy details (including number of bedrooms) • commercial premises
	Development drawings detailing the local storage, access routes, waste and recycling storage areas and presentation areas
	Details of the waste service provider (local council or private), including correspondence confirming suitability of proposed collection arrangements
Waste Management System	Description of the waste management system and a rationale for the selection and design of the waste system and how the waste and recycling services provided will achieve the market needs, detailing: • individual bin sets or shared/communal bins • bin colours (AS 4123.7—2008: Mobile waste containers) • location of disposal points (where relevant) • location of waste collection zone • supporting infrastructure (chutes, carousels, compaction facilities) • additional waste considerations (hard waste, electronic waste and difficult waste)
Waste system sizing	Information on generation rates and volume calculations (including assumed peaking factors) to inform: • waste capacity per dwelling and total for the development • number of type of waste and recycling bins • collection frequency
Storage area	Description of design and methodology for addressing the bin storage area: • sizing • positioning • resident access • bin labelling and signage • noise reduction • stormwater pollution prevention • ventilation • amenity
Transfer pathways	Description of transfer pathways addressing: • safe and convenient bin transfer • access/egress point from dwelling to the disposal point • minimising risks to persons and property • convenience to both users and waste collection staff

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D

Table D.1: Waste Management Plan content

Presentation and collection zones	Addressing key issues of: • location and space allocation • timing of collections • accessibility for collection vehicle • public safety
Specialised facilities and equipment	A description on any proposed specialised facilities and equipment, such as waste chutes, compactors, lifting equipment and others Information on how the system will be incorporated into and function as part of the residential waste system
Stakeholder consultation	Outline of consultation undertaken to inform the design of the Waste Management System and summarise feedback and modifications made
Operation and management	Summaries of: • proposed communication strategy to achieve positive user experience and outcome including guidance material and education (attach copies of proposed tenancy agreement or residents' manuals explaining the use of the system) • suggested content for a resident manual - roles and responsibilities for individuals, households, property manager and collection contractors - instructions for disposing of waste and recycling (including access and correct use of storage areas and disposal points) - health and safety - contact information for further information, questions and issues • community/strata title arrangements • expected service costs for residents and/or tenants • regulatory or contractual compliance requirements • identification and assessment of potential risks and proposed mitigation • maintenance requirements of plant and equipment and cleaning and maintenance of access areas, disposal areas and presentation area • operating instructions including use and operation of plant and equipment • responses to emergencies such as collection failure or spills

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Case Study 1: Waste Management System design at Battersea Reach, London, UK

Figure E.1: Battersea Reach development and the chute inlet used

Battersea Reach (http://www.battersearеach.com) is an award winning waterfront development with buildings cascading towards the River Thames' edge in London. It is a medium-rise mixed-use residential development with buildings not exceeding 12 storeys.

For residential dwellings, the development has been designed to include a single waste chute with a bi-separator system installed at the base of the waste chute. This arrangement allows the waste to be separated into two 1,100 litre wheelie bins located in the basement waste room, one to take residual waste and the other to take mixed dry recyclables. The recyclables and residual waste are deposited by the residents into waste inlets located near the lifts on each floor of the building by pressing the appropriate button. The Bi-separator Chute System inlet point and waste selection buttons are shown above.

On the nominated collection day, facility management use a small electric vehicle to move the 1,100 litre wheelie bins from the basement waste rooms to the ground level.

The waste chute system is cleaned approximately every two weeks in order to avoid odour problems.

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Case Study 2: Waste Management System redesigned at Whitmore Square Affordable Eco-Apartments, Adelaide

Figure E.2: Whitmore Square Affordable Eco-apartments and bins used

Completed in 2010, the Whitmore Square Affordable Eco-Apartments comprises 26 owner occupied and affordable housing units and one commercial tenancy. This development was a new 26-dwelling 'affordable and eco-housing' development by the Adelaide City Council built at a site at 42-56 Whitmore Square, Adelaide.

It was originally planned that occupants would share 240 litre bins for general waste and recycling. These bins were to be stored in the basement car park and presented on the kerbside for collection.

During construction a review of waste management system requirements was undertaken. It was determined that the proposed waste management system would be inappropriate for a development of this type. In particular, use of 240 litre bins was impractical due to the large number of bins that would be required. The limited frontage and road verge width would require the waste contractor to pull the 240 litre bins out for emptying. The gradient of the entry ramp prohibited manual transfer of bin up to the street for collection and a low roof clearance (<3m) in the basement car park prevented on site collection.

The WMS was re-designed to include shared 660 litre waste and recycling bins and the system was expanded to include 240 litre food organics bins and domestic battery recycling. Three sets of these bins were strategically positioned at main entry points where it was most convenient to primary pedestrian movements of residents. Bins were located behind gates colour matched to the bin type (red, yellow and lime green). Signage was included next to each local disposal point to provide guidance on correct waste and recycling disposal practices.

The waste management system utilises a 'pull-in pull-out' service resulting in no bins on the street improving amenity for residents and customers at the ground level café.

A private contractor with a rear-lift truck was engaged to collect the bins from the development.
This change in WMS design to better reflect the development and site circumstances substantially reduced the potential service costs, improved resident convenience and satisfaction and enhanced recycling diversion outcomes.

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Case Study 3: Improved service quality achieved by using larger capacity 660 litre bins and increasing collection frequency for the Garden East development, Adelaide

Figure E.3: Improved service quality achieved by using larger capacity 660 litre bins and increasing collection frequency for the Garden East development, Adelaide

Constructed in the 1990's, Garden East comprises 250 dwellings spread across eight multi-storey apartment buildings and a townhouse complex.

The original WMS comprised 240 litre general waste and comingled recycling bins that were stored in dedicated bin storage areas and presented for kerbside collection on a weekly and fortnightly basis, respectively. Bins were pulled out by the building manager for kerbside collection.

Over time the bin capacity was becoming insufficient for the growing demands at peak times during the year. Instances of bins overflowing and causing nuisances were generating complaints from residents. Furthermore, the fortnightly recycling service was impairing recycling outcomes, detracting from overall storage capacity and contributing to the substitution of recycling bins for waste bins as recycling bins were perceived as an inefficient use of valuable space.

In the surrounding streets on collection days, up to 150 bins were remaining on the kerbside for up to 30 hours each week due to uncertainty for the building manager around kerbside collection times and staff availability. This was impacting upon ground level commercial premises, pedestrians and amenity for outdoor dining patrons.

Working closely with residents and building management, the WMS design was reviewed and a Waste Management Plan was developed and endorsed by building management.

The replacement waste management system utilises nine 240 litre bins for food organics recycling and 50 larger capacity 660 litre mobile garbage bins for waste and comingled recycling. Total bins have been reduced from more than 150 to 59, signage and education notice boards has been installed in bins storage areas and bin presentation areas have been documented to locate bins away from sensitive ground level activities on collection days.

To enable the recycling storage capacity to exceed waste storage capacity, service frequency was increased to weekly collections for general waste, comingled and food organics recycling. Flexibility was also provided for 'at call' collections during peak holiday periods, to enable bin numbers to be reduced and storage areas to retreat back to the original areas allocated in each building.

To improve access for mobility impaired persons, 660 litre bins with a modified 120 litre lid-in-lid design were developed with local bin manufacturer Mastec. This initiative, which reduced the lifting weight of bin lids from approximately 2.7 kilograms to approximately 400 grams, was very well received by building management and residents.

These changes improved quality of service for residents, substantially improved local amenity, reduced the service cost, and improved resource recovery outcomes.

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Appendix F: Glossary

Table F.1: Glossary

Term	Definition
Baler	A device that compresses waste or recycling (usually cardboard or plastic) into bales which may be self-supporting or retained in shape by wire ties and strapping.
Built form	The arrangement, layout and form or shape of a building and associated infrastructure on a development site (what the building looks like, how tall it is, how much of the lot it takes up and so on)
Building (or development) density	The number of residential dwellings or tenancies per unit area (hectare) in a development
Bulk bin	Large bin typically 1.5 m^3—6.0 m^3
Chute (waste or recycling)	A ventilated, essentially vertical pipe passing from floor to floor of a building with openings as required to connect with hoppers and normally terminating at its lower end at the roof of the central waste room
Collection frequency	Frequency of waste collection from site
Collection zone	Location where vehicles stop or park to load bins or waste or recycling materials
Confidential paper recycling	Separate service for collection of confidential documents, typically involving on or off-site shredding of the documents and secure transport to a disposal or recycling facility
Comingled (dry) recyclables	Also commonly referred to as mixed dry recyclables and typically includes recyclable items such as bottles, cans, containers, cardboard and paper
Compactor	A machine for reducing volume of waste by mechanically compressing it
Difficult waste streams	Materials typically found in the household waste stream such as batteries, household chemicals, smoke detectors and compact fluorescent light globes which are banned from landfill in the *Environment Protection (Waste to Resources) Policy 2010*, under *Environment Protection Act 1993*
Disposal point	A location in a development where waste and recycling can be disposed by residents and/or tenants
E-waste	Electronic or electrical waste such as used computers, televisions, whitegoods, hairdryers, and other electronic consumables
Food organics	Food waste generated by a residential dwelling or commercial tenancy
Front-lift truck	Collection vehicle for waste and/or recycling that lifts bins from the front of the vehicle over the driver's cabin and into a compactor bin at the rear of the vehicle
General waste/residual	Residual waste that has not been separated for recycling (not including hard waste, e-waste or difficult waste streams)
Hard waste	Large or bulky waste items, typically including items such as used mattresses, furniture, floor coverings, soft furnishing, bikes and toys and is not suitable for collection using the kerbside bin system
Kerbside collection	Collection of waste and recycling from the street kerb typical of low density residential Council waste and recycling collections

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Term	Definition
Landfill prohibited materials	Waste materials that are prohibited from landfill in the *Environment Protection (Waste to Resources) Policy 2010*, under *Environment Protection Act 1993*
Local disposal	The place where residents and/or tenants can dispose of waste and recycling
Local storage	Storage located in a residential dwelling or tenancy where waste and recycling is temporarily accumulated before disposal by the resident or tenant in the appropriate bin
Mobile garbage bin (MGB)	Usually refers to a smaller bin (140 L, 240 L, 360 L, 660 L, 1100 L) with wheels
On-demand collection	Arrangement whereby the waste contractor collects waste 'as required' or 'on demand', typical for management of infrequent waste volumes such as collection of hard waste
Organic waste	Organic waste including garden waste, food waste and other organic materials such as paper towels
Presentation area	Where bins or waste and recycling material are temporarily stored for collection by a waste contractor
'Pull-in pull-out' service	A service where the waste contractor collects waste bins presented for collection within the development (e.g. in a waste room). As part of this service the waste contractor alsoreturns emptied bins to the same location where they were presented.
Rear-lift truck	Collection vehicle for waste and/or recycling that lift bins from the rear of the vehicle into a compactor bin
Service cost	The total annual cost to a development, or the per-unit cost for each dwelling/ tenancy, of the Waste Management System, including collection costs, which may be identified for each type of waste and/or recycling material
Side-lifting truck	Collection vehicle for waste and/or recycling that lift bins on the road or road verge at the side of the vehicle into a compactor bin
Storage area	The location where waste and recycling is stored until collection which may also include equipment for aggregation and/or compaction of the waste and/or recycling
Universal access	To be usable to the greatest extent possible by everyone, regardless of their age or ability

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