



Operational Waste Management Plan

Tweed Valley Hospital

At 771 Cudgen Road, Cudgen

On behalf of TSA Management



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Executive Summary

This operational waste management plan outlines the waste management processes, equipment and construction requirements and identifies the various waste streams and volumes that are anticipated for the Tweed Valley Hospital development located at 771 Cudgen Road, Cudgen. The plan satisfies the requirements set out by the Tweed Shire Council and the NSW Environmental Protection Authority by providing the following information:

- Type and quantity of refuse materials that would be generated during the occupancy of the proposed development.
- Refuse collection, storage, transfer and disposal arrangements during occupancy of the completed development.
- Recommended operational requirements for the operational phase of the development, and design requirements for the building and refuse management facilities.

A summary of the proposed development and waste management processes are outlined below:

- The proposed development is a new hospital development servicing the Tweed Valley region. The hospital will offer all common hospital services, including an emergency department. There will also be public spaces including retail and food and beverage outlets.
- The proposed bin and equipment numbers below are for when hospital is full capacity (max. numbers). Detail can be found in **Section 3.1 and Appendix A**. For details about bin and equipment numbers, including forecasts for future years of operation of the hospital, refer to the **Tweed Valley Hospital Logistics Findings Report**.
 - Dirty bin holding area:
 - Common waste and recycling bins and equipment:
 General waste: 1 x compactor (23m³ if food waste separation occurs / 31m³ if no food waste separation), located in the service yard
 Recycling: 1 x compactor (23m³) plus 2 x 660L bins
 Food waste bins as required
 Optional: food waste processing system
 Optional: glass waste separation (bins / glass crusher)
 - Clinical waste / sharps bins and cytotoxic waste:
 16 x 240L bins
 33 x Clinismart bins
 50 x Sharpsmart bins
 17 x Cytosmart

- Confidential waste:
 - 3 x 240L bins
 - 9 x Pharmasmart bins
- Up to 63 Linen trolleys
- Clean bin holding area and wards / departments:
 - After cleaning, general waste, commingled recycling and food waste bins will generally be **held within the wards / departments or the kitchen**. The following needs to be provided:
 - General waste: 19 x 240L and 11 x 660L bins
 - Recycling: 12 x 240L and 7 x 660L bins
 - Food waste bins as required
 - Optional: glass waste bins
 - Clinical waste / sharps bins and cytotoxic waste:
 - 16 x 240L bins
 - 33 x Clinismart bins
 - 17 x Cytosmart
 - Confidential waste:
 - 3 x 240L bins
 - 9 x Pharmasmart bins
- Refuse collection (refer to **Section 2.1**):
 - All refuse will be collected via the dirty loading dock on the western side of the facility on the basement level.
- Refuse storage, transfer and disposal (refer to **Section 2.2 and 2.3**):
 - All refuse from the hospital will be stored temporarily within the different wards and medical departments in appropriate bins (240L or 660L) or medical waste containers. This include the emergency department where ambulance vehicles arrive.
 - Refuse from the retail / food and beverage outlets will be stored the same way in bins up to 240L within the tenancies.
 - The bins / containers will then be transferred to the bin rooms on the basement level next to the loading dock by staff / cleaners.
 - General waste and recycling will be decanted into the respective compactors. Food waste bins are collected by the food waste contractor or decanted into food waste processing equipment if available before collection or re-use. Clinical waste bins are dealt with on a full for empty exchange basis, i.e. the waste contractor will collect full bins and replaced them by empty ones.

- Once emptied, bins are washed and taken back to the ward / department disposal / holding rooms to then be filled again. Clinical bins are washed off-site by the clinical waste contractor.
- Space for infrequent disposal of bulky items and electronic waste should be considered within the loading dock area.

The provisions as outlined in this report are considered appropriate for this type of development. The details of operational options will be finalised during the Detailed Design Stage and prior to the commencement of operations at the facility. It is noted that the refuse rooms are suitably sized to accommodate the waste generated and number of bins proposed based on standard storage and collection methods. The refuse rooms indicated will also accommodate all options for alternate equipment and disposal methods.

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1 Introduction

1.1 Background

TTM Consulting has been engaged by TSA Management to prepare an Operational Waste Management Plan to support the new Tweed Valley Hospital development located at 771 Cudgen Road, Cudgen.

This report is based on the following information for the Tweed Valley Hospital development:

- Tweed Valley Hospital development plans (70% schematic design), prepared by STH Bates Smart;
- Tweed Valley Hospital Logistics Review Findings Report, dated 8 May 2019, prepared by Arup;
- Tweed Valley Hospital Environmental Services Functional Design Brief, issued by the NSW Government;
- Generic waste management plan, prepared by the Tweed Byron Health Service Group;
- Stage 2 State Significant Development Consent Introductory document (V8); and
- Additional information provided to TTM about the proposed hospital operation related to waste management.

1.2 Scope

The content of this plan is intended to provide information in reverse order to the typical movement of waste streams from disposal to collection. The reverse order provides context for refuse collection, storage and transfer. Information about refuse disposal and disposal points is given for each use area within the development. The recommendations in this report relate to the operational phase of the development only. Additional requirements for refuse management during or after demolition or construction phases are not included and require a dedicated plan.

The items covered within the report are explained in Table 1.1. The key information for Council approval can be found in Section 2. Detailed information including refuse calculations, site plans and drawings, recommended refuse management equipment and system specifications, common refuse signage as well as a list of terms and abbreviations are provided in the appendix.

Table 1.1: Items Covered in this Report

Item	Explanation
Refuse streams	Identification of refuse streams and anticipated refuse volumes that will be produced within the development
Refuse separation	Recommendations for appropriate segregation methods for each refuse stream
Refuse collections	Assessment of refuse collection vehicle (RCV) access and manoeuvring
Refuse storage	Detailed analysis of refuse storage facilities and design
Refuse transfer	Assessment of refuse transfer between refuse storage and collections areas

Refuse disposal	Recommendations for refuse disposal within the development
Refuse management equipment	Identification of recommended and optional refuse management systems and equipment
Refuse management operations	Recommendations for operational efficiency and ongoing management, including refuse minimisation, tenant education and safety
Building design	Recommendations for design of refuse management facilities

In addition, the following specific requirements have been addressed across the different sections of this report to satisfy the Stage 1 State Significant Development (SSD) Consent – Stage 2 Requirements as well as the Secretary's Environmental Assessment Requirements (SEARs) with regards to refuse management for the facility:

Table 1.2: Specific Requirements Addressed in this Report

Requirements	Comment
Stage 1 SSD Consent – Stage 2 Requirements	
B15. The Stage 2 application must include a framework detailing how the future development will be designed to consider and reflect national best practice sustainable building principles to improve environmental performance and reduce ecological impact in accordance with Environmentally Sustainable Design Report prepared by Steensen Varming Pty Ltd dated 16 August 2018. This should be based on a materiality assessment and include waste reduction design measures, future proofing, use of sustainable and low-carbon materials, energy and water efficient design (including water sensitive urban design) and technology and use of renewable energy.	Waste reduction and minimisation has been addressed throughout this report. Specific details can be found in Section 3.2 and Appendix C.4.
B27. The Stage 2 application must include a Waste Management Plan to address storage, collection, and management of waste and recycling within the development. The Waste Management Plan must identify opportunities for the reduction, re-use and recycling of waste, including food waste.	This waste management plan addresses refuse collection, storage, transfer and disposal details for all refuse stream that are expected to be generated from the development, including food waste and clinical wastes. Refer to Section 2 for details. Additional information about reduction re-use and recycling can be found in Section 3.2 and Appendix C.2 and C.4.
SEAR's Request	
4. Built Form and Urban Design: Detail how services, including but not limited to waste management, loading zones, and mechanical plant are integrated into the design of the development.	Details about refuse management services including refuse rooms, bins and equipment as well as collection zones (loading dock) can be found in Section 2. Relevant plans are attached to this report (Appendix B).
22. Waste: Identify, quantify and classify the likely waste streams to be generated during construction and operation and describe the measures to be implemented to manage, reuse, recycle and safely dispose of this waste. Identify appropriate servicing arrangements (including but not limited to, waste management, loading zones, mechanical plant) for the site.	Details about all operational refuse management arrangements for this development can be found in Section 2. A detailed overview of the refuse generated from this site is attached (Appendix A). Additional detail can be found in the Tweed Valley Hospital Logistics Review Findings Report . A separate construction waste management plan is required for the construction phases.

1.3 Regulatory Considerations






1.3.1 Policies and Planning Scheme

TTM has referred to the following regulatory requirements for the preparation of this waste management plan:

- NSW Health policy directive “Clinical and Related Waste Management for Health Services” dated 17 August 2017, issued by the NSW Government;
- NSW Waste Levy Guidelines;
- Tweed Shire Council development control plan, Section A.15 Waste minimisation and Management;

Table 1.3 below demonstrates the refuse management items addressed to align with the Tweed Shire Council’s development control plan.

Table 1.3: Waste Management Plan Compliance Checklist (Tweed Shire Council)

Objectives	Comments	Compliance
i. The location of the designated waste and recycling storage room(s) or areas, sized to meet the waste and recycling needs of all tenants.	Waste and recycling storage arrangements are described in Section 2. The storage rooms are of sufficient size for this development.	
ii. The location of temporary waste and recycling storage areas within each tenancy. These are to be of sufficient size to store a minimum of one day’s worth of waste.	There will be refuse disposal and temporary storage areas located throughout the facility for temporary storage of all refuse streams prior to transfer to the refuse rooms or collection by waste contractors. Refer to Section 2 for details.	
iii. An identified collection point for the collection and emptying of waste, recycling and greenwaste waste bins.	The collection point for collection of all refuse will be located in the loading dock. Refer to Section 2.1 and Appendix B for details.	
iv. The path of travel for moving bins from the storage area to the identified collection point (if collection is to occur away from the storage area).	Refuse transfer paths are outlined in Section 2 and detailed in the Logistics Review Findings Report.	
v. The on-site path of travel for collection vehicles (if collection is to occur on-site).	Refer to Section 2.1 and Appendix B for RCV access and manoeuvring.	

1.3.2 Waste Levy

Licensed waste facilities in NSW to pay a contribution for each tonne of waste received at the facility. Referred to as the 'waste levy', the contribution aims to reduce the amount of waste being landfilled and promote recycling and resource recovery. The levy may be handed on to the waste generators.

The waste levy applies in the regulated area of NSW, which includes various metropolitan and regional areas. The Tweed Valley region is a regional levy area where a waste levy of \$82.70 per tonne applies (financial year 2019 / 2020).

The levy will normally be passed on by waste collection contractors to customers, possibly based on an assumed volume per bin or per actual weight of the waste material. Therefore, in order to reduce waste levy costs, waste generators should choose to avoid waste generation through a range of preventative measures, and separate recyclable material from general waste they do generate as much as possible.

1.4 Site Location

The subject site is located at 771 Cudgen Road, Cudgen, as shown in Figure 1.1 and Figure 1.2. The lot number is 11//DP1246853. The site has road frontage to Cudgen Road on the South and Turnock Street on the East. Site access is from Cudgen Road.



Figure 1.1: Site Location (Map View)

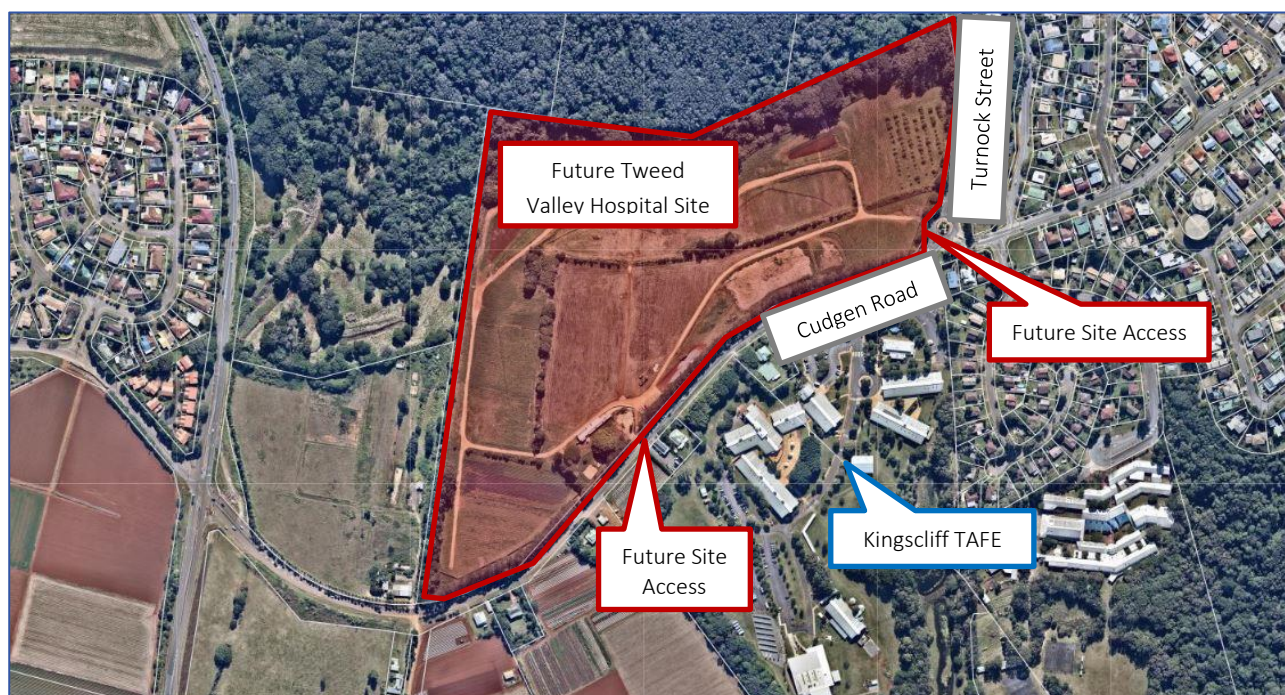


Figure 1.2: Site Location (Satellite View)

1.5 Development Summary

The proposed development is a new hospital development servicing the Tweed Valley region. The hospital will offer all common hospital services, including an emergency department. The maximum planned capacity is **450 overnight (patient) beds**. There will also be public spaces including retail and food and beverage outlets.

Table 1.4 provides a summary of the development, including the refuse infrastructure areas as context for the volume information provided in Section 1.6.

Table 1.4: Development Summary

Level	Description	Measure *
Basement	Workshops Building Facilities Food Services Kitchen Mortuary Refuse Storage and Management Loading Dock Access	2832m ² GFA
Lower Ground Level	Pharmacy / Medical Departments Staff / Logistics	10835m ² GFA 97m ² GFA
Ground Level	Front of House / Bookings Unit (Reception) Medical Departments	1175m ² GFA 8888m ² GFA

Level 1	Medical Departments / Wards	9488m ² GFA
Level 2	Medical Departments / Wards	4919m ² GFA
Level 3	Medical Departments / Wards	5091m ² GFA
Level 4	Medical Departments / Wards	4866m ² GFA
Level 5	Medical Departments / Wards	4915m ² GFA
Level 6-7	Plant / Helipad	

* Areas relevant for refuse calculations only.

1.6 Development Refuse Profile

A detailed overview of the expected refuse volumes and clinical waste streams for the proposed hospital is provided in the **Tweed Valley Hospital Logistics Review Findings Report, Table 4**. According to condition B27 of the SSD Consent, this report needs to identify opportunities for the reduction, re-use and recycling of waste, including food waste. Details about the separation and handling of food waste depends on the final operational requirements of the hospital (e.g. on site kitchen vs. off-site food preparation and delivery).

Table 1.5 below summarises the refuse volumes that can be expected from the hospital operations and non-hospital related tenancies located within the hospital facility. Further details can be found in Appendix A

Table 1.5: Commercial Refuse Summary

Description	Measure	Quantity	Generated Waste (L / Week)	Food Waste (L / Week)	Generated Recycling (L / Week)
Hospital (Patients, Staff, Kitchen, Admin etc.)	Overnight Patient Beds	450	12061	11711	18621
Food and Beverage	m ² GFA	120*	2772	2772	1117
General Retail	m ² GFA	100*	350	-	350
Total			15183	14483	20001
Clinical Waste			As per Logistics Findings Report		

* Estimates only.

Taking into consideration the current refuse collection costs as well as the waste levy outlined in Section 1.3.2, costs related to refuse management for this development are outlined below. The calculation is based on the anticipated commercial refuse volumes as shown above. A more detailed cost overview can be found in Appendix A.

Table 1.6: Refuse Collection Costs

Description	Measure	General Waste	Food Waste	All Recycling
Estimated costs (1 st year) includes waste levy and environmental charges	A\$/year	\$101,105	\$34,675	\$52,143

Notes:

Assuming a weight of general waste of 150kg per tonne as per

[https://www.greenindustries.sa.gov.au/literature/165892/Waste_and_Recycling_Reporting_Template_\(2017\).](https://www.greenindustries.sa.gov.au/literature/165892/Waste_and_Recycling_Reporting_Template_(2017).)

2 Refuse Management

This section describes the arrangements for the collection, storage, transfer and disposal of refuse within the development. This includes associated bin quantities, storage capacities, equipment details, collection frequencies and site access details.

For further details about refuse management for this facility including building-internal refuse storage, disposal and transfer, refer to the

- Tweed Valley Hospital Logistics Review Findings Report and the
- Tweed Byron Health Service Group's Generic waste management plan.

2.1 Refuse Collection

All refuse from this facility is deemed commercial and will be collected by private waste contractors. The sections below outline the required bin numbers, collection frequencies and RCV site access and manoeuvring details.

Further details about the expected refuse volumes and collection frequencies is provided in the **Tweed Valley Hospital Logistics Review Findings Report, Table 4.**

2.1.1 Bin Quantities

Table 2.1 below outlines the number of bins per collection. As waste volumes may vary according to the development occupants' attitudes to waste disposal and recycling, bin numbers and sizes may need to be altered to suit the building operation.

Table 2.1: Number of bins per Collection

Component	Refuse Stream	Bin / Equipment Size	Number of Bins / Items per Collection
Commercial Collections	General Waste	23m ³ stationary compactor	-
	Food Waste	Food waste system or 240L bins (optional)	TBD (bins or collection via tank truck)
	Commingle Recycling	23m ³ stationary compactor	-
	Cardboard	Cardboard baler	As required.
	Confidential Waste	240L	3
		Pharmasmart	9
	Clinical and Cytotoxic Waste	240L	12 + 4
		Clinismart	33
		Sharpsmart	50
		Cytosmart	17

2.1.2 Collection Cycle

Table 2.2 outlines the vehicles and estimated collection frequencies required to service the site refuse. The frequencies are based on all options for refuse stream separation with bin service only. The type of vehicles allocated, and demand will be subject to final design and potential selection of volume reduction equipment. The figures demonstrated apply as a maximum demand.

Table 2.2: Estimated Refuse Collection Vehicle Demands – Commercial Refuse

Commercial Refuse Collections		Mon	Tue	Wed	Thu	Fri	Sat	Sun	Collections per Week
General Waste	Storage Capacity	3		2		2			3
	Vehicle Type	Hook Lift		Hook Lift		Hook Lift			
Food Waste	Storage Capacity								TBD
	Vehicle Type								
Commingled Recycling and Cardboard	Storage Capacity	4			3				2
	Vehicle Type	TBD			TBD				
Glass	Storage Capacity								TBD
	Vehicle Type								
Secure Destruction Paper	Storage Capacity	4			3				2
	Vehicle Type	REL RCV			REL RCV				
Clinical and Cytotoxic Waste	Storage Capacity	2	1	1	1	1	1		6
	Vehicle Type	REL RCV	REL RCV	REL RCV	REL RCV	REL RCV	REL RCV		
Further Collections are required	Storage Capacity	e.g. medical fluids, cooking oil							TBD
	Vehicle Type								
Total Collections per Week		4+	1+	2+	2+	2+	1+		13 +

2.1.3 RCV Access and Manoeuvring

All refuse collection will occur on site in the loading dock on the western side of the development. RCV access and manoeuvring are to be confirmed upon provision of more detailed development plans.

2.2 Refuse Storage and Transfer

All refuse from the hospital will be stored temporarily within the different wards and medical departments in appropriate bins (240L or 660L) or medical waste containers. This includes the emergency department where ambulance vehicles arrive.

Refuse from the retail / food and beverage outlets will be stored the same way in bins up to 240L within the tenancies or back-of-house areas.

The bins / containers will then be transferred to the bin room(s) on the basement level next to the loading dock by staff / cleaners. Medical waste bins may be collected directly from within the building by the medical waste contractors.

Waste and commingled recycling will be decanted into the respective compactors. Food waste bins are collected by the food waste contractor or food waste decanted into processing equipment if available (see Section 2.3). All clinical waste bins will be removed by the clinical waste contractor for emptying and cleaning, and replaced by clean ones (full for empty exchange). Non-clinical waste bins will be cleaned on-site after emptying.

Once emptied and cleaned, bins that are to be used for disposal of refuse within the different medical departments / wards or other areas of the hospital will be cleaned and stored in a clean bin holding area.

Additional space for infrequent disposal of bulky items and electronic waste should be considered within the loading dock area. There will also be skip bins available for the engineering services department.

Further details about the expected refuse volumes and collection frequencies is provided in the **Tweed Valley Hospital Logistics Review Findings Report**. Refer to Appendix B.1 preliminary layout of the refuse holding room including indicative refuse transfer paths.

2.3 Refuse Disposal

The tables in this section summarise the requirements for frequently generated and infrequently generated refuse for each area use within the development. **Frequently generated waste** considers material streams that are generated in high volumes for any given period and require significant capacity for storage prior to collections. **Infrequently generated waste** includes material streams that are generated in relatively low volumes, and where minimal provision for storage can be easily managed by collection frequency.

2.3.1 Refuse from Hospital Operations

Details about refuse disposal and transfer within the hospital are provided in the **Tweed Valley Hospital Logistics Review Findings Report**. Additional recommendations are listed in the table below.

Table 2.3: Hospital Disposal

Frequently Generated Waste Streams – Hospital	
Refuse Stream	Disposal Details
WASTE	
All Clinical Waste and Waste related to Hospital Operations	Disposal and Transfer All clinical and related waste from within the medical departments and wards will be captured in specific medical bins or bins up to 240L in size. The bins will then be transferred by staff / cleaners to the dirty refuse holding room on the basement level for collection or decanting in the waste and recycling compactors. Refer to the Tweed Valley Hospital Logistics Review Findings Report for further details.
General Waste	Disposal and Transfer All general waste from within the medical department and wards will be captured in 240L wheelie bins or 660L bulk bins. The bins will then be transferred to the dirty refuse holding room

Frequently Generated Waste Streams – Hospital	
Refuse Stream	Disposal Details
	on the basement level for collection or decanting in the waste and recycling compactors. Refer to the Tweed Valley Hospital Logistics Review Findings Report .
Organic (Food) Waste	Refer to Table 2.4.
Cooking Oil Waste	Refer to Table 2.4.
RECYCLING	
Comingled Recycling including Glass, aluminium, steel cans, tins, paper, small cardboard, semi rigid plastics	Disposal and Transfer All recycling material from within the medical departments and wards will be captured in 240L wheelie bins or 660L bulk bins. The bins will then be transferred by staff / cleaners to the dirty refuse holding room on the basement level for collection or decanting in the waste and recycling compactors. Refer to the Tweed Valley Hospital Logistics Review Findings Report .
Cardboard and Plastic Film	Refer to Table 2.4 and to the Tweed Valley Hospital Logistics Review Findings Report .
Glass	Refer to Table 2.4.
Secure Destruction Paper	Disposal and Transfer All secure destruction paper from within the medical departments and wards and their offices will be captured in 240L wheelie bins or 660L bulk bins. The bins will then be transferred by staff / cleaners to the dirty refuse holding room on the basement level for collection or decanting in the waste and recycling compactors. Refer to Tweed Valley Hospital Logistics Review Findings Report .

2.3.2 Refuse from Retail Spaces and Office / Staff Areas

Table 2.4: Retail Spaces and Office and Staff Areas Disposal

Frequently Generated Waste Streams – Retail Spaces and Office and Staff Areas	
Refuse Stream	Disposal Details
WASTE	
General Waste	<p>Depending on the type of operations of the individual tenancies, different wastes may be produced.</p> <p>Disposal For general waste from non-food and beverage outlets, bins of at least 60L capacity should be located in staff rooms, back-of-house or pantry areas. Larger bins can also be placed in areas accessible to the public, e.g. near entrance and exit doors. General waste from food and beverage outlets such as restaurants, takeaways, cafés will be captured by bins typically ranging in size from 30 L to 80 L that will be placed within the kitchen or back-of-house area to meet the design or layout criteria of the cafe or restaurant operators. Office waste typically includes food waste in pantry / kitchen areas, general non-recyclable material from office activities as well as infrequent wastes such as bulky items, hazardous waste (e.g. printer cartridges) and electronic waste (e.g. computers and screens) (see respective sections for disposal of infrequent wastes). Bins are typically placed near or under the workers' desks or workstations. Waste bins should be accompanied by a recycling bin in order to facilitate separation of general waste and recycling. Waste bins should always be lined with bags and the bags tied before removal.</p> <p>Transfer After each day of operation or between peak operating periods, waste will be transferred by staff / cleaners to the refuse room and placed / decanted into (bulk) bins or appropriate equipment for collection. Small bins or carts / trolleys may be used for transfer if required.</p>

Frequently Generated Waste Streams – Retail Spaces and Office and Staff Areas	
Refuse Stream	Disposal Details
	<p>Lifts</p> <p>Service lifts are provided for transfer of waste to the refuse room. It is recommended that a removable rubber mat be used in the lift for easy removal and cleaning. Lifts should be sprayed and cleaned regularly after transferring waste containers or trolleys to prevent smells and contamination.</p>
Organic (Food) Waste	<p>Separating organic or food waste from general waste has to be adopted by the development including the food and beverage outlets and commercial hospital kitchens in order to reduce the total amount of general waste.</p> <p>The following options are proposed. A decision will be made during detailed design phase or prior to operation commencing</p> <p>Disposal and Transfer</p> <p>In general, the following options for food waste separation and disposal are available.:</p> <ol style="list-style-type: none"> 1. Food waste bins of 240L or smaller can be placed in the kitchen or back-of-house areas for direct disposal of organic waste at the point of generation. Those bins will be transferred by staff / cleaners to the refuse room or collection area on a regular basis during the day or as required for pick by the food waste contractor. 2. Digesters, dehydrators and composters are designed to recycle and reduce food waste. Digesters typically process the material into sludge while dehydrators remove liquid from food waste. Both types produce a solid fertiliser end-product. Composters decompose organic matter by aerobic processes. The machines can be placed in the refuse room or back-of house areas. Small wheelie bins or caddy bins (e.g. 60L) with a purpose-built trolley can be used for transfer of food waste and decanting into the machines for processing. <p>The purpose of using digesters, dehydrators and composters is that their products do not need to be disposed as such, but can be used within the development, e.g. for gardening or landscaping. Adequate storage facilities should be made available decomposed / processed materials.</p>
Cooking Oil Waste	<p>Waste oils can be disposed separately from general waste if large quantities are produced, for example for food and beverage outlets and a commercial hospital kitchen. A decision will be made during detailed design phase or prior to operation commencing:</p> <p>Disposal</p> <p>All waste liquids / oils should be separated and stored in clearly labelled containers. Bunded areas or bunded plastic pallets should be supplied for the storage of liquid waste / oils and stored in a levelled area. Bunded pallets can be stored indoors or purpose built for outdoors. They should be routinely inspected to ensure maintenance of their integrity. Each pallet should be capable of storing of at least one-third of its contents if there is a leak.</p> <p>Waste cooking oil containers can be placed in the back-o-house areas or in the refuse room in space allows.</p> <p>Transfer</p> <p>Typically, waste oils are removed during delivery of new oils by the supplying contractor.</p>
RECYCLING	
<p>Commercial Comingled, including</p> <ul style="list-style-type: none"> • glass • aluminium • steel cans • tins • paper • small cardboard • semi rigid plastics 	<p>Depending on the type of operations of the individual tenancies, different recycling materials may be produced.</p> <p>Disposal</p> <p>There will be receptacles within the retail outlet for collection and storage of at least one day of recycling. Recycling bins are typically placed next to the general waste bin.</p> <p>Recycling bins will usually be used for all recycling materials (comingled recycling). However, cardboard, paper, plastics, glass etc. can be collection separately if required.</p> <p>Food and beverage outlets such as restaurants, takeaways, cafés will capture their recycling in bins typically ranging in size from 30 L to 120 L that will be placed within the kitchen or back-of-house area to meet the design or layout criteria of the cafe operators.</p> <p>There will be receptacles within the non-food and beverage outlets for collection and storage of at least one day of recycling. Recycling bins are typically placed next to the general waste bin.</p> <p>Recycling bins will usually be used for all recycling materials (comingled recycling). However,</p>

Frequently Generated Waste Streams – Retail Spaces and Office and Staff Areas	
Refuse Stream	Disposal Details
	<p>cardboard, paper, plastics, glass etc. can be collection separately if required.</p> <p>Recycling from offices largely consists of clean paper (and cardboard) which can be collected separately from comingled recycling if large quantities are produced. In addition, comingled recycling may originate from pantries and meeting / conference rooms where food is consumed.</p> <p>Transfer</p> <p>Items for recycling must not be bagged and disposed in loose form. Recyclable materials should be carried / transported from the individual receptacles within the premises to the (bulk) bin in the refuse room by staff / cleaners. This can be done by decanting the materials from the individual receptacles into a larger container / wheelie bin on a trolley for transport to the refuse room</p> <p>Lifts</p> <p>Service lifts are provided for transfer of waste to the refuse room. It is recommended that a removable rubber mat be used in the lift for easy removal and cleaning. Lifts should be sprayed and cleaned regularly after transferring waste containers or trolleys to prevent smells and contamination.</p>
Cardboard / Plastics	<p>Cardboard/paper and plastic film should be disposed separately from comingled recycling if large quantities are expected. Cardboard and plastics must not be mixed. They must be stored individually (and baled individually if applicable).</p> <p>Disposal</p> <p>Where possible, large cardboard boxes and plastic film or packaging should be removed from the refuse stream prior to going into the building or individual tenancies. This involves decanting at the loading dock and providing trolleys or stackable containers for use in transporting the decanted goods to each level.</p> <p>Where this material does make it into the building or to each a level, a bin, trolley or mobile container should be placed for disposal. Cardboard, plastic film and packaging should not be placed on floors in refuse rooms or compartments. Additional areas have to be allocated for paper and cardboard storage if required.</p> <p>Transfer</p> <p>When already placed in a bin or trolley, this material is easily transferred to the refuse room or loading dock and decanted into the appropriate bin or baling equipment. For operational efficiency, consideration can be given to placing fixed bins within the building or on each level, and staff / cleaners circulating with a mobile bin or trolley to each level decant the fixed bins before returning to the refuse room to dispose of the material into the bulk bins.</p> <p>Baler</p> <p>Segregation and baling (compressing) of these materials will reduce total waste output and may lower the total cost of refuse removal. Typically, a decision on the use of this equipment would be made at the start of the operational phase following review of the site final waste requirements and completion of appropriate risk assessments and operational procedures. A baler is recommended within the refuse rooms or loading dock area for this material. However, small back-of-house balers are also available as an option. Space for cardboard bales is considered in the configuration of the refuse room.</p>
Glass	<p>Glass should be disposed separately from comingled recycling if large quantities are produced, or if a recycling compacted is proposed. Large quantities of glass waste may be produced from food and beverage tenancies.</p> <p>Disposal</p> <p>Glass bottle can be collected in bins up to 120L. Alternatively, glass crushers are recommended as an alternative to placement of glass in the comingled stream. The crushers reduce the storage volume of glass by more than 75%. Glass crushers can be placed directly in bar areas / kitchens or in the refuse compartments. Space is required for the crusher itself as well as bins of sufficient size for changeover during operating hours.</p> <p>Transfer</p> <p>Staff /cleaners will transfer glass waste to the refuse room where the glass crusher may be located, using small bins of up to 120L or refuse trolleys. The glass (bottles) are then placed into</p>

Frequently Generated Waste Streams – Retail Spaces and Office and Staff Areas	
Refuse Stream	Disposal Details
	the crusher for compaction. Glass will be stored in small bins of 60 L capacity due to the weight of crushed glass. Exchange bins are considered in the configuration of the refuse room.

2.3.3 Infrequent Waste

Table 2.5: Miscellaneous Disposal

Infrequently Generated Waste Streams – Hospital Development	
Refuse Stream	Disposal Details
Green Waste	Green waste is not typically produced from a commercial development of this type other than from surrounding landscaped areas or potted plants. Green waste is usually removed by the designated maintenance contractors. The contractor engaged for this work will be required to send this material to a composting or resource recovery facility rather than to a landfill if locally available.
Hard Waste / Bulky Goods	Hard waste may be stored in the designated rooms on the loading dock level. Alternatively, collections can be coordinated, and hard waste / bulky goods moved to the loading dock for removal prior to collection. When storing bulky goods in a loading dock, it is recommended that items are placed on a pallet for easy loading via pallet a jack or forklift onto the collecting vehicle.
Hazardous Waste (paints, batteries and cartridges) Electronic Waste	Where applicable, staff / managers usually make arrangements for the disposal of specialised or hazardous waste and electronic waste such as recycling of toner cartridges and batteries. Please refer to local council and state government websites for disposal options. It is an expectation that the building managers assist with disposal of hazardous, electronic or liquid waste and any paint or chemicals as required and requested. Hazardous waste must be handled with due care, separated and securely stored for collection by a specialist waste contractor. Please refer to local council and state government websites for further information.

3 Recommended Operational Requirements

3.1 Operational Equipment Summary

Equipment required or suitable for use as part of the operational phase of the development is outlined in Table 3.1. Lists of equipment, equipment suppliers and refuse management service providers for use during the operational phase of the development can be found in Appendix C.

For further details, refer to the **Tweed Valley Hospital Logistics Review Findings Report** for all bins and equipment required for the hospital operations.

Table 3.1: Equipment Schedule

Component	Waste Stream	Quantity	Details
Commercial Refuse	General Waste	1 19 11	Stationary Compactor 23 or 31m ³ (see Appendix C.2) 240L bins 660L bins
	Food Waste	TBD	240L bins or Food Waste Processing System with tank up to 6000L See Appendix C.2
	Commingled Recycling	1 12 7 + 2	Compactor (see Appendix C.2) 240L bins 660L bins
	Cardboard	1	Compactor (see Appendix C.2)
	Glass	TBD	If required. Up to 120L bins or 60L bins and glass crusher See Appendix C.2 and C.4
	Confidential Waste	3 9	240L bins Pharmasmart
	All Clinical Waste	33 50 17	Clinismart Sharpsmart Cytosmart
	Refuse Trolleys	TBD	See Appendix C.2 and C.3
	Bin Tug / Trailer	TBD	If required. Depends on final operational requirements See Appendix C.2 and C.3
	Linen Trolleys	63	See Appendix C.2 and C.3

3.2 On-going Management

Responsibilities have to be assigned for all on-going refuse management operations. This is generally done by the building management, staff and / or cleaners. The following lists (Table 3.2 to Table 3.8) are designed to help managing responsibilities and monitor the refuse operations in order to maintain efficient services and a safe environment.

Table 3.2: General Refuse Management Checklist

Objectives	Checked	Remarks
Organising of weekly pick-ups for all refuse streams.		Liaise with private contractors and Council as required.
Managing daily bin transfers between refuse storage / collection areas if required.		
Check bin fill levels and rotate / swap bins as required, e.g. under chutes.		

3.2.1 Safety

Transferring refuse bins and using refuse management equipment are considered hazardous tasks. Therefore, contractors must ensure that a full risk assessment of equipment, surfaces and related gradients is complete. The contractor must provide procedural documentation to appropriate personnel prior to delivery of equipment and occupancy of the development.

Table 3.3: Safety Checklist

Objectives	Checked	Remarks
Abiding by all relevant occupational health and safety legislation, regulations and guidelines to ensure site safety for residents, visitors, staff and contractors.		
Assessment of any manual handling risks and preparation of a manual handling control plan for waste and bin transfers.		
Provision of equipment manuals, training, health and safety procedures, risk assessments and personal protective equipment to staff / contractors in order to control hazards associated with all waste management activities.		

3.2.2 Signage

All receptacles, bins and other refuse management equipment will have adequate signage. Standard signage will be provided in and around waste collection and storage areas (see Appendix D).

Table 3.4: Signage Checklist

Objectives	Checked	Remarks
Ensuring compliance of signage with government local council regulations.		Use signage provided by Council's if available

Ensuring that labelling on bins, refuse room etc. is appropriate and clear and easy to read and updated if required.		
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3.2.3 Cleaning and Maintenance

Regular cleaning and maintenance of all refuse management facilities is important to maintain a safe and hygienic environment for residents, visitors, staff and contractors.

Table 3.5: Cleaning and Maintenance Checklist

Objectives	Checked	Remarks
General cleaning of all refuse holding and transfer areas including <ul style="list-style-type: none"> • Refuse rooms and storage areas • Refuse bins • Refuse transfer areas including lifts and staircases • Refuse chutes and hopper doors • Any other refuse management equipment 		Frequency depends on refuse generation and building operation.
Coordination of specialised cleaning contractors as required.		
Maintenance and servicing of refuse management equipment as per schedule.		Frequency depends on equipment and building operation.
Coordination of specialised equipment contractors as required.		

3.2.4 Refuse Minimisation

Refuse minimisation is an important part of any site operation. At a minimum, the following should be implemented. Additional refuse minimisation options and equipment can be found in Appendix C. A decision needs to be made by the hospital operator or management.

Refuse minimisation requires regular reviewing to ensure operational sustainability of refuse volumes, equipment and economic feasibility. It is recommended that refuse weights and movements are noted and reviewed. An external review is usually conducted 12 to 18 months after the implementation of the plan.

Table 3.6: Refuse Minimisation Checklist

Objectives	Checked	Remarks
Regular review of material quantities to avoid over-ordering.		
Consideration of secondary and recycled materials where possible.		
Encouraging refuse minimisation through education and signage (see below).		

Reduce refuse through continuous monitoring and review (see below).		
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3.2.5 Education and Communication

On-going education is important to ensure people continue to use the facilities as originally intended. All body corporate and leasing contracts should contain clauses pertaining to waste management arrangements and use of any associated equipment.

Table 3.7: Education and Communication Checklist

Objectives	Checked	Remarks
Communication of refuse management arrangements to residents, staff and contractors as required.		
Consideration of promotional opportunities for any successes e.g. awards programs.		

3.2.6 Monitoring and Review

Regular monitoring and inspections of waste and related equipment and facilities from the development should be conducted by building management or designated staff for maintenance and sustainability.

Table 3.8: Monitoring and Review Checklist

Objectives	Checked	Remarks
Continual monitoring of equipment uses and scheduling to ensure best operational outcomes.		
Regular review of refuse management equipment and facilities such as bin volumes, refuse storage capacities and stormwater management arrangements.		

4 Recommended Design Requirements

This section lists **general** recommended design requirements for the building and refuse management facilities. They should be considered for optimal refuse management within the development, and to comply with relevant regulations and Council requirements.

4.1 (Bin) Servicing Point

The RCVs will enter the site via Cudgen Road and pull up in the loading dock (servicing point) for all refuse collections. The servicing point should have the following features:

- Has sufficient access and clearance for the waste and recycling collection vehicles to service the bins, including no overhead obstructions.
- Allows bins to be serviced safely while minimising the impediment to traffic flow during servicing.
- Is clearly separated from car parking bays, footpaths and pedestrian access.
- Is of sufficient size to accommodate the bins.
- Is devoid of stairs, lips or ramps and allows bins to be manoeuvred easily.
- Does not block the entry and exit to the property.
- Is clear of speed control devices.
- Is not adjacent to a kitchen or eating area for public use.
- Is over 5m from any door, window or fresh air intake within the development or any adjoining site.
- Is screened sufficiently to minimise the view of bins from neighbouring properties or passing vehicles and pedestrian traffic external to the site.
- Is positioned away from entrances to shops or residential premises.

4.2 Refuse Rooms

The refuse room will have the following features in order to minimise odours, deter vermin, protect surrounding areas, and make it a user-friendly and safe area:

- Be insect and vermin proof.
- Fire rated and ventilated in accordance with the National Construction Code – Building Code of Australia.
- Doors must be wide enough to allow for the easy removal of the largest container to be stored.
- The walls, ceilings, floors and equipment are to be designed and constructed of impervious material with a smooth finish to allow for easy cleaning.

- The floors to be graded to fall to a drainage point.
- Drainage points connected to sewer in accordance with trade waste requirements.
- A hose cock must be provided inside the room for cleaning bins and the rooms.
- Adequate artificial lighting.
- Not located adjacent to or within any habitable portion of a building or place used in connection with food preparation (including food storage).
- Permit unobstructed access for removal of the containers to the service point and for positioning the containers correctly in relation to the chutes.
- Will be attractively designed to minimise their visual impact on the surrounding areas.
- Does not have any steps or lips.
- Is enclosed on all sides except for the gated entrance to ensure bins are not visible from a public place, neighbouring properties, passing vehicles or pedestrian traffic external to the site.
- Is of sufficient size to accommodate the bins with sufficient clearance around the combined bin area.
- Is positioned away from entrances to shops or residential premises.
- The height of the bin storage area allows for waste bins to be opened and closed.

4.3 Bin Wash

A bin wash-down facility will be provided within the bin storage room. It will have the following features:

- Constructed hardstand with a solid concrete base.
- Roofed and designed to prevent entry to rainwater.
- Graded to fall to a drainage point that is connected to sewer in accordance with trade waste requirements.
- Provided with a hosecock for cleaning.
- Is in a purpose-built storage area which is air locked, fly and vermin proofed, and used solely for the storage of waste.
- Is in a well-ventilated portion of the basement and not within 10m of an opening to a food premises or food handling area.

4.4 Storm Water Prevention and Litter Reduction

Designated staff / cleaners are responsible for on-site storm water pollution and litter reduction. To limit the impact on the environment and site, the following measures should be taken into account:

- Providing adequate signage to promote litter control.
- Providing sufficient refuse bins in appropriate areas.
- Preventing unauthorised entry to waste areas.
- Monitoring waste and prevent waste overflow.
- Promoting best practices for waste minimisation.
- Installing litter traps in car parks for any unwanted discharge.

4.5 Ventilation

Natural or mechanical ventilation must be provided to waste storage areas unless refrigerated below 4°C. Natural ventilation means unobstructed, permanent openings direct to external air no less than one-twentieth (1/20) of floor area. Mechanical ventilation requires a minimum rate of 100L/s and 5L/m² exhaust rate.

4.6 Bin Carting

The bin carting route will have the following features:

- Is via the hard stand driveway.
- Allows bins to be easily manoeuvred.
- Is clear of speed control devices or similar provisions.
- Does not impede traffic flow.
- Does not extend through any habitable parts of a building or food premises.
- Does not have any lips, stairs or steps for bins to be manoeuvred easily.

If bin moving equipment such as bin tug or bins trainers are required for transferring bulk bins from the bin storage rooms or chute discharge rooms to the temporary bin storage room on the ground floor from where bin will be serviced, space has to be provided for storing the bin moving equipment when not in use.

Appendix A Detailed Calculations: Refuse Volumes

A.1 Refuse Generation Rates

The table below outlines refuse generation rates use in this report. For details about clinical waste generation from the hospital, refer to the **Tweed Valley Hospital Logistics Review Findings Report**.

Type	Measure	Waste	Food Waste	Recycling
Hospital (Patients)	L / Bed / Day	2	2	1
Hospital (Staff)	L / Staff / Day	2	2	2
Hospital Kitchen	L / 100m2 / Day	10	10	100
Office	L / 100m2 / Day	10		10
Restaurant	L / 100m2 / Day	330	330	133
General Retail	L / 100m2 / Day	50		50
Clinical Waste		As per Logistics Findings Report		

A.2 Commercial Refuse Calculations

The table below summarises the refuse volumes and bin / equipment number for the hospital. For detail about the hospital operations and clinical waste generation and secure destruction, including required bins and equipment, refer to the **Tweed Valley Hospital Logistics Review Findings Report**.

Description	Quantity	Measure	General Waste (L/Week)	Food Waste (L/Week)	All Recycling * (L/Week)	Medical Waste **
Hospital (Patients)	Beds	450	6300	6300	2961	as per Logistics Findings Report
Hospital (Staff)	Staff Members	300	4200	4200	3948	
Food Services / Kitchen	GFA (m ²)	1730	1211	1211	11383	
Offices / Admin	GFA (m ²)	500	350	-	329	
Café / Restaurant	GFA (m ²)	120	2772	2772	1050	-
Retail	GFA (m ²)	100	350	-	329	-
Volumes (L / Week) (uncompacted)			15183	14483	Comm. Recyc.: 8304 Glass: 1058 Cardboard: 10639	
Volumes (L / Week) (compacted)			5061	4345	Comm. Recyc.: 2768 Glass: - Cardboard: 2128	
Volumes per Day (L / Day) (compacted)			2169	621	Comm. Recyc.: 395 Glass: 151 Cardboard: 304	
Volumes per Collection (L / Collection)			6507	4345	Comm. Recyc.: 1186 Glass: 454 Cardboard: 912	
Collection and Equipment Details	Collections Per Week		3	1	3	variable
	Storage Capacity (Days)		3	7	3	variable
	Equipment Size and Quantity		23m ³ Compactor 19 x 240L Bins 11 x 660L Bins	1 Food Waste System with 4000L Tank	23m ³ Compactor Cardboard Baler 12 X 240L Bins 7 + 2 X 660L Bins	33 Clinismart 15 Sharpsmart 17 Cytosmart 9 Pharmasmart 19 x 240L Bins
	Total Raw Equipment Area (m ²)		TBD	TBD	TBD	TBD
	Refuse Storage Room Size (m ²)		TBD			

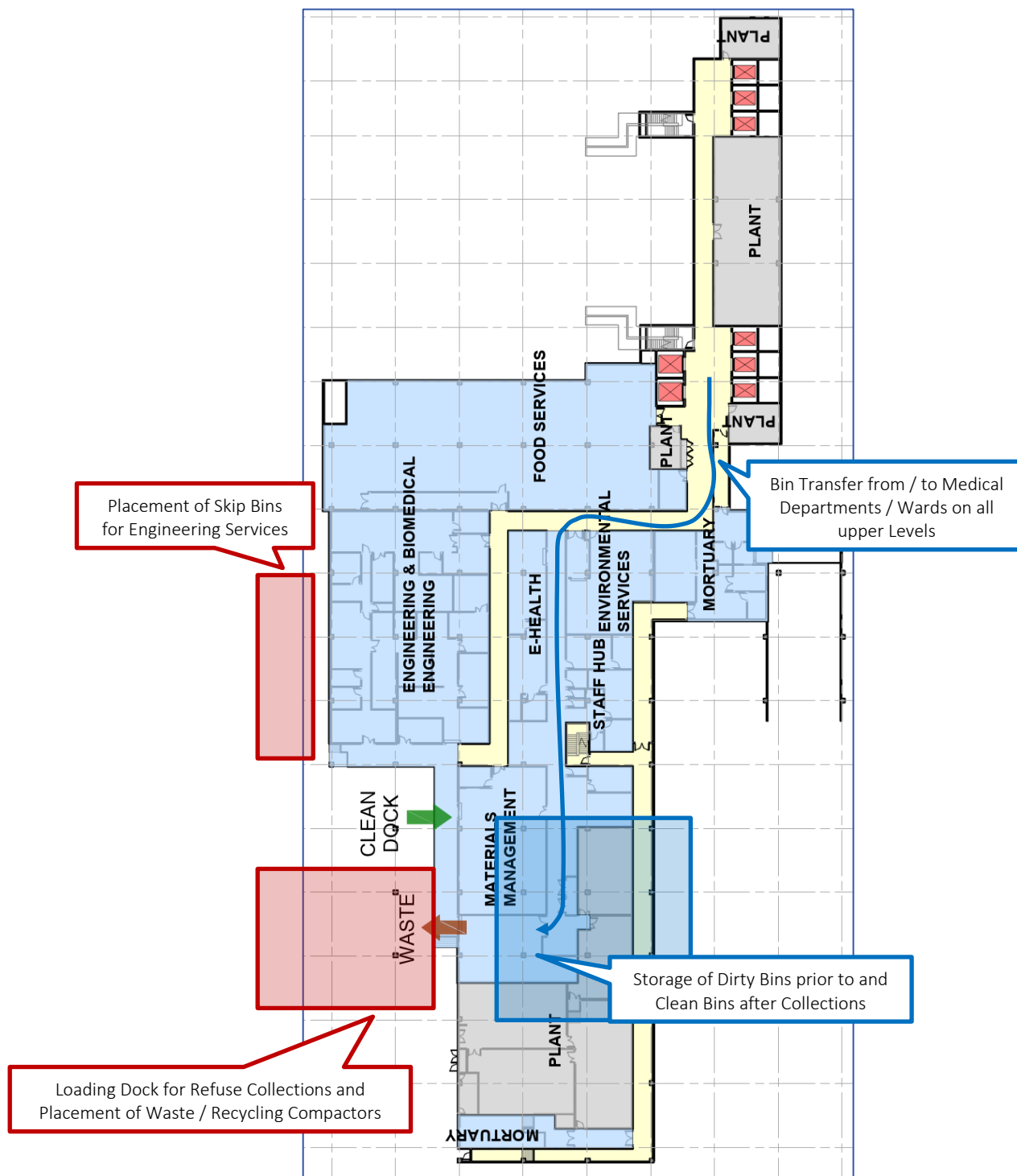
* Excludes bulky waste.

** Refer to **Tweed Valley Hospital Logistics Review Findings Report**.

Appendix B Site Plans and Drawings

B.1 Refuse Collection, Storage and Transfer

To be confirmed with final plans issue.




Source: STH / BatesSmart, Tweed Valley Hospital,
Drawing AR-STH-AR-DRW-SSD-001, Rev. 2, 25/7/2019 – Block & Stack Plans Basement

Appendix C Systems and Specifications

C.1 Typical Refuse Bins

Bin Types	Waste Streams	Examples	Information
Residential unit bins	General waste and recycling		Various options and sizes. Built and standalone bin available. Examples: https://www.bunnings.com.au
Back-of-house bins	General waste, recycling, food waste, paper / cardboard		Various options and sizes available. Tenant to supply depending on preference and space available. Example: 60L metro bins Dimensions approx. 559 x 279 x 635 mm (L x W x H) Examples: https://www.spacepac.com.au
Caddy Bins	Food Waste		Example: https://pulpmaster.com.au/pulpmaster-caddy-system
60-80L bins	Glass		Dimensions approx. 500 x 440 x 640 mm (L x W x H) (60L) 500 x 440 x 840 mm (L x W x H) (80L) Example: http://wheeliebinonline.com.au/product/80-litre-wheelie-bin/
120-140L bins	Food waste, Uncrushed Glass		Dimensions approx. 550 x 480 x 925 mm (L x W x H) (dimensions may depend on contractor) Examples: http://wheeliebinonline.com.au , https://ksenvironmental.com.au
240L bins	General waste, paper, recycling, green waste		Dimensions approx. 740 x 580 x 1080 mm (L x W x H) (dimensions may depend on contractor) Examples: http://www.justwheeliebins.com.au , http://wheeliebinonline.com.au
660L bins	General waste, recycling, paper / cardboard		Dimensions approx.. 640 x 1340 x 1220 mm (L x W x H) (dimensions depend on contractor) Examples: http://www.justwheeliebins.com.au , https://www.australianwaste-management.com.au

Bin Types	Waste Streams	Examples	Information
			
1100L bin	General waste, recycling, paper / cardboard		<p>Dimensions approx.. 1280 x 1360 x 1465 mm (L x W x H) (dimensions depend on contractor)</p> <p>Examples: http://www.justwheeliebins.com.au, https://www.australianwastemanagement.com.au </p>
Clinical / sanitary bins	Clinical, medical, pharmaceutical hygiene and sanitary waste		<p>Various options and sizes available, depending on type of clinical / sanitary waste and contractor.</p> <p>Examples: 500mL to 25L, 60L, 120L or 240L</p> <p>Examples: https://www.suez.com.au http://www.danielshealth.com.au/solutions </p>






Bin Types	Waste Streams	Examples	Information
Cigarette butt bins / ashtrays	Cigarette butts		<p>Various options and sizes available. Free-standing, wall / bin-mounted or integrated.</p> <p>Examples:</p> <p>https://www.spacepac.com.au, http://www.nobutts.com.au</p>
Public (litter) bins	General waste, recycling, paper / cardboard, glass		<p>Various types and sizes available</p> <p>Examples:</p> <p>Public Litter Bins https://draffin.com.au</p> <p>Solar litter bin with compactor https://www.solarbins.com.au/features/big-belly-solar-bin</p>

C.2 Typical Refuse Management Equipment










Systems	Waste Streams	Examples	Information
Organics Household Composting, Worm Farm, Digesters	Food waste / organics		<p>Organics / food waste separation, composting and digesting; household-type and commercial grade equipment available</p> <p>Examples</p> <p>Urban Composter https://www.urbancomposter.com.au</p> <p>Closed Loop https://closedloop.com.au/upcycling-products</p> <p>ORCA https://www.feedtheorca.com</p>
Food Waste Processing, Storage and Disposal	Food waste / organics		<p>Volume reduction and organics / food waste recycling through food waste separation and macerating</p> <p>Examples:</p> <p>Under-sink food waste macerators and disposers https://www.insinkerator.com.au (household type macerators) https://insinkerator.emerson.com (commercial-grade macerators)</p>
Cooking oil storage and recycling	Used cooking oil		<p>Cooking oil recycling</p> <p>Example: https://www.cookers.com.au</p> <p>Cooking oil delivery, used oil collection and provision of required equipment</p>

Systems	Waste Streams	Examples	Information
			
Bunded pallets	Liquid Waste		Spill containment, e.g. for waste cooking oil containers Example: https://www.tradeenviro.com.au/bunded-pallets https://www.materialshandling.com.au/products/bunded-pallet
Balers	Paper / cardboard, plastics		Volume reduction of paper, cardboard, plastics by compaction (baling) Examples: https://www.miltek.com.au/balers-and-compactors https://wasteinitiatives.com.au/product/vertical-balers/wastepac-60

Systems	Waste Streams	Examples	Information
Compactors / bin presses	General waste	   	<p>Volume reduction through refuse compaction</p> <p>Examples:</p> <p>Stationary compactor, range between 10000L to 35000L https://www.wastech.com.au/products/compactors</p> <p>Litter bin compactor https://www.solarbins.com.au/features/big-belly-solar-bin</p> <p>Under-chute compactor https://www.wastech.com.au/products/chutes/ecopac-compactor</p> <p>Bin press https://wasteinitiatives.com.au/products/waste-compactors</p>
Glass bottle crushing	Glass (bottles)	 	<p>Volume reduction of glass bottles by crushing</p> <p>Example: http://www.bottlecycler.com</p>
Trolleys	General waste, recycling, food waste, paper / cardboard	 	<p>Assisted manual transfer of refuse</p> <p>Examples: https://rubbermaidcommercial.com.au/products/waste-management/mega-brute https://www.materialshandling.com.au/products/deluxe-compact-cleaning-carts</p>

Systems	Waste Streams	Examples	Information
Bin tugs / trailers	-	  	<p>Assisted transfer of refuse</p> <p>Examples:</p> <p>http://ev.spacepac.com.au/categories/tugger, https://www.spacepac.com.au/product/wheelie-bin-aluminum-steel-trailers</p>
Converter	General waste, medical waste	 	<p>Eco-friendly method of treating large amounts of waste by converting it into refuse derived fuel. Reduces waste volume, weight and transportation costs.</p> <p>Example:</p> <p>http://www.ompeco.com/italian/language/en/home-2</p>


C.3 Refuse Transfer and Disposal Methods

Method	Examples	Description
Manual transfer / disposal	   	<p>Manual transfer is simply the process of physically carrying waste bags, food waste receptacles or recycling boxes and crates without assistance.</p> <p>From a safety perspective, this is acceptable for small quantities and initial disposal into refuse chutes, refuse compartments or, in the case of ground level activities, directly into the refuse storage room.</p> <ul style="list-style-type: none"> • Waste material should be bagged prior to any transfer from apartments, suites, offices, back-of-house areas etc. to waste storage compartments or rooms. • Food waste should be placed in receptacles such as a caddy style bin or bucket which will not allow leakage during transfer. • Recycling material should be placed in boxes or crates prior to transfer. • Cardboard and paper items can be placed within another cardboard box for transfer. <p>Examples: https://www.alamy.com</p>
Assisted manual transfer	     	<p>Assisted manual transfer includes the use of any wheeled container, wheelie bin or trolley with a capacity to carry refuse items with a combined weight of 20kg and above. The equipment bears the weight of the material, but it still requires physical force and or balance to move the bin or trolley.</p> <p>From a safety perspective, this type of equipment should be a minimum requirement for transfer of material greater than 20kg and when transferring between individual levels to the refuse storage room or loading areas. Use of enclosed or caged equipment will also eliminate 'litter or leakage trails' which can occur when using open or unsealed equipment.</p> <p>Examples: http://www.justwheeliebins.com.au, https://rubbermaidcommercial.com.au, https://www.materialshandling.com.au</p>
Assisted transfer	  	<p>Assisted transfer includes the use of any container with capacity to carry 20kg or more, pushed or towed by mechanical or electrical self-propelling equipment.</p> <p>Examples: http://ev.spacepac.com.au/categories/tugger, https://www.spacepac.com.au/product/wheelie-bin-aluminum-steel-trailers</p>

C.4 Refuse Minimisation Options

Refuse Minimisation Options – Waste

Systems	Description
Food rescue	<p>OzHarvest and Second Bite are food rescue organisations working throughout Australia. The organisation collects surplus foods from businesses (including Woolworths, Coles, Goodman Fielder and other smaller companies) and redistributes the foods to welfare agencies. They provide regular scheduled collections or ad-hoc / on call collections, and they have refrigerated vehicles. Other accepted items include fresh fruit and vegetables, tinned goods, cold meats and deli items, and readymade meals (which will only be accepted frozen).</p> <p>Where food rescue organisations are available, consideration may be given to suitable space for the temporary storage of food stuffs, including dry storage and the placement of a small fridge if cold room space is not available. There is no associated collections cost. Hence, it can be considered a zero-cost option for disposal of what would otherwise be food waste, and it supports the community at the same time.</p>  <p>Sources: www.ozharvest.org, www.secondbite.org</p>
Composting	<p>Food waste composting is an option of reducing the amount of general waste going to landfill where organic waste can create methane gas due to anaerobic digestion, which contributes to global warming. Systems of different scales exist from small benchtop composters for individual households or apartments to commercial size systems. Examples are shown below.</p> <p>The process usually involves breaking down organic food scraps through natural processes. This includes systems such as worm farms or composters where microbes break down the food waste, with or without the aid of compost additives. The composted products are rich in nutrients and good bacteria, and they can be added to flower bed or gardens.</p> <p>Most food wastes and other organic (garden) material can be composted including meat, fish, vegetables, fruit, dairy, coffee or wilted flowers. However, large bones, excessive liquids such as cooking oil or seafood shells should not be placed in the composters.</p> 

Systems	Description
	Sources: https://closedloop.com.au/upcycling-products , https://www.feedtheorca.com
Food waste separation and collection	When considering separation of organic food waste, the handling and potential for volume reduction should also be considered.
Waste Conversion	<p>Converting waste by reducing its volume and weight means less material to be disposed of, which results in fewer refuse collection vehicle kilometres. This allows cost savings in logistics and has a positive environmental effect due to less fuel used per amount of waste to be disposed.</p> <p>As an example, OMPECO provide a solution for converting general and medical waste into a sterilised, dehydrated ground material as shown below. The process involves loading the sterilisation chamber with waste material and crushing / shredding of the material by rotors to produce a fine ground. During the process, the material is heated by friction to 100°C which causes the moisture in the waste material to evaporate. After evaporation, the material is heated further to sterilisation or pasteurisation. The ground material is then cooled down to be unloaded from the converter. The final product has excellent long-term handling and storage properties, the it has up to 80% less volume and 50% less weight than the original waste material. It can be used in waste to energy systems as it is comparatively dry with a high calorific value.</p>  <p>Source: http://www.ompeco.com/italian/language/en/home-2/#</p>
Waste compaction	<p>Various compaction equipment exists for reducing the volume of (general) waste. As a result, less bins and / or fewer bin collections and service vehicle trips are required, which helps to reduce costs and environmental impact.</p> <p>Examples of typical waste compaction equipment include the following:</p> <ul style="list-style-type: none"> • High-volume stationary compactors of 10000L to 35000L capacity can be an option for large scale developments. • Under chute compactors can be installed in developments with waste chutes. This allows to compact waste material before it is discharged from the chute into the waste bins. • Bin presses can be used to annually compress waste material in bins of different sizes. • For public spaces, litter bins are available with a built-in compaction mechanism that reduces the volume of waste material in the bins. An innovative example is the solar compactor shown below. Energy produced by a solar panel on top of the bin is used to operate a fill level sensor and automated internal compaction mechanism, allowing up to eight times more waste to be stored in the bin before collection is required. In addition, notification about the fill level of the bins can be sent out in order to monitor bins and manage collection frequencies.

Systems	Description
	 <p>Sources: https://www.wastech.com.au/products/compactors, https://wasteinitiatives.com.au/products/waste-compactors, https://www.solarbins.com.au/features/big-belly-solar-bin</p>
Charity donations	<p>A good way of minimising waste is to reuse items that are still good to use. Several charity organisations exist that accept items such as clothing, shoes, bedding, books, toys, furniture, kitchenware and other household items. The donated items must not be torn, damaged or broken. Electrical appliances such as white goods are usually not accepted.</p> <p>Common organisations operating in Australia include Saint Vincent de Paul Society (Vinnies) and Lifeline (see images below). Items can be placed into the organisations' charity / donation bins located in various public spaces such as near community or shopping areas. Alternatively, they can be dropped off at the organisations' shops during opening hours. Refer to https://www.lifeline.org.au or https://www.vinnies.org.au for further information.</p> <p>For larger developments and precincts where large amounts of donation items can be expected, the placement of charity bins within the development should be taken into consideration.</p>    <p>Sources: https://www.vinnies.org.au, https://lifelinesouthcoast.org.au</p>

Refuse Minimisation Options – Recycling

Systems	Description
Container deposit schemes	<p>Container deposit / refund schemes are currently in place in several states in Australia. Various models exist including bottle return facilities and (automated) reverse vending machines.</p> <p>Residents, tenants, staff and cleaners should be encouraged to separate containers that qualify for the schemes from the waste or recycling streams, and return them to one of the return points. Storage space or dedicated bins within tenancies, apartments or communal areas should be provided.</p> <p>For larger developments or precincts where large amounts of empty containers are expected, consideration may be given to an on-site return point. The return points should be located near recycling bins so that cardboard boxes or plastic bags that have been used to transfer the empty containers to the return point can be disposed appropriately. This can prevent cluttering of the area around the return point.</p> <p>The images below show a typical return point and containers that commonly qualify for a deposit refund.</p> <div data-bbox="352 732 1420 1352">   </div> <p>Sources: https://returnandearn.org.au, https://envirobank.com.au/bottle-and-can-recycling-queensland, https://www.containersforchange.com.au/how-it-works</p>
Glass crushing	<p>Bottle crushers can reduce back-of-house and refuse room storage volumes by up to 80%. The machines are quiet and efficient. The inclusion of a glass crusher may either be designed into bar or kitchen areas, placed in back-of-house areas, or a machine may take the place of an existing recycling bin within a refuse storage room. Scanners are also being developed for these machines for scanning of bottles prior to crushing to align with government bottle return schemes. The images below show a typical setting of a glass crusher in a bar.</p> <div data-bbox="352 1585 1102 1968">  </div>

Systems	Description
	<div data-bbox="354 353 911 734" data-label="Image">  </div> <div data-bbox="927 353 1386 734" data-label="Image">  </div> <p data-bbox="354 757 1342 784">Sources: http://www.insideenterprises.com.au/bottlecycler/index.html, http://www.bottlecycler.com</p>
Baling	<p data-bbox="354 801 1396 913">Balers should be a consideration for use in reducing refuse volumes and creating safe environments by removing cardboard and plastic film which tends to overflow bins and clog up refuse room floors and doorways. The images below show a typical small baler that will produce a 60kg bale, easily removable by a trolley, as well as an option for multi chamber baler for baling multiple products.</p> <div data-bbox="354 925 1139 1861" data-label="Image">  </div> <p data-bbox="354 1899 943 1955">Source: https://www.miltek.com.au/balers-and-compactors, https://wasteinitiatives.com.au/products/vertical-balers</p>

C.5 Refuse Management Equipment Suppliers

Waste Management Equipment	Balers	Compactors	Shredders	Glass Crushers	Automated Waste Collection	Chutes	Bin Tugs / Trailers	Trolleys / Manual Handling Equipment	Bin Lifters / Tipplers	Bin Rotation	Weighing Systems	Spill Containment, Spill Response, Absorbents, Drain Protection	Food Waste Management / Vacuum Systems, Pulping, Digestors	Composting	Waste Cooking Oil Systems	Medical Waste Equipment	Smoking Management	Bins (General), Bin Stands	Bin Cleaning Equipment	Sorting Equipment
Elephants Foot Recycling Solutions http://www.elephantsfoot.com.au	✓	✓		✓		✓			✓	✓	✓									
Waste Initiatives https://wasteinitiatives.com.au	✓	✓	✓	✓																✓
Wastech http://wastech.com.au	✓	✓	✓			✓				✓										
Pakmor http://pakmor.com.au	✓	✓	✓						✓		✓									
Miltek http://www.miltek.com.au	✓	✓																		
BottleCycler http://www.bottlecyclor.com				✓																
Envac http://www.envac.com.au					✓															
Materials Handling https://www.materialshandling.com.au							✓	✓	✓			✓						✓	✓	
Spacepac http://ev.spacepac.com.au							✓	✓												
Spacepac Solutions http://www.spacepac.com.au							✓	✓									✓	✓		

Waste Management Equipment	Balers	Compactors	Shredders	Glass Crushers	Automated Waste Collection	Chutes	Bin Tugs / Trailers	Trolleys / Manual Handling Equipment	Bin Lifters / Tipplers	Bin Rotation	Weighing Systems	Spill Containment, Spill Response, Absorbents, Drain Protection	Food Waste Management / Vacuum Systems, Pulping, Digestors	Composting	Waste Cooking Oil Systems	Medical Waste Equipment	Smoking Management	Bins (General), Bin Stands	Bin Cleaning Equipment	Sorting Equipment
Draffin https://draffin.com.au									✓								✓	✓		
Electrodrive / Lift Master http://www.electrodrive.com.au							✓		✓											
Absorbenviro http://www.absorbenviro.com.au												✓								
Trade Environmental http://www.tradeenviro.com.au												✓								
Spillstationaustralia www.spillstation.com.au												✓								
Pulpmaster http://pulpmaster.com.au													✓							
Australian Vacuum Systems http://www.australianvacuumsystems.com.au					✓								✓							
Meiko https://www.meiko.com.au													✓							
Closed Loop Organics https://closedloop.com.au/upcycling-products														✓						
Compost Revolution https://compostrevolution.com.au														✓						
Urban Composter https://www.urbancomposter.com.au														✓						

Site: Tweed Valley Hospital Development, Cudgen Road, Cudgen

Reference: 19GCW0015

Waste Management Equipment	Balers	Compactors	Shredders	Glass Crushers	Automated Waste Collection	Chutes	Bin Tugs / Trailers	Trolleys / Manual Handling Equipment	Bin Lifters / Tipplers	Bin Rotation	Weighing Systems	Spill Containment, Spill Response, Absorbents, Drain Protection	Food Waste Management / Vacuum Systems, Pulping, Digestors	Composting	Waste Cooking Oil Systems	Medical Waste Equipment	Smoking Management	Bins (General), Bin Stands	Bin Cleaning Equipment	Sorting Equipment
ORCA Digester https://www.feedtheorca.com														✓						
Cookers https://www.cookers.com.au															✓					
Rubbermaid https://rubbermaidcommercial.com.au/products/waste-management								✓				✓				✓	✓	✓		
Sulo http://www.sulo.com.au								✓						✓		✓		✓		
Australian Waste Management https://www.australianwastemanagement.com.au/products									✓									✓		

C.6 Refuse Management Service Providers

	Food Waste	Waste Cooking Oil	Clinical & Sanitary Waste	Hazardous Waste	Liquid Waste	Electronic Waste	Industrial Waste	Construction & Demolition Waste	Waste Water	Secure Document Destruction
Specialist Waste Services										
Cleanaway * https://www.cleanaway.com.au		✓	✓	✓				✓	✓	
JJ Richards * https://www.jjrichards.com.au		✓	✓	✓	✓		✓	✓	✓	
Veolia * https://www.veolia.com/anz				✓	✓	✓		✓	✓	✓
Suez * https://www.suez.com.au			✓		✓	✓		✓	✓	
SecondBite https://www.secondbite.org	✓									
OZ Harvest https://www.ozharvest.org	✓									
Cookers https://www.cookers.com.au		✓								
SteriHealth http://www.sterihealth.com.au/locations			✓							
ToxFree https://www.toxfree.com.au			✓	✓		✓	✓			
AceWaste https://www.acewaste.com.au			✓	✓			✓			

Appendix D Refuse Signage

D.1 Refuse Signage

Waste signage guidelines are provided by the New South Wales Environmental Protection Authority:

<https://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/business-government-recycling/standard-recycling-signs>

General Refuse Signage



Other Refuse Signage



D.2 Other Refuse, Facility and Safety Signage

Various signage including refuse area, safety and facility signage should be arranged through certified signage providers. Example signs can be found at <http://www.signblitz.com.au>, <https://www.wayout.com.au> or <https://www.smartsign.com>.

Example Refuse Room Signage



Example Facility Signage



Example Safety Signage



Appendix E Terms and Abbreviations

In this waste management plan, a term or abbreviation has the following meaning unless indicated otherwise:

TERM	ABBREVIATION	DEFINITION
Equipment		
Baler		A baler is a device that compresses waste into a mould to form bales which may be self-supporting or retained in shape by wire ties and strapping. It is commonly used to bale cardboard and soft plastics (plastic film).
Bin (Refuse Bin)		A (Refuse) Bin is a plastic or steel container for disposal and temporary storage of waste or recycling items. Various types and sizes exist for different items and purposes. Examples include residential unit bins, Bulk Bins, Mobile Garbage Bin, Steely Bins and specialised for medical waste or cigarette butts.
Bin Hitch		A bin hitch is a galvanized steel bar or similar which allows connection between a bin and a towing vehicle (All-Terrain vehicle, Utility Vehicle, or Bin Tug). The bin hitch is typically fixed to the base of the bin and designed to connect to a towing vehicle or another bin. Bin to bin connection allows for towing of multiple bins with the lead bin connected to the towing vehicle.
Bin Storage Area		A Bin Storage Area in an enclosed area designated for storing on-site refuse bins or a refuse compactor within the property.
Bin Tug		An electric Bin Tug is a battery-powered and pedestrian-operated machine used to move heavy loads on wheels. If the load itself does not have wheels, it would be placed on a wheeled platform often referred to as a trolley, bogie or skate.
Bulk Bin		A Bulk Bin is a galvanized or steel bin receptacle that is greater than 360 litres in capacity generally ranging from 1.00 m ³ to 4.50 m ³ used for the storage of refuse that is used for on-site refuse collection.
Bulk Mobile Garbage Bin	Bulk MGB	A Bulk Mobile Garbage Bin is a plastic (polypropylene) receptacle that is greater than 360 litres in capacity generally ranging from 660 litres to 1100 litres used for the storage of refuse.
Collection Point		The Collection Point is an identified position where refuse bins are stored for collection and emptying. The collection point can also be the bin storage area.
Compactor		A (refuse) Compactor is a receptacle that provides for the mechanical compaction and temporary storage of refuse. It allows to reduce bin numbers and collection frequency.
Crusher		A (glass) Crusher is a machine that allows volume reduction by crushing them into small pieces. A glass Crusher can reduce the volume of glass bottle by about 75%.
Food Waste Recycling System		A Food Waste Recycling System is defined as a vacuum or pump-based system for shredding, macerating or pulping of food waste. The food waste is transferred through pressure (service) pipes to sealed liquid storage tanks.
Food Waste Macerator		A Food Waste Macerator can shredder all types of organic / food waste. It can be installed under sinks for direct disposal of food waste via the sewerage system. Household-type and commercial grade macerators exist.
Green Waste		All vegetated organic material such as small branches, leaves and grass clippings, tree and shrub pruning, plants and flowers.
Liquid Waste		Non-hazardous Liquid Waste generated by commercial premises should be connected to sewer or collected for treatment and disposal by a liquid waste contractor (including grease trap waste).
Mobile Garbage Bin	MGB	A Mobile Garbage Bin is a plastic (polypropylene) bin or bins used for the temporary storage of refuse that is up to 360 litres in capacity and may be used in kerbside refuse collection or on-site collection.

TERM	ABBREVIATION	DEFINITION
Putrescible Waste		Putrescible Waste is the component of the waste stream liable to become putrid and usually breaks down in a landfill to create landfill gases and leachate. Typically applies to food, animal and organic products.
Recycling		Recycling contains all material suitable for re-manufacture or re-use, e.g. glass bottles and jars; plastics such as PET, HDPE and PVC; aluminium aerosol and steel cans and lids; milk and juice cartons; soft drink, milk and shampoo containers; paper, cardboard, junk mail, newspapers and magazines.
Refuse		Refuse is material generated and discarded from residential and commercial buildings including general waste, recyclables, green waste and bulky items.
Refuse Chute		A Refuse Chute is a ventilated, essentially vertical pipe passing from floor to floor of a building for the purpose of refuse disposal, with openings as required to connect with hoppers and normally terminating at its lower end at the roof of a central refuse room.
Refuse Collection Vehicle	RCV	A Refuse Collection Vehicle is a vehicle that is specifically designed for collecting and emptying refuse bins and refuse compactors.
Refuse Storage Room		A Refuse Storage Room is an area identified for storing on-site Mobile Garbage Bins or Bulk Bins within the property.
Refuse Trolley		A Refuse Trolley is a cart on wheels that can be used to collect smaller quantities of refuse from different areas or rooms of a building or site, and wheel the collected refuse to a (Bulk) Bin storage area where it is disposed. Refuse Trolley are commonly used in hotels.
Regulated Waste		Regulated Waste is waste prescribed under legislation as regulated waste.
Stationary Compactor		A Stationary Compactor is a large permanently installed equipment used for compaction of material into sealed containers for transportation.
Steely Bin		A Steely Bin is a 660 litre Bulk Bin made of galvanized steel.
Transfer (Assisted Transfer)		Assisted Transfer of refuse material and associated bulk bins or trolleys by Tractor, All-Terrain Vehicle, Utility Vehicle or Bin Tug.
Transfer (Manual Transfer)		Manual Transfer means physical transfer of refuse material and associated Bulk Bins or trolleys without assistance.
Waste		Waste is referred to as refuse material with the exclusion of recycling, green waste, hazardous waste, special waste, liquid waste and restricted solid waste.
Waste (General Waste)		General Waste is generally referred to as material free of any actual or apparent contamination such as pathological/infectious, radioactive materials and/or hazardous chemical. Reporting use is for material considered to be free of food waste.
Wheelie Bin		A Wheelie Bin is referred to as a Mobile Garbage Bin of up to 360 L, usually with 2 wheels for easy transfer. A common type is a 240L Wheelie Bin used for kerbside collection in many residential areas.
Measures		
Cubic Metre	m ³	Cubic capacity in Cubic Metre(s) related to refuse areas or equipment.
Ground Floor Area	GFA	The Ground Floor Area of all storeys of a building is measured from the outside of the external walls or the centre of a common wall. It is commonly measured in square metres.
Kilogram	kg	Kilogram(s) related to refuse weight.
Litre	L	Litre(s) related to refuse volumes.
Net Lettable Area	NLA	The Net Lettable Area of a building is the sum of its whole floor lettable areas. taking measurements from the internal finished surfaces of permanent internal walls and the internal finished surfaces of dominant portions of the permanent outer build walls. It is commonly measured in square metres.
Square Metre	m ²	Square Metre(s) related to refuse areas.

TERM	ABBREVIATION	DEFINITION
Ton	T	Ton(s) related to refuse weight.
Collection Vehicles		
Body Truck		A Body Truck is a conventional heavy vehicle with a covered loading area. It is generally not specifically designed for emptying the content of bins into the truck during refuse collections, but can be used to carry entire (full) bins for servicing by bin swap-over.
Hook Lift Vehicle		A Hook Life Vehicle is a heavy-duty truck that is fitted with a hydraulic hook lift hoist system. The hook lift system consists of a series of hydraulic rams to hook, lift and hoist the roll-off container onto the truck chassis.
Rear-Loading Refuse Collection Vehicle	REL RCV	A Rear-Loading Refuse Collection Vehicle is a truck specially designed to collect municipal solid waste and recycling, typically 240 litre wheelie bins to 1100 litre bulk bins, from rear loading mechanism and haul the collected waste to a solid waste treatment facility.
Tank Truck		A Tank Truck is a Refuse Collection Vehicle that is specifically designed to collect liquid wastes such as waste cooking oil and food waste pulp. The waste is typically pumped from a waste storage tank into the truck via a hose. Liquid waste management equipment is often provided by the contractor who collects the waste and operates the truck.