Bank Street Park
Blackwattle Bay / Tjerruing

SSD-53386706

Appendix AL

Waste Management Plan (Mott Macdonald)

December 2023

MOTT MACDONALD

Bank Street Park, Sydney

Waste Management

28 November 2023

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Bank Street Park, Sydney

Waste Management

28 November 2023

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Contents

Tables

Figures

Executive summary

This operational, and construction and demolition (C&D) waste management plan has been prepared to support the State Significant Development Application for the proposed Bank Street park. It sets out the principles and best practice for effective waste management in the development according to state and local guidelines, waste minimisation targets, and waste hierarchy/circular economy principles.

The operational waste management plan primarily covers the community building part of the development. Residual, mixed recycling and food waste bins are to be stored in the amenities building. Internal recycling bins are also recommended. Suggestions for the design of public realm litter bins are also included, but servicing and location of these are the responsibility of Place Making New South Wales (PMNSW), as is landscaping and any green waste generated. This should be revisited at a later stage of the development once further designs have been developed.

The C&D waste management plan outlines best practice and should be revisited once a C&D contractor has been appointed. Correct segregation of recyclable waste should be a priority, as the City has landfill diversion target of 90%. Key roles and responsibilities for staff are also set out.

Circular economy principles are developed based on the seven key principles and applicable focus areas of the New South Wales Circular Economy Policy Statement[4]. The document defines the key principles of the circular economy and provides an overview of the importance of embedding circular economy principles. The circular economy framework embedded into the C&D waste management plan (CDWMP) and the operational waste management plan (OWMP) identify opportunities and recommendations to embed circularity into the design, construction, demolition and operation of the development. Recommendations on any suggested actions or opportunities to aid in increasing the circularity of the development by designing out waste, facilitating adaptive reuse, increasing resource efficiency, reducing carbon emissions and contributing towards regenerating natural systems are also included.

1 Introduction

The purpose of this report is to develop an operational waste management plan (OWMP), construction and demolition waste management plan (CDWMP), and circular economy principles framework, to support a State Significant Development Application (SSDA) in the development of a new waterfront public park within Blackwattle Bay, to be known as Bank Street Park (SSD-53386706). Bank Street Park is located at 1A-19 Bank Street, Pyrmont on the shoreline of Tjerruing Blackwattle Bay and adjacent areas of Blackwattle Bay.

1.1 Blackwattle Bay Precinct

Bank Street Park forms part of the Blackwattle Bay Precinct, which is an area of predominantly government owned land located on the western edge of the Pyrmont Peninsula and adjoining the waters of Blackwattle Bay (Figure 1.1).

Figure 1.1: Blackwattle Bay Precinct

Source: Infrastructure New South Wales (INSW)

The precinct was rezoned in December 2022 to facilitate a new mixed-use community, providing for around 2,000 new residents and 5,600 new jobs to create a vibrant economy. Updated planning and land use controls were incorporated into the Sydney Local Environmental Plan 2012, along with site specific design guidance in the *Blackwattle Bay Design Guidelines*.

A critical part of the Blackwattle Bay Precinct is the high quality public domain which includes a series of parks and open spaces connected by a foreshore promenade. Bank Street Park will bring new active and passive recreation uses into a unique park environment, catering for both existing and future communities in the vicinity.

1.2 Site description

Bank Street Park is located at 1A-19 Bank Street, Pyrmont NSW within the City of Sydney local government area (LGA) and includes harbour development in Blackwattle Bay. The site area is approximately 1.9 hectares, including 0.7ha of harbour. The relevant lot and deposited

plans and the respective ownership for the site are detailed in Table 1.1 and shown in Figure 1.2 and Figure 1.3.

Table 1.1: Summary of land title details of the development

Street address	Lot and Deposited Plan details	Ownership
1A Bank Street, Pyrmont NSW 2009	Lot 1 DP 85206 Lot 1 DP 188671	Transport for NSW
1-3 Bank Street, Pyrmont NSW 2009	Lots 1-2 DP 1089643 Lot 1 DP 439245	Infrastructure NSW
5 Bank Street, Pyrmont NSW 2009	Lot 20 DP 803159	Transport for NSW
7 Bank Street, Pyrmont NSW 2009	Lot 19 DP 803159	Transport for NSW
9 Bank Street, Pyrmont NSW 2009	Lot 21 DP 803159	Transport for NSW
11 Bank Street, Pyrmont NSW 2009	Lot 22 DP 803159	Transport for NSW
17-19 Bank Street, Pyrmont NSW 2009	Lots 5-6 DP 803160	Transport for NSW
Sydney Harbour	Lot 5 DP 1209992	Roads and Maritime Services (Transport for NSW)
Sydney Harbour	Lot 107 in DP 1076596	Transport for NSW
Part Bank Street road reserve	N/A	City of Sydney Council

Bank Street Park is located on Gadigal Land, one of the 29 clans of the great Eora Nation. It adjoins the foreshores of Glebe to the west and Pyrmont Bridge Road and Wentworth Park to the south.

Figure 1.2: Site context map

Note: The indicative site location is outlined in red.
Source: SixMaps with Architectus edits (2023)

Figure 1.3: Bank Street Park site location within Blackwattle Bay State Significant Precinct

Note: The indicative site location is outlined in red.
Source: Blackwattle Bay Design Guidelines with Architectus edits (2023)

1.3 Proposed development

1.3.1 Overview

Development consent is being sought for a *recreation area* for the primary purpose of a *public park*, comprising:

- Site preparation works, including tree removal, earthworks and remediation to facilitate the proposed use;
- Demolition of three existing buildings at 1-3 Bank Street;
- New and adapted facilities for community use, including:
  - New single storey building to accommodate flexible community space, café, and marina office/store facilities, with green roof and photovoltaics
  - Adaptive reuse of Building D for public amenities, bin and other storage
  - Boat launching ramp and pontoon for passive watercraft, including dragon boats and kayaks
  - Boat storage building with change facilities for dragon boat users with publicly accessible rooftop deck
- Public domain works, including:
  - 'Interpretation Garden' in existing building 'ruins' at 1-3 Bank Street
  - Split level foreshore promenade
  - Multi-purpose court with edge seating and partial fence
  - Nature-based inclusive playspace for ages two to12
  - Fitness equipment
  - Public plaza and grassed open space areas
  - New tree plantings and planter beds

  - Public art, wayfinding and interpretative signage, lighting, bike parking and seating
- Harbour works including:
  - Overwater boardwalk
  - Land/water interface works, including sandstone terracing into water and support structure, to improve marine habitat
  - Demolition and construction of a new timber launching ramp for dragon boats
  - Kayak/passive craft pontoon
  - Restoration, repair and alterations to the existing seawall for new stormwater outlets
- Works to Bank Street road reserve, including:
  - Road space reallocation to provide separated cycleway
  - Cycleway transition to Bank Street to continue south as part of future works
  - Reinstatement of existing on-street parallel parking
  - Tree planting
  - Accessible parking space; and
  - Loading zone adjacent 1-3 Bank Street.

1.4 Key area schedule and calculations

Table 1.2 shows a list of all the buildings in the development and associated gross floor area.

Table 1.2: buildings and structures schedule and calculations

Item	Area (GFA)
Building D	
Bin store	35 m^2
Placemaking store	37 m^2
Amenities	61 m^2
Total	**133 m^2**
Community, marina facilities and café building	
Café / Kiosk	58 m^2
Marina store	120 m^2
Marina office	71 m^2
Community space	133 m^2
Amenities	33 m^2
Plant	10 m^2
Total	**425 m^2**
Dragon Boat Building	
Boat store	420 m^2
General store	64 m^2
Total	**484 m^2**

1.5 Planning Secretary's Environmental Assessments Requirements

This report has been prepared in response to the relevant requirements outlined within the Planning Secretary's Environmental Assessments Requirements (SEARs) issued on 11 May 2023 for application SSD-53386706. Table 1.3 addresses the relevant SEARs requirements.

Table 1.3: Secretary's Environmental Assessment requirements

Item	SEARs	Relevant report section(s)
18	Construction and Operational Waste Management Plan	
	Identify, quantify, and classify the likely waste streams to be generated during construction and operation.	3.3.1 (operation) 4.5.1 (construction)
	Provide the measures to be implemented to manage, reuse, recycle and safely dispose of this waste.	3 (operation) 4 (construction)
	Include a framework for how the proposed development will incorporate circular economy and zero waste principles advocated for in the NSW Circular Economy Policy Statement into the design, construction and operation of the development.	2 4.3 4.4
	Identify appropriate servicing arrangements for the site showing storage areas away from public access for waste and recyclables during demolition and construction.	General guidance and principles have been outlined in 4.5.3. It is not possible to provide a detailed site plan at this stage until the construction contractor has been chosen.

1.6 Policy, legislation, and guidance

This OWMP and CDWMP will follow the principles and guidance set out at state and local government level relating to waste management and the circular economy. The key strategy and policy documents that have been reviewed when preparing this report are outlined in the following sub-sections.

1.6.1 State-level policy and guidance: New South Wales

1.6.1.1 NSW Government Waste and Sustainable Materials Strategy 2041 Stage 1: 2021-20271

A waste strategy reviewed every five years, with stage 1 covering 2021 to 2027. Three focus areas are covered:

- Meeting the state's future infrastructure and service needs
- Reducing carbon emissions
- Protecting the environment and human health from waste pollution.

A consultation schedule is also set out for the term. The state's strategy is designed to align with the National Waste Policy Action Plan.

[1] NSW Government (2021) Waste and Sustainable Materials Strategy 2041 [online] Available at: NSW Waste and Sustainable Materials Strategy 2041. Accessed October 2023.

Key to the strategy are the following targets:

By 2025:

- Phase out problematic and unnecessary plastics
- Plastic litter reduction by 30%

By 2030:

- Reduce total waste generated by 10% per person
- An average recovery rate of 80% across all waste streams
- An overall litter reduction target of 60%
- Triple the plastics recycling rate
- Halve the amount of organic waste that is set to landfill
- Net zero emissions from organics to landfill

1.6.1.2 Better Practice Guidelines for Waste Management & Recycling in Commercial & Industrial Facilities[2]

This guide, produced by NSW is aimed at architects, developers, council staff and building managers, covering all stages of design and ongoing management. It covers the five main types of commercial development: office buildings, non-food and food retail, group retail, and hospitality and accommodation. The guide covers:

- Better Practice guidelines that apply to all types of commercial buildings, including guidance on collection services, contracts, health and safety, containers, storage, food waste, mitigating environmental problems (such as noise, odour, vermin) and ongoing management. Case studies are used throughout the guidelines.
- Specific detailed guidance for certain types of commercial buildings. Relevant to this development are the guidelines for office buildings and food retail outlets.

1.6.1.3 Better Practice Guidelines for Public Place Recycling[3]

This set of guidelines, created by the former NSW Department for Environment and Conservation, aims to advise and provide a minimum standard for any permanent recycling systems. Specifically, those that are to be installed in public places such as parks, shopping centres and railway stations. It provides clear guidance on factors such as:

- Type and placement of bins for different recyclables, including a unified colour scheme
- Implementation: advice on community education and promotion, and staff and service provider responsibilities
- A checklist, waste audit methodology, crime prevention guidance and examples of a three-bin configuration.

1.6.1.4 Circular Economy Policy Statement[4]

The aim of the Circular Economy Policy Statement is to guide the New South Wales (NSW) government in its decision-making processes to support the transition to a circular economy. The policy statement provides a framework for implementing initiatives. The initiatives aim to promote long-lasting design, maintenance, repair, reuse, sharing, transforming products into

[2] NSW EPA (2012) Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities [online]. Available at (nsw.gov.au). Accessed June 2023.

[3] Department of Environment and Conservation (NSW) (2005) Better Practice Guide for Public Place Recycling [online]. Available at: Better Practice Guide for Public Place Recycling (nsw.gov.au). Accessed June 2023.

[4] NSW Government (2019) NSW Circular Economy Policy Statement [online]. Available at NSW Government Circular Economy Policy Statement Final. Last accessed July 2023.

services, remanufacturing, and recycling. The framework states that NSW will transition towards a circular economy by focusing on seven key principles which will underpin decision making and planning. The seven key principles are:

- Sustainable management of all resources
- Valuing resource productivity
- Designing out waste and pollution
- Maintain the value of products and materials
- Innovate new solutions for resource efficiency
- Create new circular economy jobs
- Foster behavioural change through education and engagement

The framework also states that government action will be guided by eight focus areas. The focus areas show the importance of 'push' and 'pull' incentives to stimulate both the supply and demand of resources. The focus areas include:

- Support innovation
- Sustainable procurement
- High quality consistent recycling
- Value organics
- Mainstream product stewardship
- Circular design
- Support reuse and repair
- Responsible packaging

1.6.1.5 Plastic Reduction and Circular Economy Act 2021[5]

This state legislation includes bans on certain single-use items in the state. This means that businesses, manufacturers, community organisations, etc, cannot supply them or provide them to consumers. This is enforced through fines of up to $11,000.

- From 01 June 2022, lightweight single-use plastic bags were banned.
- From 01 November 2022, the following single-use plastic items were banned:
  - Single-use plastic straws, cutlery, stirrers
  - Plates and bowls
  - Expanded polystyrene foodservice items
  - Cotton buds
  - Microbeads (used in cosmetic/personal care products)

1.6.1.6 Government Resource Efficiency Policy[6]

The aim of the NSW government resource efficiency policy (GREP) is to drive resource efficiency for NSW government agencies and consequently reduce operating costs. The implementation of the policy is mandatory for all NSW government agencies with more than 100 staff. The policy is focused on driving resource efficiency in four main areas; energy, water, waste and air emissions from government operations. The policy requires NSW government agencies to:

[5] NSW Government (2021) Plastic Reduction and Circular Economy Act 2021 No 31 [online]. Available at: NSW Legislation. Accessed June 2023.

[6] NSW Government (2019) NSW Government Resource Efficiency Policy [online]. Available at: NSW Government Resource Efficiency Policy. Accessed June 2023.

- Meet the challenge of rising costs for energy, water, clean air and waste management.
- Use purchasing power to drive down the cost of resource-efficient technologies and services.
- Show leadership by incorporating resource efficiency in decision-making.

With regards to waste, the policy states that under Policy P1 all agencies must report on respective top three waste streams by total weight and total cost. The Office of Environment and Heritage also encourages the authorities to take measures to reduce waste. Such measures include:

- Creating an agency-specific waste reduction plan to reduced or redirected waste from landfill.
- Improving separation of recyclable materials out of the general waste stream e.g., by means such as recovering organics and removing desk bins.
- Introducing paper reduction targets.
- Recycling waste products where there is access to a national voluntary stewardship scheme.
- Conducting waste management audits, where cost-effective.
- Managing separate collections of problem wastes, such as paints, oils, batteries, gas bottles and smoke detectors to avoid contaminating other waste streams.
- Participating in product stewardship schemes, where appropriate.
- Using guidance tools including Better Building Partnerships' Stripout Waste Guidelines[7] and the Environment Protection Authority's (EPA) Better Practice Guidelines for Waste. Management and Recycling in Commercial and Industrial Facilities[2].
- Drive innovation by purchasing construction materials with recycled content to comply with relevant EPA exemptions and reference design specifications for reuse.

1.6.1.7 Blackwattle Bay design guidelines

The NSW government has set out specific design guidelines for all future developments in the Blackwattle Bay area. The guidelines incorporate key sustainability and net zero principles into a set of guidelines for developers that are based on existing stage and local government policy. The design guidelines are required to be adhered to by all developers that plan to develop within the Blackwattle Bay area.

Within the guidelines, the key waste management objectives are to:

- Minimise waste generation
- Set high standards and targets for waste diversion from landfill and commence the path towards a circular economy

The items within the guidelines that are relevant to the management of waste include:

- The design of waste management systems in accordance with the policies described in (1.3.1 and 1.3.2/1.3.3)
- The application of circular economy and waste hierarchy principles to material selection, waste management plans and system design.
- The development of systems to demonstrate how the following waste targets are to be achieved:
  - 80% construction and demolition waste diverted from landfill
  - 80% operational waste diverted from landfill

[7] Better Building Partnership (2018) Stripout waste guideline [online]. Available at: BBP Stripout Waste Guidelines | Better Buildings Partnership. Accessed June 2023.

- Single use plastics to be phased out by 2025
- All households to be provided with access to food and organic waste recycling

In addition to the points above which are based on local and state guidance, the design guidelines also instructs for the investigation into the feasibility of precinct-scale waste facilities regarding:

- The City of Sydney's existing food-scraps recycling services
- Future plans for community gardens within Blackwattle Bay
- NSW EPA resource recovery orders and exemptions

1.6.2 Local policy and guidance: City of Sydney

The City of Sydney guidance has been followed and summarised as a best practice in line with the requirements of the Blackwattle Bay design guidelines. It should be noted that the responsible body for operational waste management will be Placemaking New South Wales (PMNSW). Its role is to provide facilities management, cleaning and maintenance services to major precincts such as Blackwattle Bay Precinct. However, in the absence of any PMNSW-specific waste and sustainability policy, City of Sydney guidance has been followed throughout the plan and is summarised in 1.6.2.1.

1.6.2.1 Guidelines for Waste Management in New Developments[8]

This is the principal local government document that a waste management plan in the City must follow. It sets out the minimum waste management requirement for all developments. Whilst the City of Sydney is not the consenting authority for this development, the guidelines are made up of several sections each that contain key points relevant to this plan. Relevant points are outlined in the following sub-sections.

General overview

The guidelines have several overarching principles that apply to all forms of waste management, operational, and construction and demolition. This includes:

- Targets to divert 90% of waste from operating businesses and construction and demolition activities in the local government area away from landfill by 2030.
- Requirements for storage areas for bulky, problem and food/organic waste.
- Collection points, management responsibilities and waste and recyclable storage bin requirements.
- Waste generation rates are provided which shall be used to estimate the capacities required per development type and size (gross floor area).
- Waste storage area construction and information on other equipment such as chutes, balers, compactors, if and where necessary.

Operational waste management

The guidance provides operational recommendations across a variety of different development types. The guidelines specific to the Bank Street Park are those for non-residential developments and mixed-use developments and in summary, include:

[8] City of Sydney (2018) Guidelines for waste management in new developments [online]. Available at: Guidelines for waste management in new developments - City of Sydney (nsw.gov.au). Accessed June 2023.

- Waste container numbers and spatial requirements (m^2), calculated from the developments gross floor area, collection frequency and standard container sizes (m^2). The City of Sydney provides an online calculator[9] for the calculations.
- Advice on access, collection, and ongoing management.

Specific waste management design requirements for certain non-residential premises types, including offices, food retailers/producers, retail, pubs, clubs and hotels/accommodation.

Construction and demolition waste management

The waste and recycling management plan detailing these measures must be included within a Development Application outlining how it will achieve the 80% target. This includes:

- Waste minimisation and avoidance practices – maximising reuse on-site and recycling
- 'Unscheduled' Non-hazardous materials allowed for reuse on or off-site
- Full disclosure of asbestos material if applicable
- Details of licensed removers/landfill site
- Quantity and types of waste likely to be produced
- Site plan showing storage areas, nominated persons responsible, details of licensed destinations of materials

1.6.3 Summary and relevance to this waste management plan

As a state-significant development, the operational and construction & demolition waste management plan aims to follow the NSW-provided guidance and policy at the first instance. A circular economy and waste hierarchy approach is to be followed with waste reduction, key to achieving the targets in the NSW waste and sustainable materials strategy. The NSW better-practice guidelines on commercial and industrial developments, and public place recycling, are primarily to be followed in the formation of this plan. The Blackwattle Bay design guidelines features further targets and a need to follow City of Sydney guidelines, for example in the construction and demolition waste management plan. City of Sydney guidelines would also be followed in the absence of specific NSW-level guidance, or if it is deemed more appropriate for this development, or more up-to-date than existing NSW guidance.

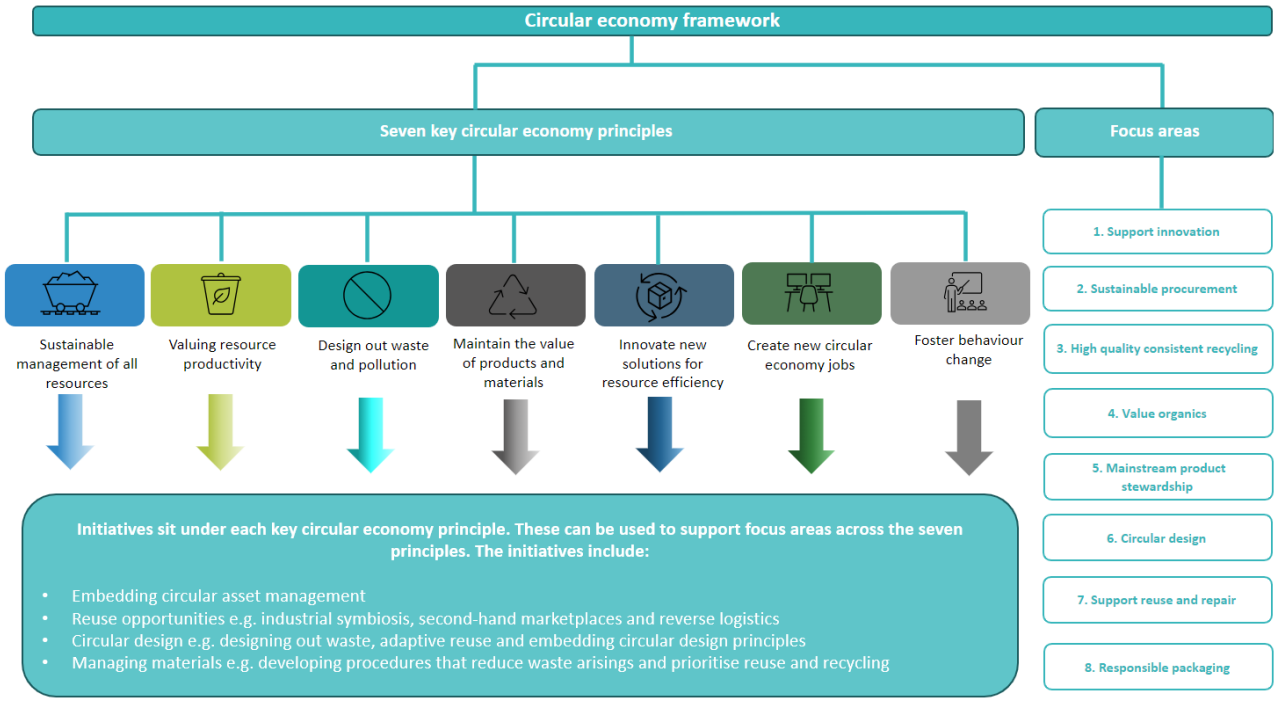
[9] City of Sydney (n.d.) Waste and recycling space calculator [online]. Available at: Waste and recycling space calculator | City of Sydney. (nsw.gov.au). Accessed June 2023.

2 Circular economy framework

2.1.1 Introduction

This circular economy framework has been developed in accordance with NSW Circular Economy Policy Statement[4]. The circular economy framework is applicable to both the OWMP CDWMP for INSW development. The aim is to support the development in incorporating circular economy principles through design, construction and operation**.** Figure 2.1 depicts the circular economy framework used for the development. The framework highlights the circular initiatives outlined that can support key circular economy principles and focus areas.

Figure 2.1: Circular economy framework



Source: Mott MacDonald

2.1.2 What is the circular economy?

A circular economy is defined as an alternative to the current linear economy in which we take resources, produce, consume and generate waste that is then disposed. The circular economy is based on three key principles:

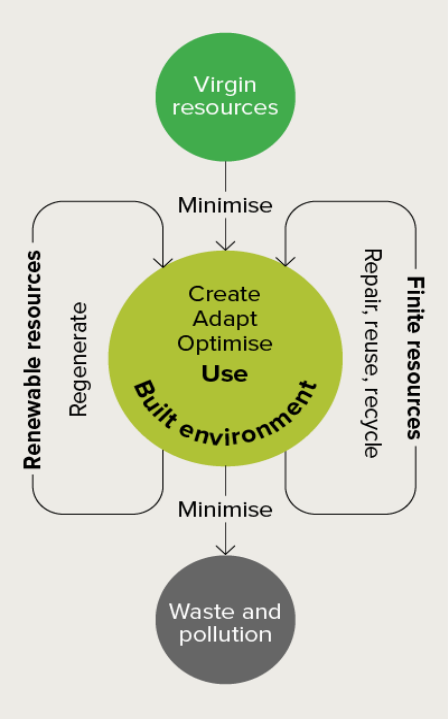
- Eliminating waste and pollution
- Circulating products and materials at their highest value
- Regenerating nature

The need for us to adopt a circular, as opposed to linear approach (which does not seek to extend the lifetime of materials) can be demonstrated by the fact that annually the built environment accounts for approximately 40% of global greenhouse gas (GHG) emissions[10]. As well as inefficient resource use and depletion, a linear economy contributes to man-made

[10] World Economic Forum (2022) A guide to decarbonizing the built environment [online]. Available at: Brick by brick: a guide to decarbonizing the built environment | World Economic Forum (weforum.org). Accessed July 2023.

climate change, deforestation, loss of biodiversity and pollution of land, air, rivers and oceans. A circular economy model is depicted in Figure 2.2.

Figure 2.2: Model of the circular economy in the built environment



Source: Mott MacDonald

2.1.3 Key principles for transitioning to a circular economy

The below sub-sections outline how the seven key principles for transitioning to a circular economy (as highlighted in NSW Circular Economy Policy Statement[4]) are applicable to the construction and operation of the development. The specific opportunities for embedding circularity into design, construction and operation of the development can be found within the OWMP and CDWMP in sections 3.10 – 3.11 and 4.3 – 4.5 respectively.

2.1.3.1 Sustainable management of all resources

To achieve circularity, materials, components and replacement parts should be understood from a whole of life perspective. This includes understanding how materials are managed, sourced and recovered through design, construction and operation. It is also recommended that INSW has a procurement strategy in place that prioritises sourcing from companies who have embedded product stewardship into their business. According to the NSW Circular Economy Policy Statement[4] product stewardship enables the transition to the circular economy by providing an incentive to design products with reduced environmental and social impacts, and to facilitate reuse and recycling.

2.1.3.2 Valuing resource productivity

For the purpose of this development, it is integral to recognise that material and resources have value throughout multiple cycles of use and reuse. Applying the principles of circular asset management helps to facilitate the efficient management of virgin raw materials and increase resource productivity. The goal of circular asset management is to create a closed-loop system where resources are used efficiently and sustainably, rather than being discarded. Circular asset management focuses on expanding the lifespan of assets through

strategies such as reusing, refurbishment, remanufacturing and lastly recycling. Circular asset management is applicable to both the operation and construction phases of the development. More information about embedding circular asset management can be found in sections 3.10.1 and 4.3 .

2.1.3.3 Designing out waste and pollution

To enable the transition to the circular economy and successfully design out waste and pollution, circular economy principles must be embedded throughout the design process. Circular design is highlighted as a focus area within NSW Circular Economy Policy Statement[4]. The aim of circular design is to allow materials to be continually circulated in loops once introduced, minimising waste and contributing to the regeneration of nature. To have the most impact, circular design principles should be considered during the planning and early design stages of the development. Considering circular design principles during the operations and maintenance of the development is also of high importance to continue the onward reuse and recovery of materials.

Key principles applicable to circular design that should be applied to the development include:

- Designing for longevity
- Designing for adaptability and flexibility
- Designing for deconstruction and disassembly
- Designing for reuse and recovery.

Opportunities for embedding circular design into the development can be found in sections 3.11.1 and 4.3 to 4.4.

2.1.3.4 Maintain the value of products and materials

Procedures should be developed to maximise the value of products and materials to facilitate reuse, repair and remanufacturing. Utilising reverse logistics and exploring opportunities within second hand marketplaces offers an opportunity to capture the value from materials before they become waste. Potential opportunities to use schemes which will maximise the value of materials by sharing, reusing and repair can be found in section 3.11.

If materials cannot be reused, repaired or remanufactured, procedures should also focus on providing collection systems that enable high quality consistent recycling and recovering value from organic waste. See section 3.8 for information on the collection systems used in the development.

2.1.3.5 Innovate new solutions for resource efficiency

Opportunities for using innovative solutions should be considered to support the transition to the circular economy. Innovation can be used to support the circular economy by using new technologies and business models that increase resource efficiency, minimise waste and promote the extension of material lifecycles. Applying circular design principles and developing circular business models using digital technologies to aid in recovery are examples of how innovation can be used in the circular economy. Specific opportunities for embedding innovation in the development can be found in sections 3.11 and 4.4 to 4.5.

2.1.3.6 Create new circular economy jobs

Circular jobs are likely to be created across a variety of sectors applicable to both construction and operations of assets within the built environment. Example industries where jobs may be created include design, supply chain and logistics, materials and waste recovery. Choosing to embed circular economy principles within the construction and maintenance of the

development supports the creation of circular jobs by using companies and initiatives who have adopted circular economy principles.

2.1.3.7 Foster behaviour change through education and engagement

Providing education to users of the development on the benefits of the circular economy is key for the implementation of circular economy principles. Education should be provided to users on potential circular economy interventions which will facilitate in extending lifetimes through reuse, recovery and recycling of materials. Education campaigns and staff training should be considered in both the construction and operation of the development, as detailed in sections 3.10.2 and 4.6.

3 Operational waste management

3.1 Introduction

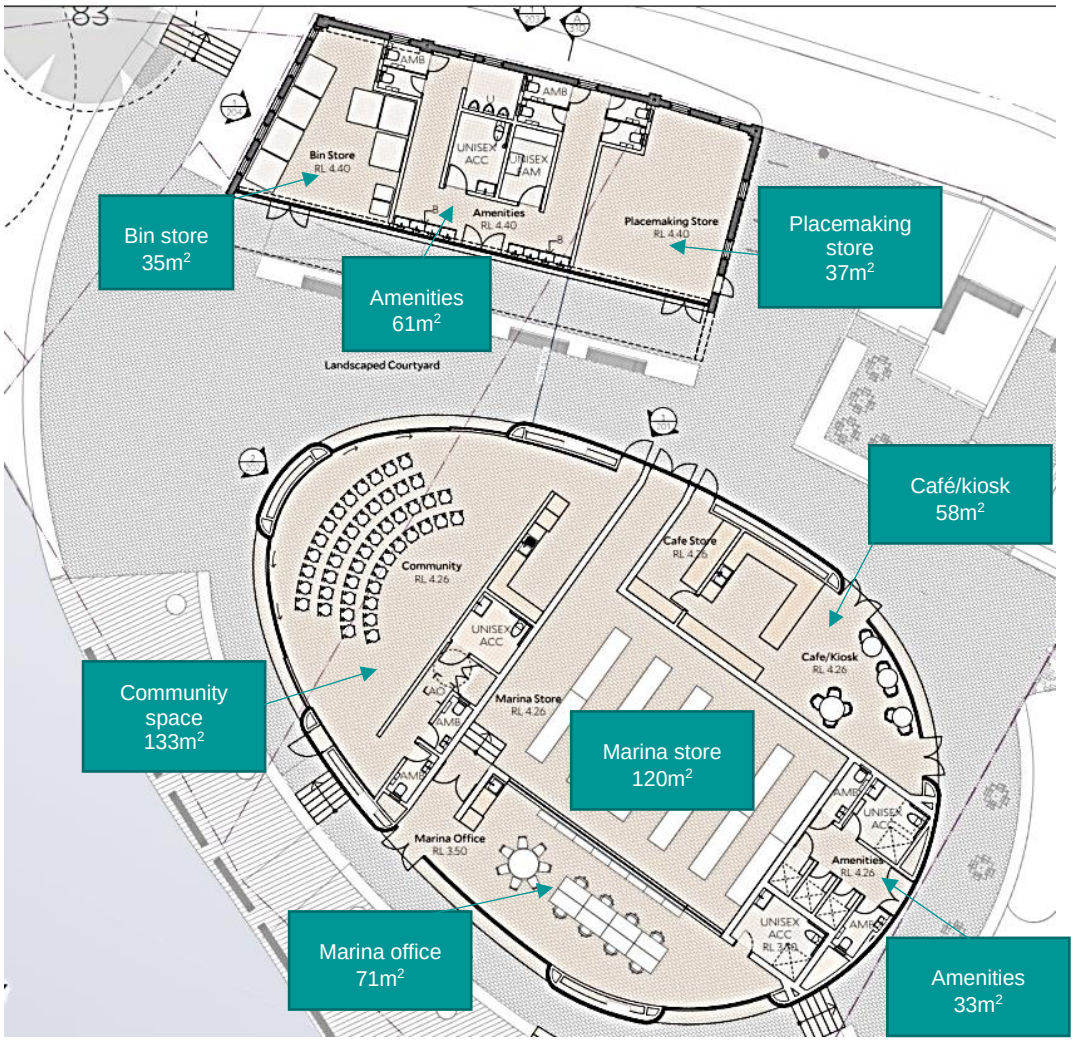
The primary aim of the OWMP is to provide clear plans and guidance for the design, operation and management of all aspects of waste management in the development. This has been developed in line with local and state-level policy and recycling targets as well as circular economy principles outlined in section 1.6. The OWMP aims to effectively manage the waste and to outline measures for reducing the amount of waste sent to landfill through maximising reuse and recycling of materials.

3.2 Building layouts

The proposed gross floor area for the development is given in Table 1.2 in Section 1.4.

A detailed floorplan of the amenities building and marina/community building is provided in Figure 3.1: Building layout and floorplan.

Figure 3.1: Building layout and floorplan



Source: Collins and Turner

3.3 Waste generation

In line with Blackwattle Bay design guidelines, the estimated quantity of waste and recyclable materials expected to arise from the development has been calculated using City of Sydney[8] benchmarks. They also contain recent (2018) benchmarks for food waste, whereas the NSW guidelines are from 2012[2] and do not provide food waste generation rates. Therefore, as the development includes a café that will produce food waste, so to maximise landfill diversion and recycling, the CoS guidelines have been deemed more relevant than the NSW commercial waste benchmarks that are currently available.

3.3.1 Waste and recyclable material streams

The material streams expected to be generated at the development during its operation include:

- Mixed recycling:
  - Paper and cardboard
  - Metals
  - Plastic
  - Glass
- Residual waste (materials that cannot be recycled)
- Food waste
- Garden waste

It is expected that some specialist waste streams may be generated at the development. The specialist waste streams require a specific management approach and are expected to include:

- Electronic waste or e-waste, including electrical and electronic equipment and appliances.
- Bulky waste, such as furniture and appliances.
- Problem waste, as defined by NSW, comprising of waste that is more complex to manage, such as used cooking oil, batteries, and lighting.

Generation rates for these materials are not provided within the guidance, and due to each arising on an ad-hoc basis, the generation quantities of these materials have not been estimated. However, sufficient space has been set aside for their safe storage and collection, as advised by NSW guidance which requires ‘suitable space’ to be provided. NSW does not provide a minimum space requirement so the City of Sydney guidance[8] of 4m^2 for developments between 100m^2 and 2,000m^2 in size has been used as best practice.

3.3.2 Waste generation rates for non-residential developments

The City of Sydney has developed waste and recycling benchmarks to estimate the quantities of waste generated by new developments[8]. However, not all the activity categories outlined in the City of Sydney’s guidance are directly aligned with the activities proposed within the development. Table 3.1 presents the development proposed activities with a suitable corresponding activity category from the City of Sydney’s guidance. Some areas are deemed to be non waste-generating, such as storage areas. As such, they have not been included in the calculation.

Table 3.1: Bank Street spatial areas and the applied benchmark waste generation categories

Bank Street Building	Bank Street spatial area	Waste generation category
Marina / community building	Marina storage	N/A
	Marina office	Commercial offices
	Café kiosk/	Restaurant/eating
	Amenities	N/A
	Community space	Childcare/community centre with kitchen
Amenities 'building D'	Bin store	N/A
	Amenities	N/A
	Placemaking store	N/A
Dragon boat storage	General store	N/A
	Boat store	N/A

Source: Mott MacDonald

The waste generation benchmarks for the relevant spatial areas within the development are presented in Table 3.2.

Table 3.2: Waste generation benchmarks for development types within Bank Street

Development type	Expected waste generation (litres per 100m^2 per day)		
	Residual waste	**Recycling**	**Food waste**
Restaurant/eating	100	500	100
Commercial offices	15	25	5
General community developments	20	50	5
Childcare/community centres with kitchens	50	50	15

Source: City of Sydney[8]

Waste arisings from the development are estimated in Table 3.3. These estimates were calculated using the City of Sydney waste generation benchmarks in line with Blackwattle Bay guidelines and targets to reduce landfill output, as NSW benchmarks do not include a separate food waste benchmark.

Table 3.3: Waste arising (in litres) from Bank Street

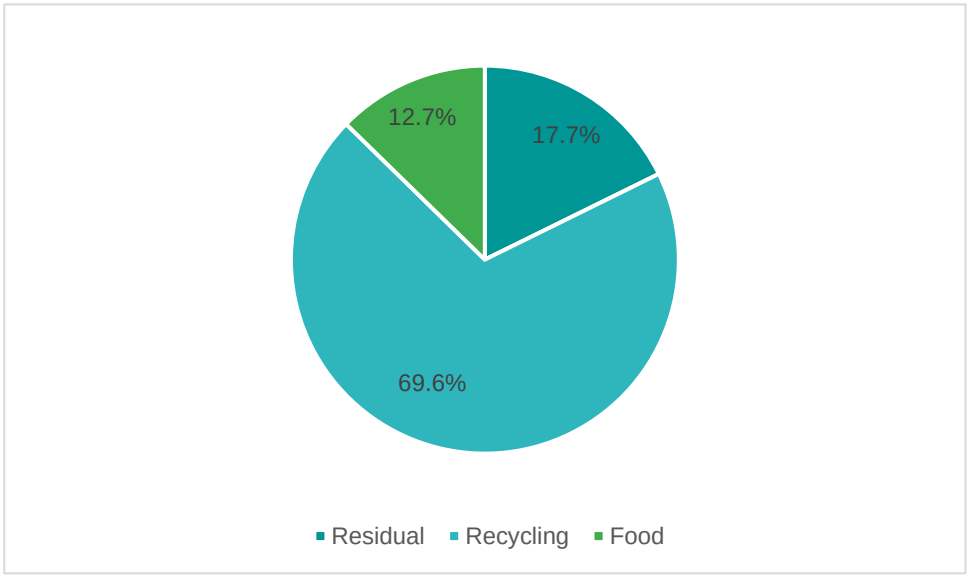
Activity	Allocated area (m^2)	Residual waste (l/day)	Recyclable materials (l/day)	Food (l/day)
Restaurant/eating	36	36	180	36
Commercial offices	75	11	19	4
General community developments	50	25	25	8
Community centre with kitchen	366	73	183	18
Total litres per day		145	407	66
Total litres per week		1,019	2,848	459

Source: Mott MacDonald

3.3.3 Diversion of waste from landfill

Figure 3.2 indicates that approximately 82.3% (food and recycling combined) of the material expected to arise from the development on a daily basis is suitable for recycling or recovery. Initial calculations suggest that the development is likely to meet the Blackwattle Bay design guidelines target of 80% diversion of operational waste from landfill, provided that segregation practices are consistently adhered to. It is possible, depending on the waste contractor, to further divert the remaining residual waste away from landfill disposal. Alternatives include sending it to an energy from waste facility, refused derived fuel (RDF), or mechanical biological treatment (MBT) facility, providing there is availability of suitable waste treatment and recovery capacity in proximity to the development. The recycling and disposal facilities chosen by the contractor must be licensed. A national database of licensed waste and resource recovery infrastructure is available on the Australian Government Department of Climate Change, Energy, the Environment and Water website.[11]

Figure 3.2: Waste types anticipated to arise from the development



Source: Mott MacDonald

It should be noted that attainment of a high recycling capture rate, whilst practicable within the design of the development waste infrastructure, will also be heavily influenced by a number of factors both internal and external to the masterplan.

Internal factors include issues such as the participation of visitors and employees in recycling and waste prevention. This can be appropriately managed through specific education programmes.

External factors include issues such as provision or availability of adequate waste collection and treatment facilities within Sydney or New South Wales to achieve high waste diversion levels and whether markets exist for the recyclable materials.

[11] Department of Climate Change, Energy, the Environment and Water (2022) Australian waste and resource recovery infrastructure database [online]. Available at: Australian waste and resource recovery infrastructure database - DCCEEW. Accessed July 2023.

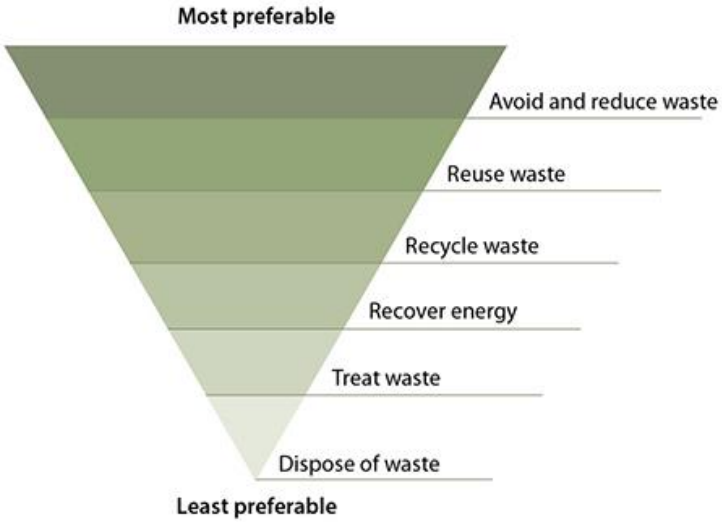
3.4 Waste strategy overview

3.4.1 Key principles

3.4.1.1 Waste Hierarchy

The waste hierarchy is a key principle that is adopted throughout this strategy. It aims to prioritise the reduction of waste being generated in the first place, followed by reuse, recycling, energy recovery, treatment and finally disposal in landfill as a last resort. The New South Wales' EPAs diagram of the waste hierarchy is shown in Figure 3.3.

Figure 3.3: Waste Hierarchy



Source: South Wales Environment Protection Agency (NSW EPA)[12]

3.4.1.2 What is the relationship between the circular economy and the waste hierarchy?

The circular economy is focused on enabling the recovery and reuse of all materials at the highest possible value at all times. The waste hierarchy can be used as a way to understand the value of resources, giving top priority to preventing waste in the first place. To comply with circular economy principles materials must be managed within the top tiers of the waste hierarchy for as long as possible, focusing on preventing waste as a priority.

3.4.1.3 Strategy process flow (overview only)

Figure 3.4 presents a flowchart showing a simple overview of the waste value chain, from waste generation to final disposal. The sub-sections that follow provide insight into the underlying approach of each step.

[12] NSW EPA (2022) The waste hierarchy [online]. Available at: The waste hierarchy (nsw.gov.au). Accessed July 2023.

Figure 3.4: Overview of the waste value chain

Source: Mott MacDonald

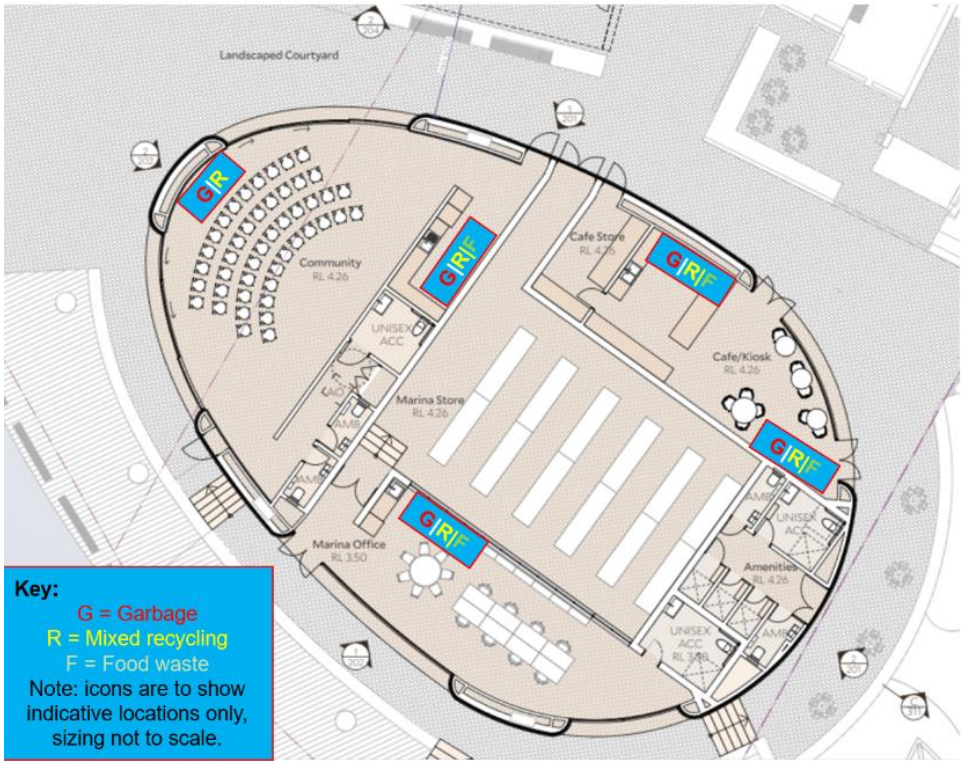
3.5 Waste segregation

Based on the outcome of the waste arisings calculations, the following point of generation containers are required to be provided:

- Mixed recycling
- Residual waste
- Food waste (only where required such as the café and kitchen areas of the office and community room)

Figure 3.5 shows potential locations within the community building of the development for residual waste, recycling and food waste point of generation bins.

Figure 3.5: Potential locations for internal point of generation bins within the community building



Source: Colins and Turner

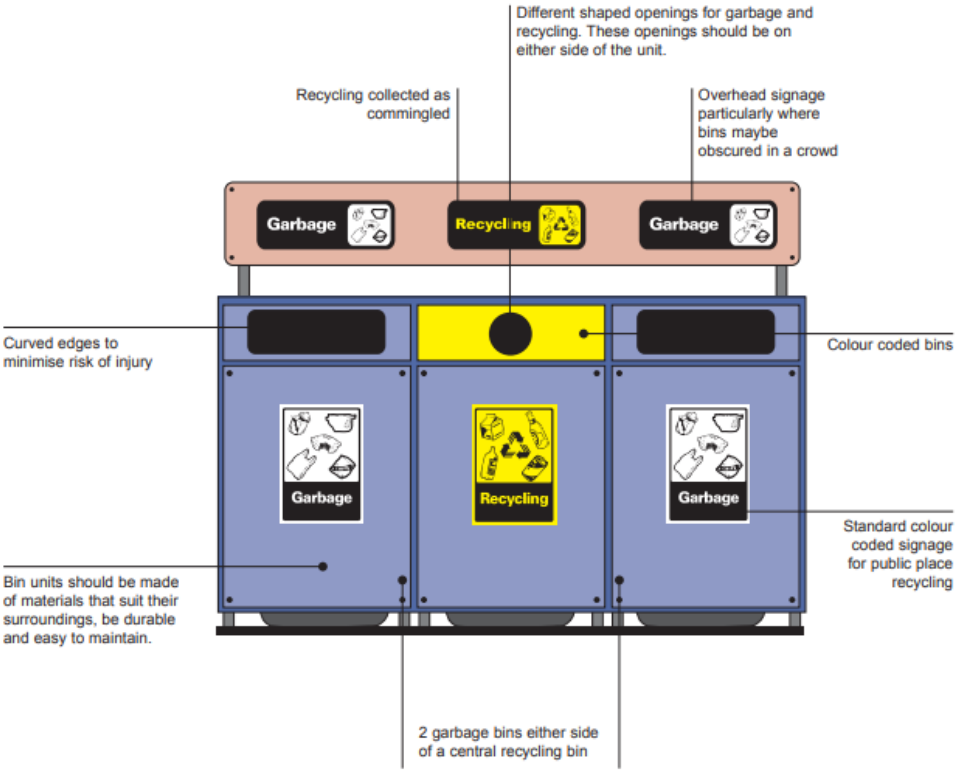
All bins should be appropriately colour coded in line with NSW guidance[2]. This is a dark green bin with:

- Yellow lid for commingled recycling,
- Red lid for residual waste, and
- Lime green lid for organic waste.

Adhering to these colours will ensure consistency with recycling arrangements across the state, making it easier for staff and visitors to understand.

As much of the development comprises public spaces, design and placement of external and internal bins will be equally important. Installation and servicing of these will be the responsibility of PMNSW or the future tenants. Bins should be designed to fit in with the local environment while achieving waste segregation aims. Figure 3.6 is a suggested design of external litter recycling bins taken from the NSW Better Practice Guide[3]. Figure 3.7 is an example of internal recycling bins from another authority, which may be used inside the community building.

Figure 3.6: Suggested design features for public litter recycling bins



Source: Department of Environment and Conservation (NSW)[13]

[13] Department of Environment and Conservation (NSW), 2005, [online] Better Practice Guide for Public Place Recycling (nsw.gov.au) Accessed July 2023.

Figure 3.7: Example of internal waste and recycling segregation bins

Source: Bass Coast Shire Council[14]

The NSW government has produced examples of consistent signage which should be displayed prominently in any waste storage compounds and on the bins themselves (Figure 3.8). Alternatively, the chosen waste contractor may be able to provide signage according to the materials accepted for recycling.

Figure 3.8: Examples of bin signage provided by NSW EPA

Source: NSW EPA[15]

3.6 Waste transfer

Source segregation bins are anticipated to be available throughout the waste-generating buildings of the development, including bins for recyclables and residual waste, allowing source separation of waste. Designated bins for food waste will also be available in kitchen

[14] Bass Coast Shire Council [online] My Kerbside Bin is Full - What can I do? | Bass Coast Shire. Accessed October 2023.

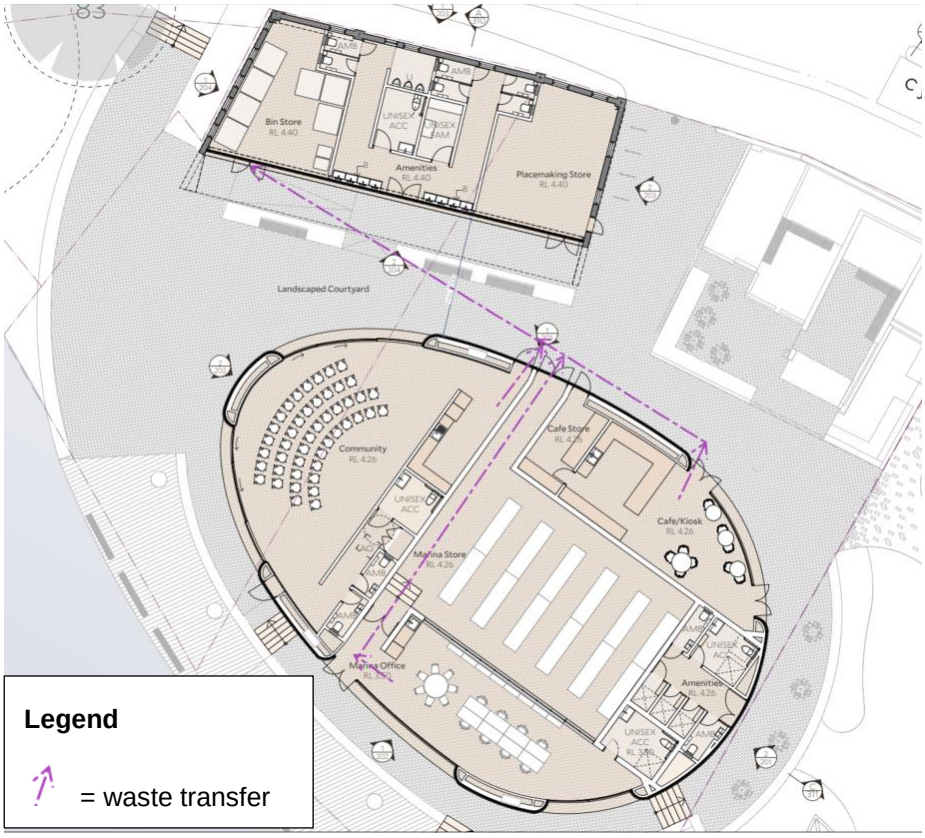
[15] NSW EPA, Standard Recycling Signs [online] Available at: Standard recycling signs (nsw.gov.au) Accessed October 2023

facilities. A cleaning contractor is required to be appointed by PMNSW to manage the recyclable and residual waste arising from the development. Bin bags and/or any waste container will be emptied and then transferred to the waste storage room by the cleaning contractor.

Internal transfer of waste from the main building to the waste storage room is anticipated to be carried out on daily basis outside of main operational hours to avoid disturbances to public users.

The waste storage room is located on the ground floor of the amenities building. Waste generated by the community building is proposed to be carried out to the waste storage area via the ramps. A proposed internal waste transfer route is presented in Figure 3.9. This proposed layout is subject to change.

Figure 3.9: Proposed internal waste transfer routes (purple arrows)



Source: Oculus

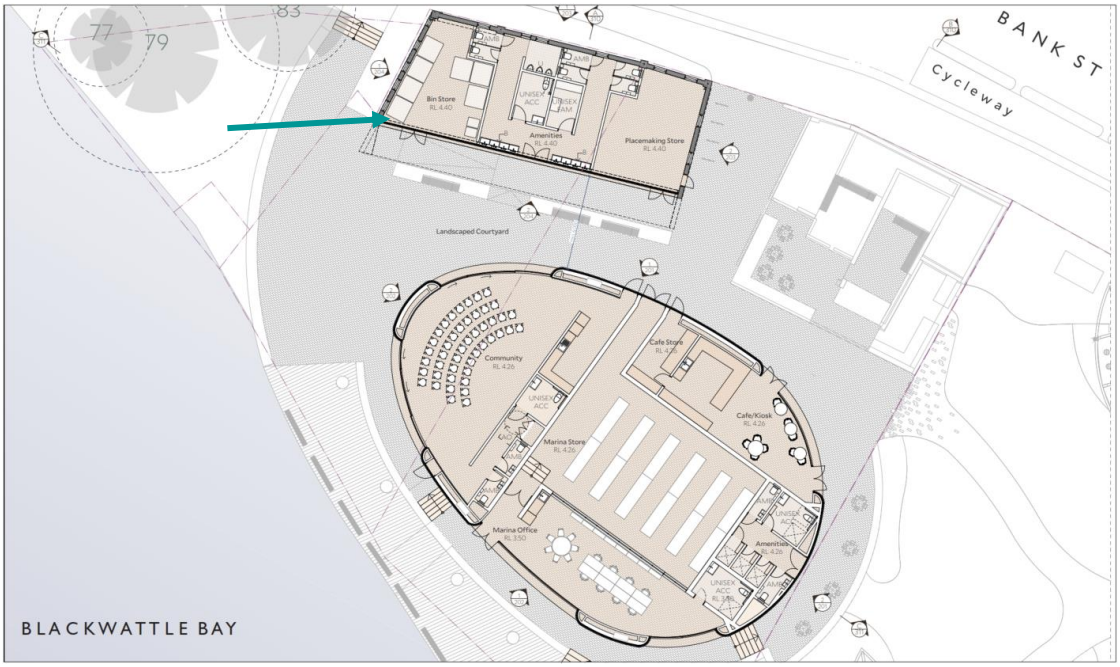
Distances for the internal transfer of waste from the point of generation to waste storage area are likely to exceed 30m. Taking this into account, carts/trolleys are recommended to facilitate the transfer bin bags or waste containers into the centralised waste storage area to reduce potential health and safety risks. The carts/trolleys will be stored in the waste storage room or marina store when not in use. It should be noted that there is no step-free route from the marina office, internally or externally. The fewest number of steps and shortest transfer distance is for office waste to be carried in bags through the marina store. If needed, a cart/trolley could be waiting at the top of the three steps in the marina store, into which bags can be placed before being rolled outside.

3.7 Waste storage

3.7.1 Waste storage room location

The proposed location of the waste storage room is in the amenities building D, as shown in Figure 3.10. A set of double doors facing the courtyard will allow waste to be transported easily from the main community building.

Figure 3.10: Waste storage room location shown within building D



Source: Oculus

Waste storage has been calculated based on the following assumptions:

- It is assumed that the development will have a centralised waste storage area where all the waste generated from the buildings making up the development will be stored. It is also assumed that 1,100L wheeled bins are to be used for storing recyclable materials and residual waste. Food waste is assumed to be stored in 240L wheeled bins. Table 3.4 presents the assumed dimensions that has been used to calculate the number of waste containers.
- A weekly waste collection for all waste streams with the exception of bulky and problem waste. These two streams are anticipated to be collected on an ad-hoc basis.
- The dimensions of the wheeled bins are derived from the specification provided in the NSW EPA guidance[2], which is outlined in Table 3.4.
- An extra allowance will be provided between individual wheeled bins, which is anticipated to be 100mm, this will be to allow an easiest removal and manoeuvring of wheeled bins. This extra allowance has been derived from the City of Sydney Waste Calculator[16].
- An extra allowance for manoeuvrability of wheeled bins will be provided. This is anticipated to be 50% of the required waste storage room.

[16] City of Sydney (n.d.) Waste and recycling space calculator [online]. Available at Waste and recycling space calculator | City of Sydney. (nsw.gov.au). Accessed July 2023.

- Bin requirements within the waste storage room have been estimated based on the waste generation calculations presented in Table 3.3.
- Waste generated in the public realm has not been quantified, as it is assumed it will be collected by PMNSW as part of its routine facilities management services.

Table 3.4: Assumed dimensions of standard wheeled collection bins

Bin size (litres)	Height (mm)	Width (mm)	Length (mm)
240	1,080	580	735
1100	1,470	1,370	1,245

Source: NSW EPA[2]

The number of bins required to store the waste within the waste storage room along with the bin area requirements are provided in Table 3.5. The number of wheeled bins and spatial requirement allocated is based on a weekly waste collection.

Table 3.5: Waste and recycling bin allocation

Bin size	Recycling materials		Residual waste		Food waste	
	Number of bins	Space requirement (m^2)	Number of bins	Space requirement (m^2)	Number of bins	Space requirement (m^2)
240 litre	-	-	-	-	2	1
1,100 litre	3	5.4	1	1.8	-	-

Source: Mott MacDonald

It is also anticipated that an additional two spare bins (one for residual and another for recyclables) be allocated, each with a capacity of 1,100L.

For bulky and problem waste, no benchmarks are provided by NSW, so guidance provided by the City of Sydney[8] has been used. It advises developments with an area of between 100m^2 and 2,000m^2 to be allocated at least 4m^2 of space to store bulky and problem waste. The total floor gross area for the marina/community building is 425m^2.

A wash area should also be provided for the washing out of wheeled bins and equipment. This area is required to have water supply and drainage to foul sewer. Due to the lack of specific area requirement within the guidance, an area of 2m^2 has been provided for the wash area based on the space required to accommodate a 1,100L wheeled bin.

Table 3.6 presents the required spatial area for the waste storage room.

Table 3.6: Waste storage room area requirements

Bin or designated area	Requirement	Area (m^2)
240L wheeled bin	2	1
1,100L wheeled bin	4	7.2
Spare bins	2	3.6
Bulky and problem waste	1	4
Wash area	1	2
Manoeuvrability	+50%	10.7
Total area		**32.1**

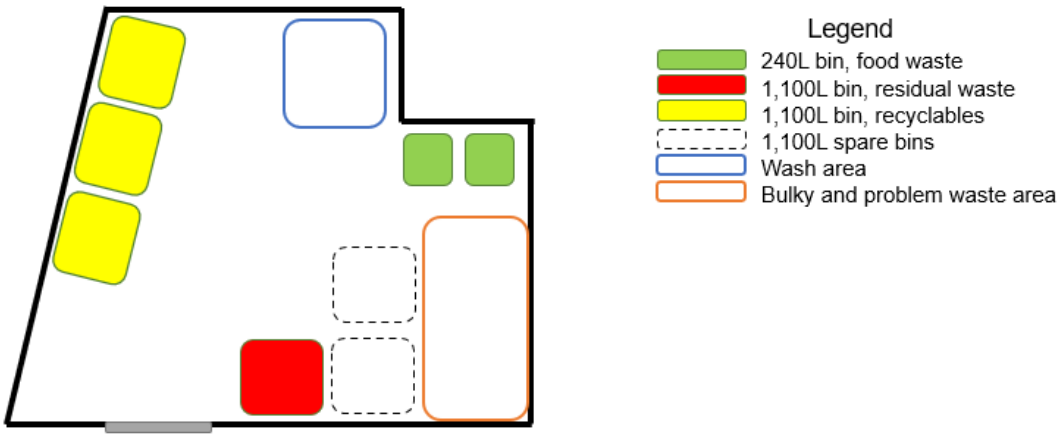
Source: Mott MacDonald

The concept design drawing, developed by Oculus, indicates that the waste storage room has a floor area of 35m^2. Sufficient area has therefore been allocated, albeit with limited contingency.

Given the low waste generation rates and proposed size of storage room, we do not propose the use of a compactor in the waste storage room.

Figure 3.11 presents the proposed waste storage room layout, including designated areas and distribution of waste containers (subject to change).

Figure 3.11: Proposed waste storage room layout



Source: Mott MacDonald. Note: Drawing is not to scale.

Figure 3.12 shows an example of a typical waste storage room in Sydney, including clearly labelled 1,100L and 240L bins.

Figure 3.12: Example of a waste storage room in the City of Sydney

Source: City of Sydney[17]

[17] City of Sydney (n.d.) Recycle at Home [online]. Available at: Recycle at home - City of Sydney (nsw.gov.au). Accessed July 2023.

3.7.2 Waste storage room construction design guidelines

The City of Sydney has key requirements[8] regarding the design of waste storage rooms. These have been used as best practice in the absence of PMNSW-specific guidelines. The aim is broadly to promote hygiene, health and safety and prevent vermin. The requirements include:

- Floors, walls, and ceilings of waste storage rooms must be finished in an impermeable smooth material for easy cleaning.
- A water supply for cleaning purposes, and floors to be graded and drained to a Sydney Water approved drainage fitting.
- Doors/gates to storage rooms must have a minimum clearance width of 900mm and at least one door/gate to allow the entry/exit of waste containers of the capacity chosen.
- Adequate ventilation, either by natural ventilation or mechanical exhaust system.
- Adequate artificial lighting controlled by internal and external switches.
- Any part of the waste and recycling management that is visible from outside should be in keeping with the dominant design of the remainder of the development.
- Compactor skips (if used) must be provided with safety cut-off systems.

As the waste storage room is to be in an existing building, adaptively reused, it should comply with the requirements mentioned above.

3.8 Waste collection

PMNSW will be responsible for the collection of waste and recycling from the site. It may appoint a contractor to collect waste and recycling from the development, in line with the guidance provided within this section.

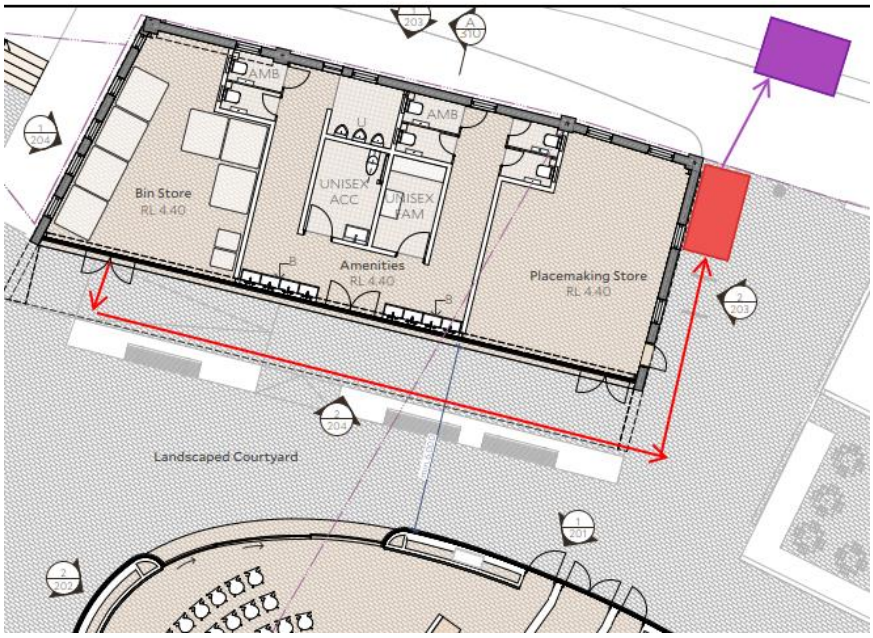
Waste storage room calculations are based on a weekly collection for residual, recyclables and food waste. It is recommended that the chosen contractor collects residual and recyclables waste on this basis. Spare bins have been allocated to accommodate any potential fluctuation or any occasional increase of waste generation (i.e. due to an event in the development). An increase on the collection frequencies can also be arranged, if necessary.

Although sufficient capacity has been allocated for a weekly collection of food waste, the collection of this waste stream on a frequent basis should be considered to avoid odours, leachate and vermin proliferation. The City of Sydney guidance[8] establishes that food waste should be collected daily (or stored in a refrigerated room) if it is generated in the following quantities:

- 50L of seafood, poultry and/or meat waste in total each day of operating, or
- 20% fish, poultry or meat by weight or volume

The collection frequency for food waste should be reviewed and adjusted by the PMNSW facility management team or contractor, once the development is operational. Waste will be transferred from the waste storage room to a collection point close to Bank Street Park for waste to be collected by the chosen contractor. A proposed loading zone is shown in Appendix A, which is also proposed for the waste collection vehicle to use. Figure 3.13 presents a proposed swept path for the movement of wheeled bins from the waste storage area to the proposed waste collection point, and then to the proposed area where the waste vehicle may be located.

Figure 3.13: Proposed internal transfer of wheeled bins for waste collection



Source: Oculus Note: Red lines represent the internal transfer of waste from waste storage area to proposed collection point (red rectangle). The purple line and rectangle represents the proposed movement of waste by the waste contractor to where it will be loaded onto a collection vehicle on Bank Street.

The waste storage room is located approximately 30m away from the proposed waste collection point. Wheeled bins will be moved on the day of collection to the collection point by the cleaning contractor staff. NSW guidance states that there should be no steps or a gradient of more than 1:14, and a distance of less than five metres from the collection point for larger bins (660L-1.5m^3).

The proposal shown in Figure 3.13 is subject to change. An alternative option to minimise waste transfer distances to a collection point is to interchange the location of the waste storage room with the placemaking storage room, so that the waste storage room is located adjacent to the proposed collection point with minimal transfer distance.

3.8.1 Public realm litter

PMNSW is responsible for servicing and maintenance of the litter bins in the public realm. The design team should liaise with PMNSW to provide sufficient provision of and emptying of litter bins located at the public realm in strategic locations across the site. As illustrated in Figure 3.6, these should be designed with recycling bins built-in. Indicative locations of litter bins across the site concept plan are shown in Figure 3.14.

The NSW Better Practice guidance mentions that the public would not travel more than 12 metres to a litter bin based on research, though this is not a hard rule. Based on this guidance, suggested locations for litter bins are close to key locations of waste generation, including the outdoor seating area outside the café, seating areas, sports court, play areas, major thoroughfares and entrances/exits to the site. This minimises the travel distance required by visitors in those likely areas of waste generation.

Figure 3.14: Potential location of litter bins across the Bank Street Park

Source: Oculus

3.8.2 Landscaping waste

PMNSW will be responsible for the landscaping of the outdoor areas of the park. This will generate quantities of organic 'garden' waste which should be sent for composting at an appropriate industrial facility, such as open windrow or in-vessel. It has not been currently deemed appropriate for an on-site composting facility to be made available.

There are no local City of Sydney or state-level guidelines or benchmarks for the generation of garden waste. However, Kew Gardens in the UK is a large mixed-use botanical garden, which publishes its garden waste generation figures[18]. Applying its garden waste generation rate, calculated as 1.21kg/m^2/year, to Bank Street Park, an estimated 232 tonnes of garden waste would be produced annually.

The exact quantities of this over the year would vary according to season. It is suggested that garden waste be removed by landscaping staff as and when maintenance work is taking place. Trolleys and/or large sacks can be used to contain the garden waste at point of generation, before loading into the landscaping team's vans/pick-up trucks as appropriate. It is not proposed that garden waste be stored in bins on site, given the limited room in the bin store and its seasonal variation.

3.8.3 Waste collection vehicle specifications

The NSW Better Practice guidelines provides the minimum vehicle dimensions and design parameters, which are outlined in Table 3.7. It is likely that standard refuse vehicles, which is what the guidance is based on, will be used by any waste contractor.

[18] Royal Botanic Gardens, Kew, 2021, Annual Report [online] Available at RBG Kew Annual Report 2020-2021 Accessed October 2023.

Enough space must be allocated to allow the vehicle to stop, collect waste and manoeuvre, with minimal reversing. Taking these into consideration, it has been proposed the loading zone to be used as a waste collection area (refer to Figure 3.13).

Table 3.7: Typical dimensions of a rear-lift collection vehicle

Parameter	Dimensions
Length	Up to 10.24m
Width	2.5m
Operational/travel height	Up to 3.5m
Minimum vertical clearance required	4.0m
Weight (vehicle only)	12.4 tonnes
Weight (payload)	9.5 tonnes
Turning circle	18m

Source: NSW Better Practice Guidelines[2]

3.9 Offsite treatment and disposal

The chosen collection contractor must collect waste and recyclable materials and transport it to appropriate treatment facilities. When selecting off site treatment facilities, the development is required to follow circular economy principles and the waste hierarchy so that landfill is considered the last resort.

Wherever feasible, the proximity principle should be considered so that waste is sent to suitable and permitted treatment facilities within the shortest distance possible.

Table 3.8 outlines the preferred waste treatment and disposal method for the waste streams expected to arise from the development.

Table 3.8: Summary of offsite treatment and disposal for waste streams arising from Bank Street

Waste stream	Treatment/disposal	Additional comments
Recyclable materials	Recycling	Dry recyclable materials will be sent to a materials recovery facility (MRF) for sorting and recycling
Food waste	Recovery	Food waste will be prioritised to be sent to a commercial organic treatment facility to be processed into compost, or used in an anaerobic digestion process
Garden waste	Recycling	Any garden waste from landscaping will be sent to an industrial composting facility such as in-vessel or open windrow, to be recycled into compost.
Used cooking oil	Recovery	Used cooking oil will be prioritised to be collected separately, if feasible, and sent to an off-site facility for recovery.
Bulky waste	Recycling/recovery	A bulky and problem waste area has been allocated within the waste storage room for a separate collection. Waste arisings will be sent to a suitable and permitted recycling or recovery facility.
E-waste, batteries, lightbulbs, and other problem waste	Recycling	A bulky and problem waste area has been allocated within the waste storage room for a separate collection. They must not be mixed with residual waste or other recycling. These will be collected by a specialist contractor and sent to a licensed facility for recycling. Disposal of waste to landfill will be considered as the last option.
Residual waste	Recovery/disposal	Residual waste will be prioritised to be sent to a waste recovery facility, if available and feasible to do so.

Waste stream	Treatment/disposal	Additional comments
		Disposal of waste to landfill will be considered as the last option.

The chosen contractor must send the recyclable materials to a licensed materials recovery facility (MRF). A national database of licensed waste and resource recovery infrastructure, including MRFs, is available on the Australian Government Department of Climate Change, Energy, the Environment and Water website.[19]

3.10 Enabling reuse and recycling

The following sub-sections provide measures that can be put in place within Bank Street Park that support the initial levels of the waste management hierarchy.

3.10.1 Circular asset management

To embed circularity, consideration must be given to how circular economy principles will be embedded into the operation of the development. Implementing circular asset management processes can have several potential benefits, including environmental benefits generated from a reduced impact on resource extraction, reductions in waste arisings and lower associated GHG emissions.

To pursue circular asset management, it is recommended that an inventory or database of assets is developed for the commercial premises of the development. The inventory should include a record of all physical assets such as materials used in construction and any fit-out materials e.g., furniture. Having an inventory of assets can support waste minimisation by:

- Producing a log of materials/products within a development prevents unnecessary purchasing, which in turn will reduce material usage and waste production.
- If for example a building needs refurbishing in the future, having a log of all materials contained within the existing building will help to improve recycling and reuse rates.
- Identifying when materials or assets need maintaining can help to extend lifetimes by prioritising repairs and refurbishment.

The NSW Circular Economy Policy Statement[4] states that innovative new solutions for resource efficiency should be a key focus area. Setting up an inventory or database of assets can be done using various different platforms. Examples of digital technologies that can be used to increase resource efficiency and reuse throughout a development's lifecycle include:

- Building information modelling (BIM) can be used as a database for information on all building components and materials. This information can be used to track materials throughout the lifetime of the development, helping to facilitate efficient maintenance schedules and improve recovery rates.
- Using digital twins to create a digital copy of a building, which can be used to monitor the condition and usage of assets. This helps to improve proactive maintenance. Digital twins can also be used to record information on all physical assets within a building, this information can then be utilised to improve reuse and recovery rates.

3.10.2 Skills development and education

Engagement initiatives should be used to communicate the importance of the circular economy and waste hierarchy principles. Users of the precinct should be provided with useful

[19] Department of Climate Change, Energy, the Environment and Water (2022) Australian waste and resource recovery infrastructure database [online]. Available at: Australian waste and resource recovery infrastructure database - DCCEEW. Accessed July 2023.

and accessible information on opportunities for reuse, waste collection patterns and the recycling and composting facilities provided.

Increasing the awareness of the benefits of supporting the principles of the circular economy and the waste hierarchy can help to foster behavioural change. Providing businesses within the development with information on reuse and recycling has the potential to empower individuals so they can make more informed decisions about their waste management practices. This in turn can help to reduce waste being sent for disposal by increasing the awareness of the reuse and recycling opportunities that will be made available throughout the development. Examples of how the development can increase awareness on reuse and recycling opportunities include:

- Delivering training sessions and workshops for all relevant stakeholders on reuse and recycling opportunities.
- Conducting communication campaigns that raise awareness on the importance of the circular economy principles, reuse and recycling.
- Developing guidelines and signage that clearly state the required steps for sorting waste and eligible items for reuse and recovery.
- Setting targets and incentives to encourage stakeholders to participate in reducing waste arisings and increasing reuse rates.

3.11 Potential for on-site waste reduction, community reuse and recycling schemes

If surplus materials or waste is generated through the operation of the development, efforts should be made to prioritise reuse before utilising recycling or recovery methods. Choosing to reuse components and materials and decreasing the need for new resources has the potential to generate carbon savings throughout the lifecycle of the development. The following sections highlight opportunities to reuse and recycle materials throughout the operation of the development.

3.11.1 Waste reduction

Measures to reduce waste in the first place should be undertaken. The development contains facilities such as a café, kitchen, and office where waste can be minimised.

The New South Wales single-use plastics ban should already effectively reduce the generation of significant amounts of certain single-use plastic products at the development. If compostable alternatives are to be used, these should be checked with the appointed waste collection contractor if suitable for inclusion in the food waste recycling service, to prevent contamination of the composting/anaerobic digestion process.

Some single-use items, such as coffee cups and plastic cups, are not included in the ban. The Blackwattle Bay design guidelines states that single-use plastics should be phased out by 2025. A scheme to reduce the use of coffee and drinks cups at the development should be explored. This could be through charges on disposables or incentives for customers to bring their own reusable cups. Disposable cups and crockery for customers dining-in could be eliminated completely if adequate washing facilities/staffing are made available in the cafe. For customers wishing to purchase items to takeaway, sustainable, renewable materials such as compostable (plant-based) cups and cutlery may be used as opposed to plastic. Appropriate litter bins situated in close proximity to the café as suggested in Section 3.8.1 will help to mitigate littering of takeaway cups and cutlery.

3.11.2 On-site reuse and recycling opportunities

3.11.2.1 Precinct-scale waste facilities

The Blackwattle Bay design guidelines (section 1.6.1.7) include the exploration of precinct-scale waste facilities, along with the City's food waste recycling service and community gardens. As the scope of the Bank Street Park development does not include any residential land use, at present it is not proposed that there should be a community composting within the development.

The City's food waste recycling service trial is only open to residential properties. Therefore it is not deemed suitable for this development and PMNSW, as the responsible body for the site, should instead appoint a suitable contractor to collect all food waste from the café and community building.

3.11.3 Off-site reuse opportunities

The NSW Circular Economy Policy Statement[4] states the key principles of maintaining the value of products and materials and creating new solutions for resource efficiency. Sections 3.11.3.1 to 3.11.3.3 present information on opportunities that can be used throughout the operation of the development to maximise value from materials and resources.

3.11.3.1 Industrial symbiosis

Industrial symbiosis is the process by which the waste or materials of one industry or business becomes a raw material for another industry or business. If materials generated from the operation of the development cannot be reused on-site, industrial symbiosis opportunities for sharing materials and waste with other businesses within the Sydney district should be explored. Examples of materials which may be exchanged through industrial symbiosis include items such as surplus construction/landscaping materials or redundant furniture.

When compared with extracting and sourcing virgin raw materials, reusing materials already in use can offer opportunities to reduce operational costs, raw material demand, carbon emissions and waste generation.

3.11.3.2 Second-hand marketplaces

Surplus materials which are fit for reuse should be reused at the development wherever possible. If materials cannot be utilised at the development, they should be shared using second-hand marketplaces, with a particular focus on utilising companies and organisations within the third sector. Second-hand marketplaces are platforms where individuals or businesses can sell, buy or exchange goods. Like industrial symbiosis, using a second-hand marketplace contributes to extending the lifecycle of materials, reducing the demand for raw materials and reducing waste arisings. Examples of items which may be listed on a second-hand marketplace include fit-out materials stripped out of a building during refurbishment.

The difference between industrial symbiosis and second-hand marketplaces, is that second-hand marketplaces are often more focused on individual transactions whereas industrial symbiosis requires collaboration between industry partners.

3.11.3.3 Reverse logistics

Throughout the operation of the development procuring components from manufacturers who offer reverse logistics through means such as take-back schemes should be prioritised. Once the materials have reached their end of life, the materials should be sent back to the manufacturers, who will retrieve their components for reprocessing. Reverse logistics can offer a processing route to facilitate reuse and remanufacturing of components. This can help to

enable the recycling of complex components which may not be recoverable via widely accessible waste management facilities. Some examples of items which may be returned via reverse logistics include electronics such as light fittings.

Those responsible for the upkeep or maintenance of the development should be aware of which products or materials can be taken back to the manufacturers via reverse logistics opportunities. This information should be clearly recorded, specifying all required details on how to return the items back to the manufacturer.

3.12 Environmental impacts of waste

The main potential impacts of any waste management system can be grouped into the following impact categories:

- Noise
- Litter
- Odour
- Traffic
- Dust
- Vermin
- Visual intrusion
- Water pollution

These must be considered throughout the design and operation of the development's OWMP and mitigated as much as possible. The following sub-sections provide a summary of the impacts associate with each impact category listed above.

3.12.1 Noise

The discharge of waste into containers, and the emptying of containers into collection vehicles will generate some noise in the process. The proposed waste storage area is located within the amenities building in close to the Bank Street main road. It is not deemed to be in a location that will cause disruption to users of the community centre or local residents. During waste collection, some noise will be emitted, this can be mitigated by working with the contractor to ensure collection times are not early in the morning or late at night.

3.12.2 Litter and fly-tipping

Inspections will be undertaken to check the remaining storage capacities of bins to determine whether additional collections are required, or to modify the frequency of collections, once the site is in operation. The frequency of these inspections will depend on the use of the bins.

Some waste spillage may occur during the transfer process and this should be cleared prior to the vehicle leaving the development or waste storage area. Some litter may also arise during the movement of bins from the development to the waste storage room. All litter should be cleared promptly and effectively.

3.12.3 Pests

The use of wheeled bins or containers with lids will limit the attraction of vermin, pests and flies, provided lids are kept closed when not in use. The use of smaller lidded 'caddies' rather than open bins for the initial depositing of organic waste at the point of waste generation (such as kitchens) will further reduce risk of pests in the building. These caddies can be closed and locked when not in use can then be emptied into the larger bins.

Any waste spillage is required to be cleared up, as soon as practically possible, after discovery, where applicable. Should vermin, pests and flies be discovered within the development, measures will need to be taken to eradicate the problem, such as appointing a professional pest control removal service.

3.12.4 Odour

The waste storage room should be designed with adequate ventilation to prevent build-up of odours. This could be done passively to create a negative pressure, or via a mechanical ventilation system fitted if necessary. All bins will be lidded and sealed. Food waste collection should take place no less than weekly to prevent build-up of odours from decaying organic matter.

The waste storage room will have a water supply and wash area to allow for periodical cleaning of all bins after collection. This system will also allow for the room to be washed down on a monthly basis. Any wastewater will drain into a foul sewer drainage system.

3.12.5 Dust

Hardstanding areas should be swept periodically to minimise dust build-up and maintain cleanliness and tidiness of the general area.

3.12.6 Traffic

Collection vehicles traffic movements will be limited to the collection of residual, food and recyclable waste. The volume of collection vehicle movements is not expected to impact the traffic flow in and around the area. However, in order to minimise potential nuisance, it is recommended that, where possible, waste collections be undertaken during off-peak times.

Traffic through Bank Street serving the bin store and collection point would need to be coordinated and scheduled accordingly to minimise potential disruptions to other operations. The frequency of recycling and residual waste collections should be limited to at most three times a week, and will be scheduled, where feasible, for joint collection. Food waste collections may be more frequent. Collections will be prioritised for off-peak times and the use of the smallest suitable vehicle to reduce disruption and nuisance.

3.12.7 Visual intrusion

Waste bins are to be stored inside the bin store of the amenities building so will not be in permanent visual sight. Any litter bins in the public realm are to be designed in an innovative way to fit into the environment while allowing for segregation for recycling.

As the waste storage room will be in an existing building, it should not unduly disrupt the character of the area. The bin storage and collection areas should be hidden from any ‘beauty spots’/landscape views. However, any riverside paths will be an important area to put strategically located litter bins which will mitigate the visual pollution of litter that would otherwise enter the environment.

3.12.8 Water pollution prevention

As a development close to the marine environment, care must be taken to prevent water pollution as a result of poor waste management. This could be through litter, which should be picked up regularly to prevent waste blowing into the water. The single-use plastics ban should mitigate the risk of plastics entering the environment. However, there may be a risk from litter brought by visitors from elsewhere, and food packaging, which may cause harm to wildlife if it enters the marine environment.

Chemical pollution should also be avoided. The waste storage room should have a drain that enters a foul water sewage system, so that any water from washing of containers does not contaminate groundwater or run off into the freshwater environment. Any chemicals used to clean containers should be environmentally-friendly and the use of harsh chemicals, such as bleach, avoided.

4 Construction & demolition waste management

4.1 Introduction

The Blackwattle Bay design guidelines include a target of 80% diversion from landfill for C&D waste. The City of Sydney's target has since been increased to 90% by 2030. This construction and demolition waste and recycling management plan aims to outline how measures will be taken to minimise waste and increase the reuse of materials on the construction site.

4.2 Objectives

The purpose of this CDWMP is to outline the broad principles and requirements for the management of C&D waste during the construction works. This CDWMP is developed during the design stage. The main objectives of the plan include:

- Waste minimisation and segregation practices.
- Adoption of circular economy principles throughout the construction works.
- Correct collection and transportation of materials from site by licenced contractors.
- Landfill minimisation, according to targets.
- Assigning of roles and responsibilities of the key project stakeholders during the construction stage.

4.3 Designing out waste

Before considering reuse and recycling opportunities to recover value from surplus materials and waste, the development should aim to reduce the possibility of creating waste in the first instance. Mitigation measures should be implemented during the construction of the development to design out waste by:

- Applying a 'design in layers' approach to facilitate reuse and minimise waste. This is achieved by designing for longevity, standardisation, dematerialisation and disassembly.
- Encouraging suppliers to reduce packaging used to deliver components and promoting the use of reusable packaging wherever possible.
- Employing responsible material sourcing, by using reclaimed or recycled materials to reduce demand for virgin materials and opting for materials that minimise waste generation during installation.
- Delivering materials on an 'as required' basis to avoid damage or contamination thus reducing the likelihood of waste generation.
- Using pre-cast or modular elements where practicable to promote efficient use of materials and avoid the generation of waste arisings from off-cuts.
- Avoiding the temporary stockpiling of fill materials prior to incorporation, to minimise double handling and damage in turn resulting in a reduction of waste materials. Materials should be stockpiled in accordance with best practice and managed appropriately to limit the likelihood of damage or contamination.

The mitigation measures listed to design out waste will also help to enable circular asset management during the construction phase of the development. Decisions should be made

during design and construction phases to enable the measures stipulated in section 3.10.1. Additional considerations required during construction to facilitate circular asset management include:

- Selecting healthy materials for use that do not pose risk to the environment or human health.
- Using materials based on their recycled content and their ability to be reused or recycled at the end of their service life.
- Using modular construction techniques to facilitate the onward reuse and recovery of materials at the end of their service life.
- Embedding circular design principles listed in section 4.4 to facilitate adaptive reuse, maximise recovery and minimise resource use.
- Managing materials throughout the construction and demolition phases of the development using the techniques detailed in sections 4.5 to increase resource efficiency and reduce waste arisings.

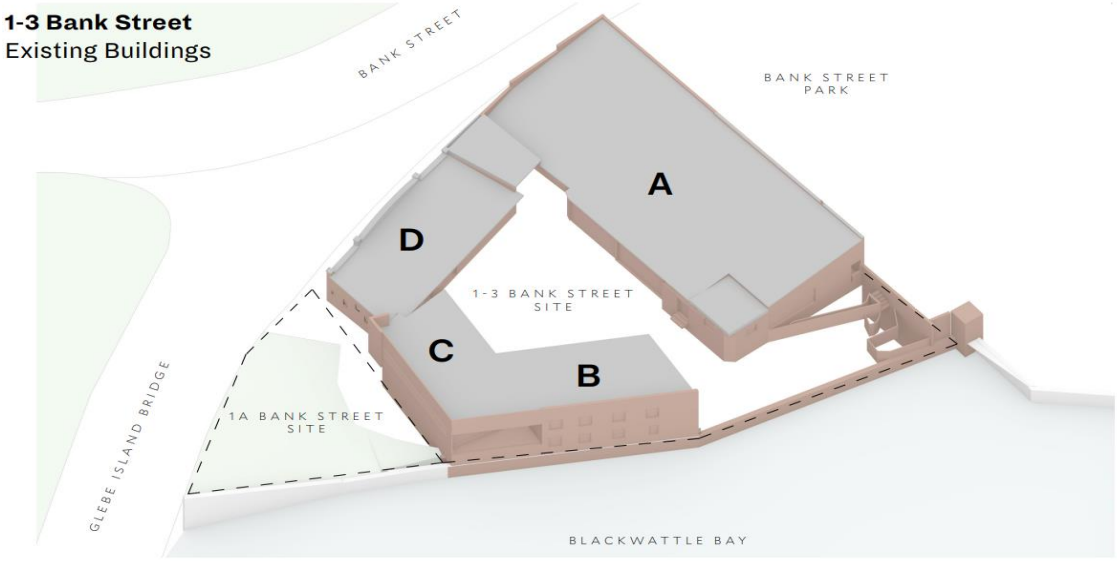
4.4 Opportunities for embedding circular design principles

Embedding circular design principles within the construction and demolition of new and existing buildings is integral to minimise waste arisings, reduce raw material demand and contribute to regenerating nature. Using circular economy principles can also contribute to significantly lowering the embodied carbon emissions of the development. This reduction in GHG emissions can be appreciated throughout the whole lifecycle of the development.

Key principles applicable to circular design are focused on promoting longevity, adaptability and flexibility of developments, whilst considering repurposing, reusing and refurbishment over demolition and deconstruction.

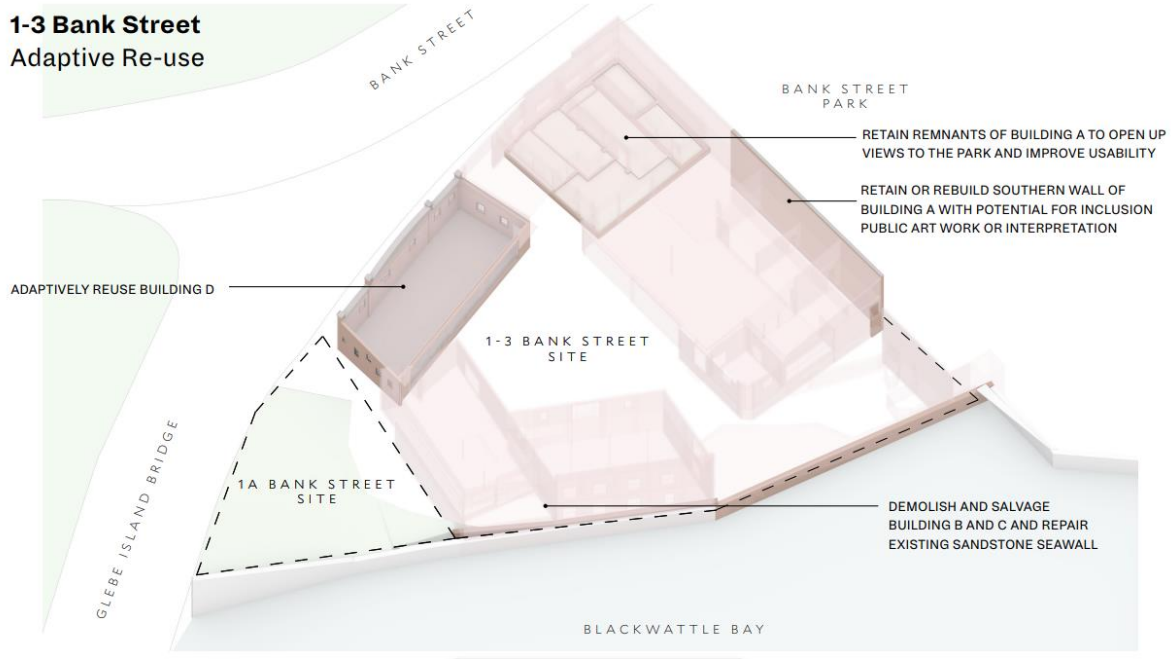
The hierarchy for building approaches applicable to construction and demolition within the circular economy aims to maximise the use of existing materials. Adaptive reuse should be prioritised wherever possible to reuse and refurbish existing buildings and materials within the development. The existing buildings located within 1-3 Bank Street and the future plans for adaptive reuse can be found in Figure 4.1 and Figure 4.2 respectively.

Figure 4.1: 1- 3 Bank Street (existing buildings)



Source: Collins and Turner

Figure 4.2: 1- 3 Bank Street (adaptive reuse opportunities)



Source: Collins and Turner

Building D is being adaptively reused. Some of the foundations of Building A are being retained as an interpretation garden. When refurbishing building D, all parts of the building that can be feasibly retained should be identified. Maximising the retention of the building should be prioritised and communicated to all relevant parties, including the contractors working on the development. As per the most recent Oculus Design Report (November 2023), the northern, southern and eastern walls of Building D are to be retained, while the south elevation and roof will be demolished and replaced. For the parts of building D that cannot be retained or reused, it should be considered how the building's structure or contents can be retained or reused elsewhere within the development. For the parts of the building that cannot be reused within the development it should be considered how best to recover the 'residual value' through either on or off-site material and waste management, as shown in Table 4.1 in section 4.5.2.

A material passport (MPs) should be considered for the use in design and construction of the upgrades to building A and D to facilitate the onward reuse and recycling of materials. MPs provide a digital database of materials and components which can help to facilitate circular asset management. The MPs database can be linked to BIM so that future operators of the building are able to access information on the material composition, repairability and reuse options for different components. This information can be used to improve opportunities for reuse and recycling.

Designing for disassembly and reuse should also be considered for buildings A and D. Choosing to use a design for deconstruction (DfD) checklist for new building developments presents an opportunity to increase reuse, recovery and recycling rates. DfD checklists serve as a scoring matrix to facilitate and assess the potential reuse, repair, deconstruction and recycling of key elements and components.

The use of a pre-demolition audit is recommended prior to the partial demolition of building A and the total demolition of buildings B and C. Conducting a pre-demolition audit will provide an understand of what materials or components can be reclaimed or reused before demolition

commences. Material recorded from the demolishment of buildings C and D should be recovered through treatment routes, as shown in Table 4.1.

4.5 Construction and demolition waste management

4.5.1 Construction waste management

The following materials are expected to arise throughout the construction and demolition stages:

- Hardcore such as concrete, bricks, paving, road material
- Soil
- Wood
- Hard plastics
- Metals
- Glass
- Vegetation from landscaping
- Packaging such as cardboard, plastic film
- Materials for reuse – such as buildings or certain elements of buildings

4.5.2 Segregation and management

C&D waste must be segregated on-site and any materials for off-site recycling, sorting, or reprocessing stored in appropriate containers prior to collection.

Different materials streams arising from the C&D activities should be sorted and temporarily stored in containers on-site where possible. Separate containers should be used for materials suitable for reuse, offsite recycling and offsite disposal. Further details on methods to facilitate material reuse are provided in section 3.11.2 and 3.11.3. Segregated storage will increase the likelihood of effective recycling and reduce contamination. Suitable methods of storing the waste streams expected to arise, along with details of how they should be managed are provided in Table 4.1.

It is not currently possible to provide a detailed estimate of the quantity of each material expected to arise. It is expected that this would be clarified at a later design stage once a construction team and/or quantity surveyor is appointed and has undertaken any value engineering and design activities. Specific construction method statements and logistics plans are required to accurately quantify materials, which will only be available once a construction contractor is appointed.

Table 4.1: Common materials and methods of management for reuse and recycling

Material	Source	Method of containment	Potential for adaptive reuse onsite	Reuse and recycling offsite
Rubble, such as concrete, hardcore, bricks, tile	Construction and demolition	Large skips	Reuse on site, e.g. large pieces can be used to re-build walls. Broken up material can be used as filling.	Collected by a contractor for sorting and reprocessing offsite
Waste electrical and electronic equipment	Construction and demolition	1,100L bins for mixed equipment and/or designated area for large appliances	Waste Electrical and Electronic Equipment, or e-waste, should be retained for reuse within the proposed development, providing the appliances have been PAT tested.	Utilise product stewardship schemes for the onward recycling and reuse of TVs, computers and printers. Collected by a contractor for sorting and reprocessing offsite.

Material	Source	Method of containment	Potential for adaptive reuse onsite	Reuse and recycling offsite
Existing building elements - internal furnishing	Construction and demolition	Designated area	Reuse where possible within the new development. If internal furnishing cannot be reused on-site, efforts should be made to share surplus material with other users of the development e.g. for use in the community space.	If materials cannot be reused on site, opportunities for donating the materials to local community groups, using second hand markets or utilising reverse logistics should be explored. If materials cannot be reused or repurposed on or off site, they should be collected by a contractor for recycling offsite.
Existing building elements – Mechanical, electrical, and plumbing (MEP)	Construction and demolition	Designated area	Salvage and reuse MEP components on-site.	If materials cannot be reused on site, opportunities should be explored to return the MEP equipment to the manufacturer for reuse or remanufacturing through take-back schemes or reverse logistics. If materials cannot be used or remanufactured, they should be collected by a contractor for recycling offsite.
Aggregates, such as dug up road/pathway material, tarmac	Construction and demolition	Large skips	Reuse on site, e.g. as filling	Collected by a contractor for sorting and reprocessing offsite. Some contractors may accept this mixed with rubble.
Soil	Construction and demolition, landscaping	Large skips/bags	Reused on site, e.g. as filling	Collected by a contractor for recycling offsite.
Wood and timber	Construction and demolition	Large skips or 1100L bins depending on expected quantity	Large pieces if in good condition could be reused in buildings or be turned into community art projects (e.g. carving, furniture)	Collected by a contractor for recycling offsite.
Glass	Demolition	1100Lbins	Not suitable for reuse	Collected by a contractor for recycling offsite.
Hard plastics	Construction and demolition	1100L bins	Potential for reuse onsite if intact.	Collected by a contractor for sorting and recycling offsite.
Metals	Construction and demolition	Large skips	Potential for reuse on site.	Collected by a contractor for recycling offsite.
Green waste	Landscaping	Large skips or 1100L bins depending on expected quantity	Potential for on-site composting or reuse on-site, such as woodchipping of cut trees to create pathways and bedding.	Collected by a contractor for composting offsite.
Plasterboard	Construction and demolition	Small skips	Not suitable for reuse	Collected by a contractor for sorting/reprocessing offsite. Should be kept separate from other ‘hard’ construction waste as requires specialist recycling.
Carpets and floor coverings	Demolition	Small skips or 1100L bins	Share any suitable carpet tiles and floor coverings that are suitable for reuse with other users of the development.	Explore the possibility of using second-hand marketplaces to facilitate onward reuse.

Material	Source	Method of containment	Potential for adaptive reuse onsite	Reuse and recycling offsite
				Some specialist contractors may recycle this material offsite. If not possible, then collection by contractor for recovery or landfill.
Mixed recyclables: plastic bottles, cans, glass bottles, paper and card	Site offices, construction workers	240L bins	Not suitable for reuse	Collected by a contractor or municipality for sorting and recycling.
Packaging from deliveries: large amounts of cardboard, pallets, plastic wrapping	Construction	1100L bins	Pallets may be returned to the supplier, or could be reused in art projects.	Separate if required and collected by a contractor for recycling.
Non-recyclable waste	Site offices, demolition	Large skips or 1100L bins depending on expected quantity	Not suitable for reuse	Collected by a contractor for recovery or landfill. Landfill should only be used as a last resort treatment method if the waste cannot be otherwise recovered.

The New South Wales EPA has created consistent signage graphics which may be printed and displayed on site at collection skips and bins to inform workers of the correct approach to material segregation. Examples are provided in Figure 4.3.

Figure 4.3: Examples of NSW EPA signage for construction and demolition waste

Source: NSW EPA[20]

4.5.3 Site plan

It is anticipated that the appointed construction contractor will develop a construction site logistics plan. The site logistics plan should indicate the designated areas for waste segregation and areas for set aside for reuse. The site logistics plan should be considered fluid and is expected to require regular update as works progress throughout the site to capture any changes in the materials that arise from the work as they change. As a general rule, the designated areas for collection of waste should be kept well away from the public realm. This is to promote health and safety, and prevent fly-tipping or other unauthorised individuals from tampering with the contents.

[20] New South Wales Environmental Protection Agency (2021) Standard Recycling Signs [online]. Available at: Standard recycling signs (nsw.gov.au). Accessed July 2023.

4.5.4 Roles and responsibilities

This section sets out likely roles and responsibilities of key stakeholders throughout the construction and demolition works.

4.5.4.1 Project manager

The role of the project manager is to:

- Coordinate the completion of the CDWMP for submission, once a bill of quantities is obtained and destinations for waste materials has been determined.
- Appoint licensed contractors to collect waste for recycling, and promote adherence to the 90% landfill targets.
- Draw up site plans and protocol, updating them where necessary throughout the phases of development.
- Follow the principles of the waste hierarchy and circular economy throughout, identifying areas for adaptive reuse.

4.5.4.2 Construction site manager and/or site environment, health and safety manager

The construction site manager and/or site environment, health and safety manager is responsible for:

- Health and safety on site
- Mitigating any negative environmental impacts on the surroundings.
- Conducting site inductions for all staff working on site, explaining waste segregation procedures and that all waste is correctly segregated on site, preventing contamination.
- Monitoring the segregated waste for contamination and enforcing correct use of bins/skips.
- Managing the removal of waste with the chosen contractor for removal and recycling.
- Maintaining records of waste transfer, holding the paper records and updating the online tracking system if applicable.
- Working with the project manager to update site plans, updating the construction and demolition waste management plan, as the development progresses.
- Develop a plan to identify commercial benefits of adaptive reuse, outlining best practice methodologies for material removal, handling and storage, maximising waste minimisation.
- Procurement of materials in appropriate quantities, with orders placed preferably just prior to installation, preventing wastage.

4.5.4.3 Client lead/liaison

The client lead/liaison is responsible for:

- Reviewing the contractor’s progress against the CWDMP, tracking waste quantities in line with the proposals and that landfill targets are being met.
- Monitoring, tracking and meeting the development’s aims for adaptive reuse and circular economy.

This CDWMP has been compiled for the design stage of the Bank Street Park development. A site specific CDWMP is recommended to be developed at the construction stage, once a construction contractor has been appointed.

4.6 Site training and inductions

To transition to a low carbon circular economy, infrastructure developments must be designed in a way that prioritises the recovery of materials and waste. All staff involved in the

construction and demolition of the development must be trained on the principles of the waste hierarchy and the circular economy. The training should encompass procedures to maximise management of materials and waste that would achieve the highest practicable performance levels within the waste hierarchy.

To achieve this, the training should broadly cover:

- The correct sorting and segregation of waste into separate containers and designated areas.
- The consequences of improper sorting and contamination, as that would lead to potentially recyclable materials being wasted.
- The importance of reuse and waste minimisation. This includes salvaging and setting aside potentially reusable materials for adaptive reuse, but also preventing over-ordering of new materials in the construction which may also lead to wastage.

4.7 Environmental Impacts

4.7.1 Dust

Production of dust is likely a considerable environmental impact of the construction/demolition process. Not only in the active process of demolition, or construction (such as digging, cutting) but also in terms of storage of waste, where strong winds may blow dust and materials into the air. This should be mitigated to prevent damage to the environment and health of staff and passers-by using the following methods:

- Staff should wear masks at times when dust is produced.
- Skips should be covered to prevent dust from blowing out in strong winds.
- During times of demolition works, and in dry weather, water sprays may be used to suppress dust creation.

4.7.2 Noise

The generation and collection of C&D waste is likely to generate significant levels of noise. The timings of waste collection should be in line with local noise regulations to avoid disruption to nearby residents and visitors.

4.7.3 Water pollution

As a marine development, care must be taken to prevent water pollution by runoff. Waste construction and demolition materials are to be stored in skips as soon as possible after generation. The skips are required to be covered when not in use, preventing rain from washing off pollutants. Soil which may contain fertilisers should also be contained when dug up, to prevent excess runoff of organic matter/fertilisers which may have an adverse effect on the marine environment.

4.7.4 Contamination

Correct segregation of waste using clear signage on waste containers and adequate training should prevent cross-contamination of materials that may render them unrecyclable or unsuitable for reuse. The containers used for collecting waste must also be adequate to prevent overspill or runoff that may contaminate the soil. Waste should be deposited in containers as soon as possible after generation to prevent ground contamination.

4.7.5 Hazards to health

Assessment of hazardous waste is not part of the scope of this plan. Should any hazardous waste arise, it must be dealt with according to relevant state-level regulations. Hazards to health that may arise from the expected non-hazardous waste could include inhalation of dust and physical injury arising from improper handling or accidents caused by inappropriate storage of waste. Personal protective equipment must be worn by staff at all times.

4.8 Collection, treatment and disposal

The appointed C&D waste contractor shall be responsible for managing the removal of C&D waste to be sent for recycling, recovery, or disposal. The collection contractor must abide by the waste hierarchy and circular economy principles by making transport to recycling facilities the priority over final disposal destinations. Any non-recyclable waste that cannot otherwise be recovered should be sent to landfill.

If required the collection contractor may appoint subcontractors to remove the waste and send it to licensed facilities capable of sorting, recycling/recovering or final disposal to landfill.

The collection containers may be provided by the waste collection contractor. If this approach is taken, skips may be replaced when full. Each time waste is removed off site, the trip must be logged and paper records or manifests maintained. This should be arranged in agreement with the collection contractor. This is to ensure accurate and correct record-keeping and a clear line of duty of care.

4.8.1 Construction and demolition waste sent for recycling

The waste will be collected and transported to licensed facilities capable of sorting and reprocessing construction and demolition waste. A national database of licensed waste and resource recovery infrastructure, including suitable construction and demolition waste facilities, is available on the Australian Government Department of Climate Change, Energy, the Environment and Water website[21]. It is the construction contractor's responsibility to obtain confirmation from the waste collection contractor that licensed sites are being used. A contractor may also choose to transport waste outside the state however this requires specific guidance to be followed. This guidance can be found within 4.9.

4.8.2 Construction and demolition waste sent to landfill

It is expected that there will be a proportion of waste that cannot be reused, recycled or recovered. This would be sent to a licensed landfill. A national database of licensed waste and resource recovery infrastructure, including licensed inert landfills, is available on the Australian Government Department of Climate Change, Energy, the Environment and Water website.[21]

4.8.3 Hazardous waste

The treatment of hazardous waste is not part of the scope of this report.

4.9 Monitoring and tracking

The construction contractor will be responsible for maintaining all records of waste transfer when it is collected from the site. Some general principles that should be adhered to include:

[21] Department of Climate Change, Energy, the Environment and Water (2022) Australian waste and resource recovery infrastructure database [online]. Available at: Australian waste and resource recovery infrastructure database - DCCEEW. Accessed July 2023.

- A paper-based manifest system may be utilised to organise and track all waste movements off site.
- The construction copy of the construction waste manifest is signed, stamped and received by the waste carrier, main contractor and end route location for each waste load removed from site.
- Paper dockets or receipts from the waste collector should be signed by the contractor and retained on site throughout the development process.
- The quantity and type of materials removed should be recorded at all times.
- The waste receipts should also show the licensed facility that is the destination of the collected waste, whether it be recycling/recovery or landfill.

Regarding tracking, NSW EPA operates an online tracking system[22] to track the movement of hazardous waste and all types of waste generated in the Metropolitan Levy Area (MLA) of NSW, that is transported out of the state.

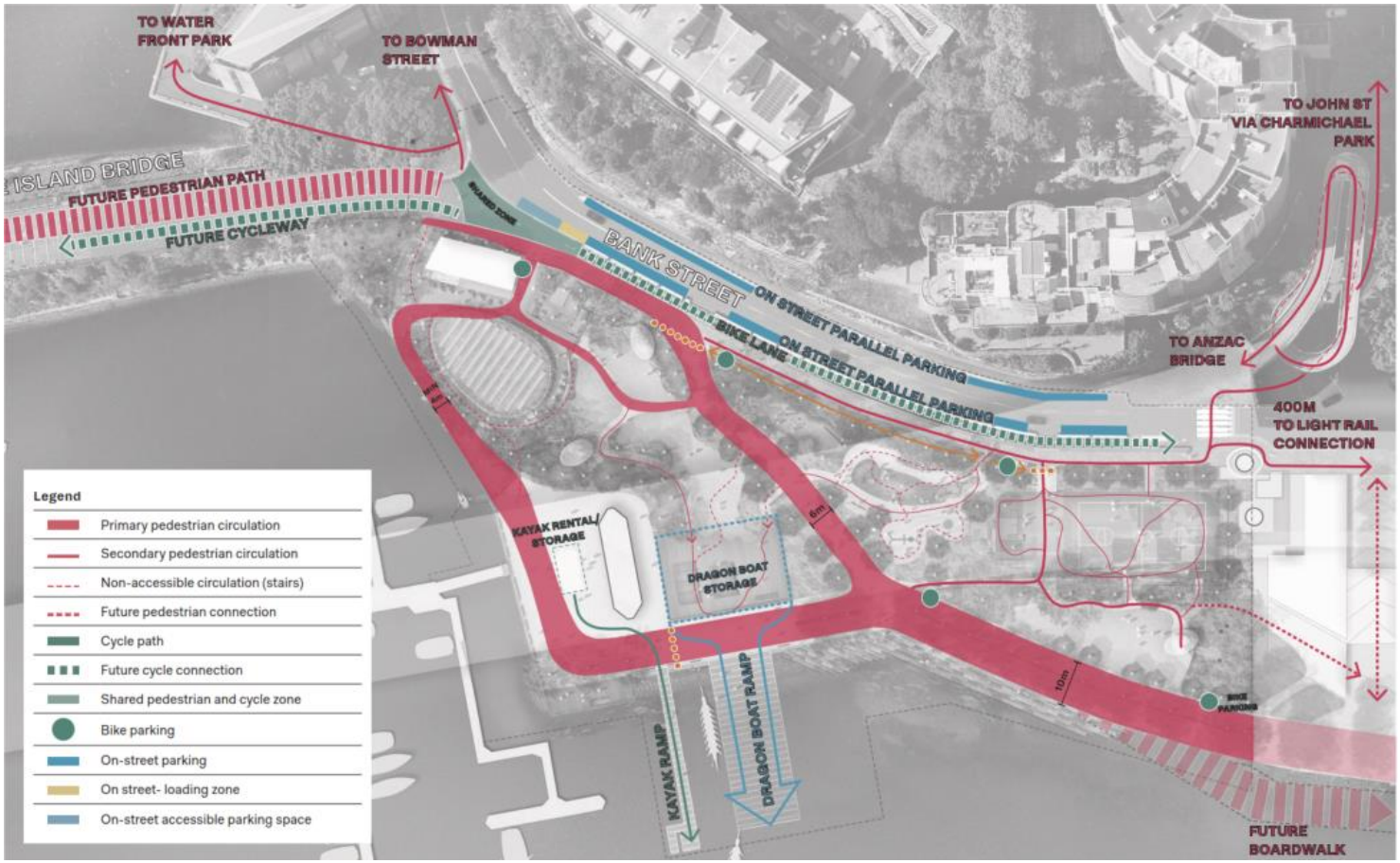
Non-hazardous waste that is transported within NSW does not have to be tracked online. It is the responsibility of the waste contractor to ensure any waste transported from the MLA out of the state is properly tracked using the online system.

[22] NSW EPA (2021) Tracking waste from the Metropolitan Levy Area [online]. Available at: Tracking waste from the Metropolitan Levy Area (nsw.gov.au). Accessed July 2023.

Appendices

A. Access and circulation

Figure A.1: Access and circulation map, showing on-street loading zone for the development in yellow. This is where a waste collection vehicle would be expected to empty bins presented for collection.



Source: Oculus