

19. Resource efficiency

19.1 Existing environment and background

19.1.1 Overview

This chapter identifies the waste management, resource use, and greenhouse gas (GHG) emissions associated with the project and identified corresponding environmental management and mitigation measures.

19.1.2 Policy and planning setting

The assessment considered the following relevant policies and guidelines:

- *Protection of the Environment Operations Act 1997* – outlines the relevant regulatory requirements for waste management and disposal, including aims to minimise waste generation. The Act also defines waste as broadly being “any discarded, rejected, unwanted, surplus of abandoned substance”. It classifies six waste classes, special waste, liquid waste, hazardous waste, restricted solid waste, general solid waste (putrescible), and general solid waste (non-putrescible)
- *Waste Avoidance and Resource Recovery Act 2001* – focuses on efficient resource use, minimising natural resource consumption (natural capital), and the above hierarchy
- Protection of the Environment (Waste) Regulation 2014 (NSW POEO (Waste) Regulation 2014) – sets out provisions covering the way waste is managed in terms of storage, transportation, and processing as well as reporting and record keeping requirements for waste facilities
- Waste Classification Guidelines (NSW Environment Protection Authority (EPA), 2014) – focuses on effective waste classification and management based on the six classifications described above
- NSW Waste and Sustainable Materials Strategy 2041: Stage 1 – 2021–2027 (NSW Department of Planning, Industry and Environment, 2021) – focuses on the transition to a circular economy and prioritising a hierarchy of waste avoidance, over reuse, recycling, and recovery, in place of treatment and disposal
- *Plastic Reduction and Circular Economy Act 2021* – introduces a range of staged bans on certain single use plastic products, provides design standards for certain plastic-based products, and establishes a new framework for encouraging the re-use or recycling of materials
- EPA Resource Recovery Orders and Resource Recovery Exemptions (NSW EPA, various) – allows certain wastes to be beneficial reused.

Other policies, guidelines, and plans guiding the assessment were:

- National Water Quality Management Strategy (Australian Government, 1992)
- State Water Management Outcomes Plan (NSW Government, 2000)
- *Water Management Act 2000*
- Managing Urban Stormwater: Soils & Construction (the ‘Blue Book’, Landcom, 2004)
- *National Greenhouse and Energy Reporting Act 2007*
- National Greenhouse and Energy Reporting (Measurement) Determination (Australian Government, 2008)
- National Greenhouse Accounts Factors: Australian National Greenhouse Accounts (Australian Government, Department of the Environment and Energy, 2019)
- The Greenhouse Gas Protocol (GHG Protocol, The World Business Council for Sustainable Development and the World Resources Institute, 2012)
- Australian National Greenhouse Accounts Factors – for individuals and organisations estimating greenhouse gas emissions (NGA Factors) (Australian Department of Climate Change, Energy, the Environment and Water, DCCEEW, 2022).

19.1.3 Current Waste Management System

The waste at Sydney Terminal Building is currently generated from the following sources:

- Commuters waste such as food, packaging, and beverage containers
- Retail tenants
- Other tenants such as NSW Police
- Station operations, such as waste generated by office activities and maintenance works

- The immediate precinct environment, including infrastructure and surfaces over which rainfall runoff and solid waste can be captured/transported.

Retailers also use returnable food containers, such as milk and bread crates. Members of the public can recycle used beverage containers through reverse vending machine located at the Station. A licenced contractor takes care of most of the waste at the Central Station Terminal Building.

19.1.4 Future waste management system

The project would provide additional tenancies, including about 15 retail and 38 food and beverage spaces, which would result in increased waste generation on site. The food and beverage tenancies would include a mix of restaurants, late-night stalls, and bars. Adaptive reuse and improved activation of spaces would also include high quality retail, commercial and community uses.

To accommodate the increased number of new tenancies and associated waste, the waste management system currently adopted at the Station would need updating to include the collection and segregation of additional waste streams and volumes. Additionally, the new system would implement circular economy principles through increasing resource recovery and diverting waste from landfill. The details of a new proposed system, including waste streams and their management including waste diversion, are described in Section 19.2.2.

19.1.5 Waste and resources infrastructure

There are several materials recovery facilities in the Sydney area accepting mixed and separated recyclables. The most appropriate recycling facility will be determined by an appointed waste contractor. All waste and recyclables will be delivered to sites lawfully able to accept them.

Not all materials could be recovered (see Section Table 19-2 below). As such, there are suitable waste facilities in the Sydney area that are licensed to accept general putrescible and non-putrescible solid waste and liquid waste. Facilities closest to the project site are listed in Table 19-1 below.

A review of the waste infrastructure included waste streams accepted and the scale of facilities based on EPA licenses and shows that there is sufficient capacity to accept and process construction and operational waste from this project.

Table 19-1: Resource and waste management facilities

Facility name	Resource type	Capacity limit (tonnes or ML/day ¹)	EPA Licence reference	Distance by road from Central Station (km)
Resource recovery facilities in the Sydney area, licensed to accept general solid putrescible and non-putrescible material				
Artarmon Resource Recovery Centre	General solid waste (putrescible), dry material, garden organics, separated bricks, concrete, roof tiles, terracotta pipes	5000–50,000t annual capacity to receive organics Any annual capacity	Environment Protection License (EPL) 4922	10.7
Banksmeadow Transfer Terminal	General solid waste (putrescible and non-putrescible)	Any annual capacity	EPL 20581	10.7
Rockdale Resource Recovery Centre	General solid waste (putrescible), dry material, garden organics, separated bricks, concrete, roof tiles, terracotta pipes	Any annual capacity	EPL 4557	15.1
Other potential resource recovery				
Clyde Transfer Terminal	General solid waste (putrescible)	Any annual capacity	EPL 11763	19.9
Eastern Creek Resource Recovery Park	General solid waste (putrescible and non-putrescible) and organics, garden waste, sand and timber (virgin excavated natural material (VENM))	5000–50,000t annual capacity to receive organics Any annual capacity	EPL 12517	37.7
Kemps Creek Resource Recovery Park	General solid waste (putrescible), White goods and scrap metal	5000–50,000t annual capacity to receive organics Any annual capacity	EPL 12889	53.9
Recycling facilities licenced to accept paper and cardboard recyclables				
Opal Matraville Mill	Paper and cardboard packaging	>100t generated and/or stored	–	9.0

¹ Applicable to wastewater capacity limit

Facility name	Resource type	Capacity limit (tonnes or ML/day ¹)	EPA Licence reference	Distance by road from Central Station (km)
Visy Recycling Smithfield	Paper and cardboard packaging	>100t generated and/or stored	EPL 5680	29.5
Recycling and recovery facilities licenced to accept construction and demolition waste				
Alexandria Recycling Centre	Construction and demolition waste including asphalt, vegetation, brick, concrete, timber/wood waste, insulation	Any annual capacity	EPL 4679	4.2
Banksmeadow Recycling Centre	Construction and demolition waste including concrete, ceramics, bricks, plasterboard, sand, soil	Any capacity	EPL 12857	11.0
Ryde Resource Recovery Centre	Construction and demolition waste including concrete, timber, pallets, bricks, sand and soil	Any capacity	EPL 4527	16.9
Breen Resources Recycling Facility	Construction and demolition waste including concrete, bricks, particleboard, glass, timber, medium-density fibreboard, sand, soil, non-asbestos fibro	Any capacity	EPL 4608	27.6
Lucas Heights Resource Recovery Park	Construction and demolition waste, e-waste, recyclables including food and beverage packaging, furniture and fittings, garden organics, scrap metal	5000–50,000t annual capacity to receive organics Any annual capacity	EPL 12520	35.4
Recovery facilities licenced to accept food waste				
EarthPower Technologies	Food waste including liquid food waste, grease traps and bulk packaged food waste	>50,000t of organics received	EPL 11797	22.5
Waste facilities licenced to accept asbestos				
Kimbriki Recycling and Waste disposal centre	Asbestos waste	Any capacity	EPL 13090	28.4
Horsley Park Waste Management Facility	Asbestos waste, asbestos sheeting	Any capacity	EPL 11584	34.8
Lucas Heights Waste and Recycling Centre	Asbestos waste	Any capacity	EPL 5065	35.0
Water treatment plants				

Facility name	Resource type	Capacity limit (tonnes or ML/day ¹)	EPA Licence reference	Distance by road from Central Station (km)
Bondi Sewage Treatment Plant	Wastewater	680 megalitres/day of primary treated wastewater	EPL 1688	8.6

Note: arrangements for collection contractor and selection of waste facilities would be specified in the later stages of the project and details included in the Construction Environmental Management Plan (CEMP).

19.2 Waste inventory and on-site management

19.2.1 Construction

On-site management

Demolition and construction waste would be stored in (a) designated storage area(s) in the Western Loading Dock, Western Forecourt, and/or use existing back of house areas of the Sydney Terminal Building prior to collection and transport off site.

The designated storage area(s) would consist of bins, pallets, and other waste equipment. The designated areas would allow adequate space to store all demolition and construction activity waste materials. The storage areas would also have sufficient capacity to be flexible enough to cater for change of use through the project. If there is not sufficient space at the western loading dock and forecourt, dedicated stockpile areas would be set up on site, as identified in the CEMP, with regular transfers to dedicated skip bins in the Sydney Trains Yard for sorting prior to collection and transport off site.

All materials placed in skips or bins be contained to ensure that it would not be discharged from site. The areas would also be inspected and maintained, and applicable weather protection measures would be implemented to minimise any off-site impacts as outlined in the CEMP.

Any recovered and waste materials would transported to a licensed facility via a licenced contractor as per its classification as listed in Table 19-1. Details of avoidance and reuse, storage, collection, and disposal of waste are listed in Table 19-2 and Table 19-3 below.

In accordance with good practice designated waste material storage areas would:

- Allow unimpeded access by site personnel and waste disposal contractors
- Consider environmental factors that could potentially cause an impact to the waste storage, such as slope, drainage and the location of watercourses and native vegetation
- Include an adequate vermin and bird protection
- Allow sufficient space for the storage of garden waste and other waste materials on site
- Employ adequate environmental management controls to prevent off-site migration and contamination
- Consider visual amenity, safety, and accessibility in their selection
- Not present hazards to human health or the environment.

Demolition material types and quantities

Demolition at the project site would generate the materials listed, and involve the activities described, in Table 19-2 below. The predicted total quantity of known solid waste material generated during demolition is around 2,055 cubic metres. For a detailed description of demolition works such as removal of structures, roofing, flooring, fittings, excavation works and trees clearing refer to Section 5.3 of the EIS.

Table 19-2: Demolition material activities and management

Material type	Type of activity	EPA classification	Approximate quantities (m ³)	Avoidance and reuse	Storage collection	Disposal (refer to Table 19-1)
Concrete	Removal of all mezzanine floors and associated support structures within the back of house area of the Sydney Terminal Building. Demolition of ramp adjacent to rail line behind existing retail shops. Demolition of mezzanine within the Central Electric Building. Demolition of wall in the centre of Eddy Avenue Plaza.	General solid waste (non-putrescible)	697	On-site reuse where possible	Separate and stockpile or crush waste for reuse on site. Separate materials requiring off-site processing and recovery	Waste that cannot be used on site would be sent for separation and recovery. Disposal where material cannot be reused or recycled at a licensed facility
Excavated natural material (ENM) or VENM	Excavation of the eastern side of Eddy Avenue Plaza to remove level difference. Realignment of the light rail track under the Porte Cochere of the Sydney Terminal Building to enable platform widening and water proofing corrective works.		149	On-site reuse of topsoil for landscaping	Separate materials requiring off-site recovery	
Sand and soil	Removal of void infill and associated services to restore the Booking Hall to its original double height space.		788	On-site reuse of topsoil for landscaping	Separate materials requiring off-site recovery	
Bricks and tiles	Removal of flooring in Grand Concourse. Removal of the Mezzanine.	General solid waste (non-putrescible)	125	Cleaned for reuse as footings, broken bricks for	Separate materials requiring off-site recovery	Waste that cannot be used on site would be

Material type	Type of activity	EPA classification	Approximate quantities (m ³)	Avoidance and reuse	Storage collection	Disposal (refer to Table 19-1)
	Removal of Grand Concourse roofing. Removal of Porte Cochere roofing. Demolition of wall in the centre of Eddy Avenue Plaza			internal walls, crushed for landscaping Recycled off site and used for road base, fill sand or new bricks On-site reuse of any materials of heritage significance as advised by the heritage consultant	Stockpile waste for reuse on site.	sent for separation and recovery. Disposal where material cannot be reused or recycled at a licensed facility
Metals such as fittings, appliances, and bulk electrical cabling, including copper and aluminium	Demolition of mezzanine within the Central Electric Building. Dismantling site compounds and hoarding. Cladding, roof sheeting. Removal of redundant services.		246	On-site reuse of any materials of heritage significance as advised by the heritage consultant	Separate materials requiring off-site recovery.	Off-site recycling at metal recycling compounds.
Doors, windows, fittings	General demolition of walls, redundant services.		35	On-site reuse of any materials of heritage significance as advised by the heritage consultant	Separate materials requiring off-site recovery.	Waste that cannot be used on site would be sent for separation and recovery Dispose waste that cannot be reused on site at a licensed facility
Green waste	Clearing and pruning of trees in Eddy Avenue Plaza.		15	–	Stored in bins or other contained area.	Waste that cannot be used on site will be sent for recovery.
Asbestos	Any asbestos waste identified during the demolition and strip out activities.	Special waste	Not yet known	–	Managed consistent with the NSW POEO (Waste) Regulation 2014 meaning it would be disposed off site.	Off-site disposal at a licensed landfill facility.
Lead-based paint	Any lead-based paint identified during the demolition and strip out activities.	Hazardous waste	Not yet known	If lead-based paint is found on heritage significance items, paint would be safely	Managed consistent with the NSW POEO (Waste) Regulation	Off-site disposal at a licensed landfill facility

Material type	Type of activity	EPA classification	Approximate quantities (m³)	Avoidance and reuse	Storage collection	Disposal (refer to Table 19-1)
				removed and appropriately disposed of by a licenced contractor at licensed facility.	2014 meaning it would be disposed off site.	
Wastewater	Human amenities	Liquid waste	Not yet known	Wastewater treatment plant	Portable amenities or on-site amenities disposed off-site	Transported off site or direct to Bondi Sewage Treatment Plant
Stormwater	Rainfall and runoff	Liquid waste	Not yet known	Pit and pipe network, on-site flow controls, on-site detention, and gross pollutant traps (GPTs)	Pit and pipe network, on-site detention, GPTs	City of Sydney Council drainage network or recycled on site
Potential spills of fuel and other chemicals	Mechanical operations and general/plant maintenance Decommissioning of Diesel Generator	Various (may include general solid waste, restricted solid waste or hazardous waste)	Not yet known	Conduct refuels and maintenance activities away from receptors, signage/labelling, on-site spill kits, adhere to site spill management plan	Dangerous Goods Containers, waste drums, other appropriate storage	Transport to comply with the transport of Dangerous Goods Code, spill kits consistent with Australian Standards
Erosion/sediment	Earthworks/runoff	Solid waste	Not yet known	Erosion controls (for example, sediment fencing, coir logs, sandbags), manage in accordance with the Blue Book	On-site erosion infrastructure	Redistribution on site where viable
Total (applicable to solid waste)			2,055			

Construction material types and quantities

Construction is projected to start in the third quarter of 2023 and work would last for about three years. As shown in Table 19-3 below, the total estimated quantities of know solid waste generated during the construction would be about 540 cubic metres.

For detailed description of construction areas and activities on the project site, refer to Chapter 5 (Project description).

Table 19-3: Construction material activities and management

Waste stream	Activity	EPA classification	Approximate quantities (m ³)	Avoidance and reuse	Storage and collection	Disposal (refer to Table 19-1)
General Waste	General waste during the construction activities throughout the project, workers on site	General solid waste (non-putrescible)	269.0	–	Separate, stockpile, reuse on site Separate materials that require off-site disposal	Dispose waste that cannot be reused on site at a licensed facility Recyclable materials will be reused on site or sent to licensed facility for recycling
Recyclable materials	Office waste including paper, cardboard, glass, plastics, workers on site		31.9	Use returnable containers whenever possible Order in bulk whenever possible Avoid using composite materials	Keep recyclable waste separate from non-recyclable Organise collection by a licensed contractor	
Steel	Construction of project site structures		102.2	Recycle scrap metal	Separate, stockpile, reuse on site Separate materials that require off-site disposal	
Furniture	Doors, windows, and fittings		56.5	Consider donation functional equipment to community organisations	Separate, stockpile, reuse on site Separate materials that require off-site disposal	
Copper	Construction of project site structures, fittings, sinks, pipping, showers, water fixtures		0.3	Recycle scrap metal	Separate, stockpile, reuse on site	

Waste stream	Activity	EPA classification	Approximate quantities (m³)	Avoidance and reuse	Storage and collection	Disposal (refer to Table 19-1)
Stainless steel	Construction of project site elements, water and sewage treatment, wiring, nuts, and bolts		1.5	Recycle scrap metal	Separate, stockpile, reuse on site Separate materials that require off-site disposal	
Rubble	Construction of project site structures		38.6	Cleaned for reuse as footings, broken bricks for internal walls, crushed for landscaping or driveway use	Separate, stockpile, reuse on site Separate materials that require off-site recovery	
Aluminium	floating ceiling, windows, doors, stairs, wall panels, roofing		24.7	Recycle scrap metal	Separate, stockpile, reuse on site Separate materials that require off-site recovery	
Timber, pallets, crates	Delivery of construction materials used in construction of project structures		4.0	Pallets to be returned to the supplier, if possible. Appropriate procurement processes to avoid ordering and delivery of excess materials and supplies	Off-site recycling, chip for landscaping, sell for firewood Treated: reused for formwork, bridging, blocking, propping or second-hand supplier Untreated: reused for floorboards, fencing, furniture, mulched second-hand supplier. Remainder to landscape supplies. Reused for similar projects	
Other metal	Other types of metal used in construction activities		7.3	Recycle scrap metal	Separate, stockpile, reuse on site Separate materials that require off-site recovery	
Wastewater	Human amenities	Liquid waste	Not yet known	Wastewater treatment plant	Portable amenities or on-site amenities	Transported off site or direct to Bondi Sewage Treatment Plant

Waste stream	Activity	EPA classification	Approximate quantities (m³)	Avoidance and reuse	Storage and collection	Disposal (refer to Table 19-1)
Stormwater	Rainfall and runoff	Liquid waste	Not yet known	Pit and pipe network, on-site flow controls, on-site detention, and GPTs.	Pit and pipe network, on site detention, and GPTs.	City of Sydney Council drainage network or recycled on site
Potential spills of Fuel and other chemicals	Mechanical operations and general/plant maintenance	Liquid waste	Not yet known	Conduct refuels and maintenance activities away from receptors, signage/labelling, on-site spill kits, adhere to site spill management plan	Dangerous goods containers, waste drums, other appropriate storage	Transport to comply with the transport of Dangerous Goods Code, spill kits consistent with Australian Standards.
Erosion/sediment	Earthworks/runoff	Solid waste	Not yet known	Erosion controls (for example, sediment fencing, coir logs, sandbags), manage in accordance with the Blue Book	On-site erosion infrastructure	Redistribution on site where viable
Total (applicable to solid waste)			534.8			

While the final types and quantities of demolition and construction waste material would be confirmed during detailed design, it is predicted that 90 per cent of would be diverted from landfill either by being reused on site or recovered or recycled off site.

19.2.2 Operation

The operation of the project has the potential to generate the following:

- General litter and food waste
- Infrastructure maintenance and cleaning waste
- Stormwater
- Sewage from customer and staff toilets
- Wastewater from retail outlets and amenities
- Trade waste such as oil and grease from retail outlets and restaurants.

Most of the waste materials would be from staff and customers. Small quantities of other waste types such as batteries, e-waste, light bulbs, printer toners and ink cartridges would also be generated. These would be managed as described in Table 19-12.

Operational waste estimates

The City of Sydney's [Guidelines for Waste Management in New Developments](#) (2018) were used to predict operational waste volumes. Generation rates published in the Guidelines can be found in the Table 19-4 below.

Table 19-4: Waste generation rates applied for the operation waste estimate

Type of premises	Litres per 100 m ² of floor space per day		
	General waste	Recycling	Food waste
Restaurant/eating	100	500	100
General retailing	15	25	5
Commercial offices	25	200	5

Table 19-5 below describes the waste collection provisions that would be needed on site to service the project.

Table 19-5: Waste storage area approximate bin number

Waste Stream	Bin size (L)	Number of bins	Collections per week
General waste (commercial wheelie bin)	1100	9	4
Cardboard (commercial wheelie bin)	1100	4	4
Food waste (standard bin)	240	19	7
Office paper (standard bin)	240	1	4
Commingled containers (commercial wheelie bin)	1100	3	2
Plastic film (commercial wheelie bin)	1100	2	2
Total	–	38	–

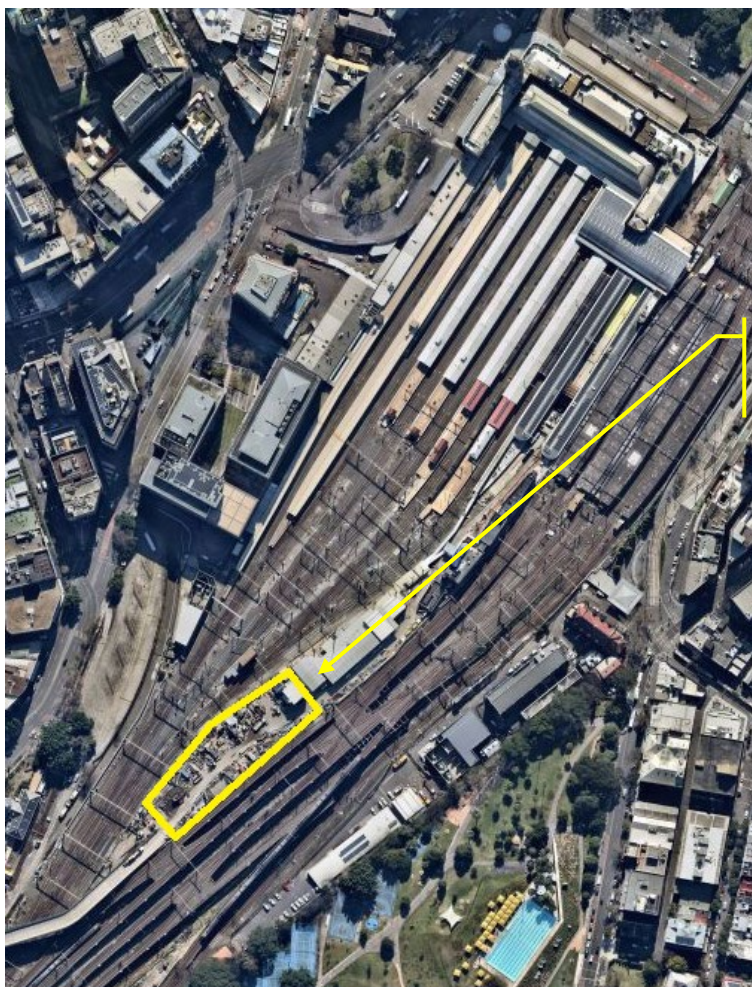
Waste storage area

Waste would be collected and taken to the Western Loading Dock (see Figure 19-1) located at the street level, where it would be stored and separated into types based on their management requirements.



The area would include the above bins for separating materials for recovery and recycling, food waste, and other general waste. Hazardous waste such as batteries would be stored in closed containers and collected by a licensed contractor for a disposal at a licensed recycling facility. Details of how each waste stream would be transported on site is provided in Table 19-6 below.

A second, alternative location for central waste storage is being considered to increase the usable space for car parking and deliveries at the loading dock location. A site inspection was carried out on 14 November 2022, and the area is generally suitable for waste management related activities. Use of this area would involve relocating waste operations to the Sydney Trains Yard as shown in Figure 19-2. The implementation of this option would include development of one interim waste storage location located at the end of Platform 15 as shown on Figure 19-3, from where the waste would be taken by cleaning contractors to the Sydney Trains Yard storage area for collection by a licensed contractor. The final decision on the most appropriate central waste storage area location would be determined in the later stages of the project.



Proposed alternative central
waste storage area

Figure 19-2: Proposed alternative location at Sydney Trains Yard for central waste storage area



interim waste storage area
location

Figure 19-3: Proposed alternative interim waste storage area

Operational waste types and quantities

Table 19-6 below lists the optional activities and waste generation. It also describes the proposed method to avoid, store, collect, and dispose of any waste material. The total estimated quantities of waste during the operation would be about 12.9 cubic metres per day, across seven separate waste streams. In addition to currently separated and collected waste streams, the future operation of the project would involve waste streams such as food waste, plastic film, and comingled containers.

Table 19-6: Potential operation waste types and their management

Waste stream	Activity	EPA classification	Approximate quantities (m ³ /day) ² or (l/s) ³	Avoidance and reuse	Storage and collection	On-site waste transport	Disposal (refer to Table 19-1)
General waste including non-recyclable plastics	Office activities, public place bins, food and beverage and other tenancies	General solid (non-putrescible) waste	5.6	–	Store in closed bins for transport to disposal	Waste from tenancies would be taken by tenants to the interim waste storage area. When full, the bins would be hauled by cleaners from interim waste storage area to the Western Loading Dock. Public bins and train waste would be managed by cleaning contractor. Waste would be placed in 1,100L bins.	Collected by a licensed contractor and disposed of at landfill
Comingled containers	Office activities, public place bins, food and beverage and other types of tenancies	General solid (non-putrescible) waste	0.3	Materials purchased in bulk. Procurement of products delivered in reusable or returnable containers. Food and beverage container return system (deposit on containers).	Placed in bins in designated waste storage area	Reverse vending machine recyclables would be collected directly by appointed contractor Comingled containers would be collected from public bins by cleaners and stored in the interim waste storage. Full bins would be taken by the cleaners to	NSW container deposit scheme 'Return and Earn', container recycling collected by a licensed contractor and disposed of at off-site licensed material recovery facility

² Applicable to solid waste quantities

³ Applicable to wastewater quantities from human amenities

Waste stream	Activity	EPA classification	Approximate quantities (m ³ /day) ² or (l/s) ³	Avoidance and reuse	Storage and collection	On-site waste transport	Disposal (refer to Table 19-1)
						central waste storage area and stored in 1,100L bins Commingled containers from food and beverage areas would be taken by tenants to interim waste storage areas. When full, the bins would be hauled by cleaners from interim waste storage area to Western Loading Dock.	
Food waste	Food waste such as food scraps generated by staff and customers. Food waste derived from food and beverage tenancies located at the project site	General solid (putrescible) waste	4.4	Development of menus at food and beverage tenancies encouraging low waste generation, optimised serving sizes.	Separation of food scraps in the food and beverage tenancies, storage in labelled bins. Food waste bins to always have closed lids. Daily collection to avoid odour and vermin.	Bins would be taken by tenants to the central waste storage for collection and stored in 240L bins	Food waste collected by licensed contractor on site and composted off site to a licensed facility, no waste sent to landfill
Cardboard	Food and beverage, retail tenancies packaging	General solid (non-putrescible) waste	1.9	–	Separation and storage of corrugated cardboard in designated bins in waste storage area Appropriate compaction to maximise the space in the bins	Waste would be taken by tenants from to interim waste storage area to the Western Loading Dock. Waste would be placed in 1,100L bins	Cardboard recycling collected by licensed contractor and taken off site to licensed material recovery facility

Waste stream	Activity	EPA classification	Approximate quantities (m ³ /day) ² or (l/s) ³	Avoidance and reuse	Storage and collection	On-site waste transport	Disposal (refer to Table 19-1)
Office paper	Office activities	General solid (non-putrescible) waste	0.3	Reduce printing on site Procurement of recycled paper	Separation and storage of paper in designated bins in waste storage area	Bins would be collected by cleaners from the offices and taken to the central waste storage area and transferred to 240L bins for collection.	Paper recycling collected by licensed contractor and taken off site to licensed facility
Plastic film and wrapping	Food and beverage, retail tenancies packaging	General solid (non-putrescible) waste	0.4	Implement procurement management measures to minimise ordering products wrapped in plastic film	Separation and storage of plastics in designated bins in waste storage area	Waste would be taken by tenants to the Western Loading Dock. Waste would be placed in 1,100L bins.	Plastic recycling collected by licensed contractor and taken to off-site licensed facility
Batteries, e-waste, printer toners and ink cartridges, light bulbs and fluorescent tubes	Office activities, general maintenance	Hazardous waste	<1	Use of rechargeable batteries, if possible, recycle used ones.	Storage of batteries in appropriate sealed containers for collection Tubes stored in boxes and collected by contractor	Designated containers would be located in the offices and other tenancies. The waste would be collected by licensed waste contractor.	Waste transported to licensed recycling facility by licensed contractor. Batteries recycled
Wastewater	Human amenities	Liquid waste	28.3 L/s (average) to 136 L/s (peak) ⁴	Wastewater treatment plant	On-site amenities	–	Bondi Sewage Treatment Plant
Stormwater	Rainfall and runoff and washdown water		Not yet known	Pit and pipe network, on-site flow controls, on-site detention, GPTs	Pit and pipe network, on-site detention, GPTs	–	City of Sydney Council drainage network or recycled on-site
Maintenance and chemicals and other chemicals	General facility maintenance		Not yet known	Conduct maintenance activities away from receptors, signage/labelling, on-site	Dangerous Goods Containers, waste drums, other appropriate storage	Waste would be handled on site by a licenced contractor and transported to a licensed facility for treatment.	Transport to comply with the transport of Dangerous Goods Code, spill kits consistent with Australian Standards.

⁴ Estimates from the [Central Precinct Renewal Program Utilities and Infrastructure Servicing Report](#) (Transport for NSW, 2022j).

Waste stream	Activity	EPA classification	Approximate quantities (m ³ /day) ² or (l/s) ³	Avoidance and reuse	Storage and collection	On-site waste transport	Disposal (refer to Table 19-1)
				spill kits, adhere to site Spill Management Plan			
Trade waste (oil and grease)	Retail operations across the project site	Liquid waste	Not yet known	Increase trade waste capture capacity, install new trade waste drainage	Grease arrestors	Waste would be handled on site by a licenced contractor and transported to a licensed facility for treatment.	Bondi Sewage Treatment Plant (post-treatment) Oil waste transport to comply with Australian Standards

19.3 Greenhouse gas assessment

This section assesses the potential GHG emissions associated with the recycling and disposal of waste generated by the demolition, construction, and operation phases of the project. It was prepared and guided by legislation and policies listed in Section 19.1.2. Emissions associated with the estimated waste types and quantities are presented as tonnes of carbon dioxide equivalent (t CO₂-e).

This waste related GHG assessment is based on the indicative design at the current project stage and should be considered as an initial estimate.

The key inputs for the emission calculations were based on the initial estimate of waste types and quantities described above in Section 19.2.1 and Section 19.2.2.

This GHG assessment compares two emission scenarios:

- Scenario A | material going to landfill
- Scenario B | the reuse, recovery, and recycling of 90 per cent of the waste (that is, 10 per cent would be to landfill).

19.3.1 Emission scope definitions

Emissions can be categorised into direct and indirect sources as per the Greenhouse Gas Protocol (World Resources Institute & World Business Council for Sustainable Development, 2012).

Direct (or **Scope 1**) emissions are produced from direct activities within the construction footprint. They cover:

- Transportation of materials, products, waste or people
- Generation of electricity, heat and/or steam via combustion of fossil fuels
- Fugitive emissions, both intentional and unintentional
- Vegetation clearing
- On-site waste management (for example, solid and liquid waste management, through landfilling, incineration, and sewage treatment plants).

Indirect (Scope 2 and Scope 3) emissions are generated beyond the construction footprint in the wider economy. They are produced by others in needing to carry out activities to support the project. Specifically:

- Scope 2 emissions are associated with the purchase of energy to support the project
- Scope 3 emissions are the emissions within the project’s supply chain (for example, associated with mineral extraction, manufacturing)

Scope 3 GHG emissions are sometimes not reported because they are under another entity’s control and should therefore be accounted for as Scope 1 emissions by those relevant entities. They are also not formally reported under the Australian National Greenhouse Energy and Reporting scheme.

This assessment focused on estimating the Scope 3 GHG derived from disposal of waste to landfill and treatment. The Scope 3 emissions were derived from solid waste being recycled and disposed to landfill and the emissions from wastewater handling and potential composting of food waste. Transport of waste from the construction footprint to the final recycling and/or disposal location was excluded as the final locations for these activities are yet to be determined. Selection of potential waste and recycling disposal sites for the purposes of the GHG assessment may result in significant over or under estimation of actual GHG emissions associated with waste transport.

To estimate the GHG emissions associated with waste disposal and processing, the calculations were based on the emission factors formula included in the [NGA Factors](#) (DCCEEW, 2022).

19.3.2 Demolition and Construction

Scenario A| all waste disposed of to landfill

The estimated emissions are presented in the Table 19-7 below. The total emissions would be about **500 t CO₂-e**, consisting mainly of general waste.

Table 19-7: Emissions associated with decomposition of waste taken to landfill (construction and demolition waste)

Waste type	Scope 3 GHG emissions (t CO ₂ -e)
Demolition	
Concrete	–

Waste type	Scope 3 GHG emissions (t CO ₂ -e)
ENM or VENM	–
Sand and soil	–
Bricks and tiles	–
Metals such as fittings, appliances, and bulk electrical cabling, including copper and aluminium	–
Doors, windows, fittings	3.7
Green waste	5.8
Sub-total – demolition emissions	9.4
Construction	
General waste	473.4
Recyclable materials	9.5
Steel	–
Furniture	5.9
Copper	–
Stainless steel	–
Rubble	–
Aluminium	–
Timber, pallets, crates	0.5
Other metal	0.0
Sub-total – construction emissions	489.3
Grand total emissions	498.7

Scenario B | 90 per cent of waste recovered through recycling

The estimated emissions are listed in Table 19-8 below. The total emissions would be about **75 t CO₂-e**.

Table 19-8: Emissions associated with recycling of waste

Waste type	Scope 3 GHG emissions (t CO ₂ -e)
Demolition	
Concrete	6.9
ENM or VENM	1.5
Sand and soil	7.8
Bricks and tiles	1.2
Metals such as fittings, appliances, and bulk electrical cabling, including copper and aluminium	2.4
Doors, windows, fittings	0.4
Green waste	0.6
Sub-total – demolition emissions	20.87
Construction	
General waste	50.0

Waste type	Scope 3 GHG emissions (t CO ₂ -e)
Recyclable materials	1.0
Steel	1.0
Furniture	0.7
Copper	0.0
Stainless steel	0.0
Rubble	0.4
Aluminium	0.2
Timber, pallets, crates	0.1
Other metal	0.1
Sub-total – construction emissions	53.4
Grand total emissions	74.3

19.3.3 Operation

Scenario A | all waste disposed to landfill

The estimated emissions are listed in Table 19-9 below. The total emissions would be about **6,000 t CO₂-e** annually.

Table 19-9: Summary of GHG emissions of operational waste disposed to landfill

Waste type	Scope 3 GHG emissions (t CO ₂ -e)
General waste including non-recyclable plastics	3597.4
Commingled containers	0.0
Food waste	1686.3
Cardboard	206.0
Office paper	32.5
Plastic film and wrapping	0.0
Batteries, e-waste, printer toners and ink cartridges, light bulbs and fluorescent tubes	522.0
Total emissions	6044.2

Scenario B | 90 per cent of waste recovered through recycling

The estimated emissions are listed in Table 19-10 below. The total emissions would be about **630 t CO₂-e** annually.

Table 19-10: Summary of GHG emissions generated from recycling of operational waste

Waste type	Scope 3 GHG emissions (t CO ₂ -e)
General waste including non-recyclable plastics	380.0
Commingled containers	0.1
Food waste	168.7
Cardboard	21.2
Office paper	3.3
Plastic film and wrapping	0.6
Batteries, e-waste, printer toners and ink cartridges, light bulbs and fluorescent tubes	55.8
Total emissions	629.6

Wastewater treatment emissions

The estimated emissions are listed in Table 19-11 below. The total emissions would be about **450 t CO₂-e** annually.

Table 19-11: Total emissions from wastewater treatment per annum

Wastewater (L/s)	Scope 3 emissions (t CO ₂ -e per annum)
28.3	446.2
Total emissions	446.2

Diverting material from landfill would reduce GHG emissions by around seven-fold (from 500 tonnes CO₂-e to 75 tonnes CO₂-e) during construction and around 10-fold every year during operation (from 6,000 tonnes CO₂-e per annum to 630 tonnes CO₂-e per annum).

The estimated GHG emissions generated from the project activities represent a very small fraction (<0.01 per cent) of projected NSW state GHG emissions in 2030. While this amount represents a small component of overall NSW GHG emissions, the identified waste recycling and landfill diversion measures would contribute to achieving NSW emission targets.

19.4 Environmental management measures

Waste, resource and GHG impacts will be addressed in the form of management measures. Measures relating to climate change, soils and contamination, traffic, air quality, and hazard and risk are addressed in other impact chapters and have not been included here. Table 19-12 lists the measures to manage waste, resource and GHG impacts specifically.

Table 19-12: Environmental management measures – resource efficiency

Ref	Impact/ uncertainty	Environmental management measure	Timing
RE01	Impact Waste management	<p>A Waste and Resources Environmental Management Plan (WREMP) will be prepared. It will be implemented under the CEMP. The Plan will:</p> <ul style="list-style-type: none"> Consider circular economy principles and identify opportunities to design out waste and pollution and keep products and materials in use Collate measures to manage waste and avoid, mitigate, and manage impacts to human health and the environment. The plans will define processes to track waste quantities, roles, and procedures for the handling of waste, and processes for the continual improvement of waste management Demolition and construction waste will be stored in a designated waste storage area for collection and disposal and precise locations will be included in the CEMP Collate measures to manage resource consumption and waste generation. The measures contained in the WREMP will reflect circular economy principles and the waste management hierarchy Include any requirements contained within the <u>Central State Significant Precinct study</u> and supporting technical documents where applicable. 	Pre-construction
RE02	Impact Solid waste recovery, reuse, and recycling	<p>Waste hierarchy principles and circular economy opportunities to be investigated during construction and operation (see RE07) include:</p> <ul style="list-style-type: none"> Reuse of waste streams including metals, sand, soil, concrete, and fittings where possible Recycling of waste streams including brick, masonry, metals, plasterboard, plastic, and timber where possible 	Construction / operation

Ref	Impact/ uncertainty	Environmental management measure	Timing
		<ul style="list-style-type: none"> Contract terms with suppliers that specify recyclable content and returnable packaging Co-operation in stewardship programs for compatible waste streams including pallets expansion of the current collection with additional waste streams such as plastic film derived from packaging, as well as a separate collection for food waste and commingled containers mainly from food generating tenancies Measures to recover and treat waste will include recovery of compatible waste including metals, oils, solvents, bricks, metals, plasterboard, plastics, timber, food, plastic film, and commingled containers. <p>Opportunities identified through this process will be included in the WREMP and OEMP (see RE07).</p>	
RE03	Impact Solid waste storage and disposal	<p>A central waste area will be established during construction, at which waste and recyclables will be stored. Some materials and waste may be stored elsewhere in stockpiles and bins where needed. Stockpiles and bins will be appropriately labelled, managed and monitored. The waste storage area for the project must be large enough to adequately store construction waste (potentially being able to accommodate operational waste) and recycling between collections. Waste and recyclables will be collected by a licensed contractor for off-site recycling.</p> <p>Residual waste that cannot be avoided, reduced, reused, recycle, recovered or treated will be collected by a licensed contractor for disposal at a licensed facility.</p>	Construction / operation
RE04	Impact Solid waste misclassification resulting in missed opportunities to maximise resource recovery and recycling	All waste will be assessed, classified, managed and disposed of if reuse is not possible, in accordance with the Waste Classification Guidelines (NSW EPA, 2014).	Construction / operation
RE05	Impact Illegal dumping	An illegal dumping prevention strategy will be developed as part of the CEMP and OEMP (see RE07). The strategy will outline measures to be carried out to minimise the risk of illegal dumping on the project site and will be developed in consultation with the NSW EPA and City of Sydney.	Construction / operation
RE06	Impact GHG emissions from waste	GHG emissions associated with waste disposal will be managed and minimised by implementing measures to avoid, reuse and recycle waste as outlined in Section 19.2.	Construction / operation
RE07	Impact Waste management	<p>An Operational Environmental Management Plan (OEMP) will be prepared prior to operations commencing.</p> <p>The OEMP will collate measures to manage waste and avoid, mitigate, and manage impacts to human health and the environment. It will define processes to track waste quantities, roles, and procedures for the handling of waste, and processes for the continual improvement of waste management.</p> <p>The OEMP will collate measures to manage resource consumption and waste generation including the management of food and organic waste. The measures contained in the OEMP will reflect circular economy principles and the waste management hierarchy.</p>	Operation