Transport for NSW

Chapter 22
Waste management and resource use

NSW GOVERNMENT

Contents

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22. Waste management and resource use

This chapter summarises the waste management and resource use requirements for the project, identifying waste management risks and how these risks would continue to be managed. A preliminary assessment is provided of the types of wastes that would be generated, and measures to manage and minimise these wastes are identified. The chapter also provides a high-level summary of the resources and materials required during construction and operation.

22.1 Approach

To facilitate waste avoidance and reduction planning and allow for considered and responsible management of unavoidable waste, the different types of waste and materials that may be generated by a project need to be identified early in the project development process. Wastes and materials need to be managed appropriately to avoid contaminating soils and water, and generating leachate, odours and dust, with the associated potential for environmental, health and safety risks. Resources need to be managed to ensure they are used effectively and sustainably.

The waste management and resource use assessment considered the types, amounts and potential impacts associated with waste and materials likely to be generated/used by the project. Based on the potential impacts identified, measures to manage waste during construction and operation are provided. The assessment has been undertaken in accordance with the resource management hierarchy outlined in the *Waste Avoidance and Resource Recovery Act 2001* (NSW) and *Infrastructure Sustainability Rating Scheme Technical Manual Design & As-Built* (Infrastructure Sustainability Council, 2021). This hierarchy, which is considered at all stages of design development and construction planning, involves:

1. Avoidance and reduction of waste
2. Reuse of waste
3. Recycling, processing and reprocessing waste
4. Recovery of energy
5. Disposal.

The assessment was also undertaken with reference to:

- relevant legislation, including the POEO Act, the Protection of the Environment Operations (Waste) Regulation 2014 and the Work Health and Safety Regulation 2011
- *NSW Waste and Sustainable Materials Strategy 2041* (DPIE, 2021h)
- *NSW Circular Economy Policy Statement: Too Good to Waste* (NSW EPA, 2019)
- *Sustainable Design Guidelines* (Transport for NSW, 2020c)
- the NSW EPA's *Waste Classification Guidelines* (2014).

22.1.1 Key tasks

The assessment involved:

- reviewing the indicative construction methodology to identify potential waste generating and resource consumption activities
- identifying potential waste and material types, quantities and preliminary waste classifications in accordance with relevant legislation and guidelines
- estimating quantities of excess spoil from preliminary cut and fill estimates
- identifying environmental issues and consequences if waste is not managed appropriately
- identifying waste and materials management options
- providing measures to avoid, reduce and manage wastes and material use in accordance with circular economy principles.

The estimated waste and material types (including spoil quantities) are indicative and have been identified for the purpose of determining potential waste management options. Although the actual quantities of waste generated by the project may differ from the estimates made, the identified waste management options would remain appropriate based on the waste stream identified and are scalable.

22.2 Assessment of construction impacts

Potential impacts during construction relate to:

- generation and management of waste (including spoil), and associated potential impacts if waste is not managed appropriately
- construction resource use, including construction materials, water and power.

These potential impacts are considered in the following sections.

22.2.1 Waste generation

Spoil

The largest waste generating activity by volume would be earthworks. This activity (described in section 7.3) would generate spoil. Spoil is any material (such as soil, rock or dirt) excavated and removed from its original location.

Spoil is the largest waste stream expected to be generated during construction. As described in section 7.3.8, it is estimated that:

- about 101,000 cubic metres of material is estimated to be excavated from within the project site
- about 28,000 cubic metres of material is required for fill (including for backfilling excavations)
- there would be about 73,000 cubic metres of excess material above the project's fill needs.

The approach to managing excess material is discussed in section 22.2.3.

Other wastes

Other construction activities described in Chapter 7 (Project description – construction) would generate waste. Table 22.1 provides the key waste streams predicted to be generated and their likely classifications based on the *Waste Classification Guidelines Part 1: Classifying waste* (NSW EPA, 2014a).

Table 22.1 Key waste streams and classification – construction

Activity	Waste streams that may be produced	Likely classification of waste streams
Cut and fill earthworks	Spoil – comprising eligible recovered resources/reusable soils, sediments and aggregate Contaminated soils Potential and actual acid sulfate soil	General solid waste (non-putrescible) Restricted waste, hazardous waste and/or special waste
Utilities investigation and relocation	Excavated soil and water Redundant utilities waste such as wiring and piping Asbestos	Liquid waste General solid waste (non-putrescible) Restricted waste, hazardous waste and/or special waste
Clearing and grubbing of vegetation	Green waste	General solid waste (non-putrescible)
Removal (including demolition) of existing structures and infrastructure	Concrete, asphalt, aggregate, timber, brick, scrap metals, plasterboard and other construction materials Building fixtures such as carpet and flooring materials, furniture and white goods Hazardous building materials (including asbestos containing materials, lead paint, treated timber) Coal tar and coal tar asphalt Spoil	General solid waste (non-putrescible) Restricted waste, hazardous waste and/or special waste (such as asbestos)
Construction of project infrastructure	Concrete, concrete slurry, asphalt, aggregate, timber formwork, scrap metals, cable and packaging materials	General solid waste (non-putrescible) Liquid waste
Welding	Waste metal	General solid waste (non-putrescible)
Ballasting and tamping (where used)	Waste ballast	General solid waste (non-putrescible)
Fencing (temporary and permanent)	Waste metal/timber posts/plastics Concrete	General solid waste (non-putrescible)
Work areas and construction compounds	Food and other organic waste	General solid waste (putrescible)
	Wastewater (grey water and sewage)	Liquid waste
	Waste paper and cardboard	General solid waste (non-putrescible)
	Waste containers – plastics, glass, metals	General solid waste (non-putrescible)
	Other office waste	General solid waste (non-putrescible)
	Electrical and electronic waste	General solid waste (non-putrescible)
	Waste from vehicle/plant equipment maintenance - adhesives, lubricants, waste fuels and oils, engine coolant, batteries, hoses	General solid waste (non-putrescible) – drained oil filters (mechanically crushed), rags and oily rags (only if they contain non-volatile petroleum hydrocarbons and no free liquids) Hazardous waste - containers holding oil, grease, and lubricants if residues have not been removed by washing Liquid waste (oils)

Activity	Waste streams that may be produced	Likely classification of waste streams
	Packaging such as pellets, plastic film wrap, cable reels, and metal straps/bands, paper/cardboard, polystyrene	General solid waste (non-putrescible)
	Tyres (including tyre pieces)	Special waste

22.2.2 Potential impacts if waste not managed appropriately

The potential impacts associated with aspects of waste generation and management during construction are summarised in Table 22.2.

Table 22.2 Potential impacts associated with waste generation and management

Aspect of waste management	Potential impacts
Generation of waste, including excavation and handling	• dust from excavation, handling and movement of waste • erosion and sedimentation due to runoff from exposed surfaces • mobilisation of acid sulfate, where present • sediment laden/contaminated runoff and leachate generation, which if located close to receiving waterbodies, could impact water quality and aquatic ecosystems • noise from plant and equipment movement • human health risks due to handling of contaminated soils and hazardous materials, such as asbestos and coal tar asphalt, lead paint, refrigerant and greenhouse gases • mixing of liquid and asbestos waste due to broken Telstra pit or pipes being sucked into sucker trucks • odour if coal tar is exposed
Storage of and segregation of waste	• odours and dust from stockpiling/storage of wastes • cross contamination of wastes due to improper segregation • human health risks due to storage of contaminated soils and hazardous materials, such as asbestos and coal tar asphalt, lead paint, refrigerant and greenhouse gases • sediment laden/contaminated runoff and leachate generation, which if located close to receiving waterbodies could impact water quality and aquatic ecosystems • waste build up from irregular or disrupted collections • cross contamination of soils due to improper segregation and storage • attracting illegal dumping from third parties on stockpile sites or other waste storage areas
Waste transportation	• dust from loading waste onto vehicles and movement of waste on haul roads • road traffic noise from waste collection vehicles and movement of spoil • traffic generated by haulage of spoil to reuse/disposal facilities • odours from loading waste onto vehicles and movement of waste collection vehicles to disposal or recycling facilities • mud tracking on road from waste collection vehicles • unlawful transport and disposal • incorrect classification of waste materials • risk of liquid waste becoming contaminated with asbestos waste due to test pitting

Aspect of waste management	Potential impacts
Non-classified or incorrectly classified waste transport and disposal	• regulatory non-compliance • contamination of recycling facilities/landfills • contamination of soils, groundwater and/or surface water • unlicensed waste contractors transporting waste
Unlicensed waste contractors transporting waste	• regulatory non-compliance • potential illegal dumping of waste • potential for disposal at unlawful unlicensed receival sites

The potential impacts associated with excavating and disturbing soil (including contaminated soil) are considered in Chapter 18 (Soils and contamination). Other potential indirect impacts to traffic and transport, noise and vibration, water and air quality, and hazard and risks impacts, associated with excavating, handling and transporting wastes have been considered in the respective chapters for these environmental matters (see Chapters 9, 10, 17, 19 and 20).

Construction waste management activities would not have a significant impact on the environment or human health assuming:

- the mitigation measures provided in relevant chapters noted above are implemented
- construction wastes are managed as described in section 22.2.3
- additional waste mitigation measures provided in section 22.5 are implemented.

22.2.3 Construction waste management

All waste generated during construction would be managed using circular economy principles and the waste hierarchy approach of avoidance and reuse before consideration is given to disposal. All wastes would be managed in accordance with the waste provisions contained within the POEO Act and other relevant legislative and policy requirements, as defined by the instruments, policies and guidelines listed in section 22.1.

Should waste be found to be unsuitable for reuse or recycling, disposal methods would be selected based on the classification of the waste material in accordance with the *Waste Classification Guidelines*. The *Waste Classification Guidelines* provide direction on the classification of waste, specifying requirements for management, transportation and disposal of each waste category.

Overall, the project would seek to achieve the diversion targets listed in Table 22.3.

Table 22.3 Project waste diversion targets

Waste stream category	Phase	Target
Clean/usable excavation spoil	Construction	100% diverted from landfill (maximising on-site reuse where feasible)
Office waste (office and kitchen based)	Construction and operation	Minimum 70% diverted from landfill
Other inert waste streams	Construction and operation	Minimum 80% diverted from landfill

Spoil management

Ongoing design development and construction planning would minimise the amount of excess material generated as far as practicable. The following hierarchy would be applied to managing excavated materials:

1. Material with suitable engineering properties that meets soil quality requirements (excluding prohibited or prescribed materials under the POEO Act and Regulation) would be reused within the project site, where practicable.
2. Excess usable material would be transported off site for reuse on other Transport for NSW project sites, recycling or disposal at an appropriately licensed facility (to be determined based on the waste classification).
3. Excess material (including contaminated material) that is unable to be reused within the project site or other Transport for NSW project sites would be transported off site for treatment and/or disposal at an appropriately licensed facility (to be determined based on the waste classification).

Prior to reuse or disposal, spoil would be temporarily stored within the construction footprint (such as at construction compounds) for further material analysis. In-situ waste classification would be implemented to minimise double handling. Any temporary stockpiling would occur near where the spoil is generated as far as practicable. Spoil suitable for reuse would be segregated (where practicable) to enable reuse on-site or off-site.

Options to manage excess spoil that cannot be reused on-site include:

- Option 1 – reusing spoil on other Transport for NSW projects, or other local projects as permitted by an applicable resource recovery order and exemption
- Option 2 – off-site disposal and/or reuse at a licensed waste facility or other site as permitted by an applicable resource recovery order and exemption
- Option 3 – stockpiling spoil on Transport for NSW-owned land for reuse on a future project or in maintenance activities.

Transport for NSW has a beneficial reuse target of 100 per cent of clean spoil generated during construction. The geology of the spoil material, as well as its consistency and quality, would determine the reuse options.

Resource recovery orders and resource recovery exemptions allow some wastes to be beneficially and safely re-used independent of the usual NSW laws that control applying waste to land (such as holding an environment protection licence and paying the waste levy for disposal). Generators and processors must meet all the conditions of an order to supply a resource recovery waste to a consumer. Those conditions may include:

- material specifications
- record-keeping requirements, and
- reporting.

All spoil that cannot be reused within the project site would be classified in accordance with the *Waste Classification Guidelines* (NSW EPA, 2014a) before transport off-site. In addition, where spoil (such as virgin excavated natural material and excavated natural material) is intended for reuse off-site, it would be undertaken in accordance with the conditions of the relevant resource recovery order and exemption.

Managing other wastes

The proposed approach to managing other types of construction waste, including measures to facilitate segregation and prevent cross contamination, is provided in Table 22.4. Additional mitigation measures, proposed as an outcome of the assessment, are provided in Table 22.8.

Table 22.4 Management of other construction waste

Waste type	Management
Contaminated spoil (including asbestos containing materials), and acid sulfate soils	In-situ testing of soils in areas of potential contamination concern would be undertaken to determine the appropriate waste classification. Contaminated spoil would be sampled before being transported and disposed of at a suitably licensed off-site location. Acid sulfate soils and potential acid sulfate soils would be managed in accordance with the *NSW Acid Sulfate Soils Manual* (Stone et al, 1988) and the *Waste Classification Guidelines Part 4: Acid sulfate soils* (NSW EPA, 2014b). Any treated acid sulfate soils and potential acid sulfate would be chemically assessed in accordance with Step 5 in Part 1 of the *Waste Classification Guidelines* (NSW EPA, 2014a) prior to disposal at a facility licensed to accept that class of waste. Further information about the management of contaminated soil is provided in Chapter 18 (Soils and contamination).
General construction waste (concrete, asphalt, timber formwork, scrap metals, cable and packaging materials etc)	Construction waste would be classified in accordance with the *Waste Classification Guidelines* (NSW EPA, 2014a) and directed to a waste management facility that is lawfully permitted to accept that type of waste. General construction waste would be managed in accordance with the waste hierarchy. Where practicable, waste would be segregated and stockpiled on site, with materials such concrete, metals and asphalt separated and sent to a construction and demolition waste recycling facility. Other recyclable materials would be sent for recycling as a mixed waste stream. Methods would be implemented to avoid mixing and avoid contamination for coal tar impacted asphalt from other layers in the road. This would involve stripping off in layers to avoid cross contamination. Opportunities for take back agreements in procurement would be identified (e.g. packaging and pallets etc).
Waste asphalt containing coal tar	Waste asphalt that cannot be recycled (such as asphalt containing coal tar) would be collected and stored separately in designated storage areas at construction compounds for off-site disposal by an authorised contractor. The material would be managed in accordance with the *Waste Classification Guidelines* and the Transport for NSW's coal tar asphalt fact sheet.
Liquid waste	Wastewater, sewage and grey water would be disposed to sewer or transported to an appropriately licensed liquid waste treatment facility. Extracted groundwater would be managed in accordance with the dewatering management strategy (see mitigation measure W16 in section 17.6.2).
Adhesives, lubricants, waste fuels and oils, engine coolant, tyres	Waste from construction vehicle and plant maintenance activities would be collected and stored in designated waste storage areas for collection by an authorised contractor for disposal off site. Any potentially hazardous waste would be stored separately in clearly labelled receptacles and disposed of in accordance with its waste classification. Waste oil and oil filters would be stored in separate recycling bins and collected by an authorised contractor, and recycled off site, where feasible. Tyres would be collected by an authorised contractor for recycling at a facility licensed to receive tyres (including tyre pieces).

Waste type	Management
Office waste, including kitchen waste, paper, cardboard, plastics, glass, food organics	Recyclable materials such as paper, cardboard, plastics, glass, ferrous and non-ferrous containers would be stored at recycling bins for collection by an authorised contractor, and recycled off site, where feasible. Food organics would be stored in food or food and garden organics bins for collection by an authorised contractor, and composted off site at an appropriately licensed facility, where feasible. Where recycling is not feasible, waste would be collected and stored in designated waste storage areas for collection by an authorised contractor for disposal off site at a licenced waste facility
Green waste	As far as practicable, weed-free green waste would be chipped, mulched and reused on site, transferred to another site (in accordance with an agreement that the waste can be legally accepted for the intended use under section 143 of the POEO Act), or collected by an authorised contractor and recycled off site. Otherwise, green waste would be collected by an authorised contractor, and composted off site at an appropriately licensed facility. Weeds would be handled in accordance with relevant guidelines/requirements.
Non-destructive digging waste	Where practicable, non-destructive digging waste management facilities would be established at work sites or construction compounds for on-site treatment. This would facilitate the reuse of soil and water and minimise off-site disposal. Where feasible, design of the assets would avoid or reduce these wastes. Where on-site treatment is not practicable, non-destructive digging waste would be consolidated and transported for off-site disposal at an appropriately licensed facility. Where this waste has potential to contain asbestos pieces the facility selected would be licensed to accept liquid waste and asbestos (special waste).
Hazardous building materials	All handling and disposal of hazardous building materials (such as asbestos-containing materials, lead paint, and treated timber) would be carried out by appropriately qualified and licensed contractors in accordance with the Work Health and Safety Regulation 2011 and other relevant guidelines and disposed of at an appropriately licensed facility.

Off-site recycling and disposal

Recyclables such as containers (plastics, glass, cans, etc), paper and cardboard would be collected by an authorised contractor for off-site recycling.

Specialist licensed contractors would be used for the collection and treatment/disposal of any liquid, special, restricted or hazardous waste at appropriately licensed facilities that can lawfully receive the wastes.

There are a number of options for recycling and disposal of construction and operational waste generated by the project. Examples of waste facilities in Sydney include (but are not limited to) those listed in Table 22.5.

In addition, where possible, certain wastes such as virgin excavated natural material and excavated natural material that cannot be reused on the project site, would be reused on other local projects. Such reuse would be undertaken in accordance with the conditions of the relevant resource recovery order and exemption.

The recycling and disposal facilities for each waste type would be determined based on availability/capacity, waste licensed to be accepted, and confirmed waste classifications. The facilities would be documented in a waste and resource management plan to be prepared for the project prior to construction commencing.

Table 22.5 Potential off-site recycling and disposal facilities

Facility	Location	Wastes accepted
Clyde Transfer Terminal	319 Great Western Highway, Auburn	General solid waste (putrescible) General solid waste (non-putrescible)
Eastern Creek Resource Recovery Park	Wallgrove Road, Eastern Creek	General solid waste (putrescible) General solid waste (non-putrescible)
Kemps Creek Advanced Resource Recovery Park	1725 Elizabeth Drive, Kemps Creek	General solid waste (putrescible) General solid waste (non-putrescible) Special waste (asbestos) Restricted waste
Lucas Heights Resource Recovery Park	New Illawarra Road, Lucas Heights	General solid waste (putrescible) General solid waste (non-putrescible) Special waste (asbestos)
St Marys Industrial and Technical Waste Services	42-46 Charles Street, St Marys	Special waste (including asbestos contaminated drilling muds, muddy waters and contaminated soils) Liquid waste Hazardous waste (certain types)
Genesis Xero Waste – Landfill and Recycling	Honeycomb Drive, Eastern Creek	General solid waste (non-putrescible) Special waste (asbestos)
Wetherill Resource Recovery Facility	20 Davis Road, Wetherill Park	Special waste (asbestos) General solid waste (non-putrescible) (including soil, metals, electronic waste, batteries, cardboard, paper, mattresses)
Kimbriki Recycling and Waste Disposal Centre	Kimbriki Rd, Ingleside	Special waste (asbestos) General solid waste (non-putrescible) (including virgin excavated natural material, vegetation, metals, tyres, concrete, brick, mixed waste, electronic waste, cardboard, paper, batteries)
Tyrecycle	1/21 Grady Crescent, Erskine Park	Special waste (waste tyres)
Bingo Recycling Centres	Various (e.g. Auburn, Eastern Creek, Silverwater, Patons Lane etc)	General solid waste (non-putrescible) (including concrete, bricks, tiles, gyprock, timber, metals, plastics, green waste, rocks and stones, general building and demolition waste)
Concrete Recyclers	14 Thackeray Street, Camellia	General solid waste (non-putrescible) (including concrete, brick, bitumen, terracotta, roof tiles, clean excavated sand)
Benedict Recycling Chipping Norton	33-39 Riverside Road, Chipping Norton	General solid waste (non-putrescible) (including concrete, brick, soil and clay, asphalt, virgin excavated natural material, timber, gyprock, vegetation, cardboard, other non-recyclable waste, mixed building and demolition waste, tyres, mattresses)
Boral Recycling Widemere	39a Widemere Road, Wetherill Park	General solid waste (non-putrescible) (including concrete, brick, asphalt, soil, reclaimed road base)
Ecorr	155 Newton Road, Wetherill Park	General solid waste (non-putrescible) (including virgin excavated natural material, concrete, brick, asphalt, soils)

Facility	Location	Wastes accepted
Sims Metal	70 Burrows Rd, Alexandria or 13 Pembury Road, Minto	General solid waste (non-putrescible) (including ferrous and non-ferrous scrap)
Total Scrap Metals Recycling	1 Christina Road, Villawood	General solid waste (non-putrescible) (including ferrous and non-ferrous scrap)
Complete Metal Industries	37 and 38 York Rd, Ingleburn	General solid waste (non-putrescible) (including ferrous and non-ferrous scrap)

22.2.4 Resource use

The resources that are expected to be used during construction are outlined below. While construction would increase demand on local and regional resources (for the resources outlined below), it is unlikely that it would result in any resource becoming scarce or in short supply.

Materials consumption

Based on materials used in similar projects, it is expected that construction would require in the order of:

- 230,000 tonnes of aggregates and asphalt (such as road sub-base and road base and structural fill (where existing subgrade material is not suitable))
- 50,000 cubic metres of concrete (such as premix concrete and precast concrete pipes and conduits)
- 15,000 tonnes of metals (such as steel rails, structural steel, steel reinforcement, overhead wiring, prefabricated steel furniture and signage).

Construction would also require the use of materials such as, (but not limited to):

- glass
- liquid fuel (diesel and petrol)
- lubricating oil
- timber/plywood
- rock gabions
- bentonite
- bricks
- landscaping materials
- paving stones
- PVC conduit
- paint
- sleepers and ballast.

Other materials required would be confirmed during design development and construction planning.

Construction material requirements for the project are typical for a transport project of this scale. The design work undertaken to date has included careful consideration of the construction methodology and selection of materials and resources to ensure fit for purpose and minimise resource consumption.

Consistent with the resource management hierarchy described in section 22.1, resource consumption would be further minimised during construction through reuse, where practicable. For example, asphalt removed from road pavements to install the light rail tracks would be reused in temporary and new road pavements (for the road changes proposed as part of this project and/or other projects undertaken by Transport for NSW) where technically feasible.

Consistent with the principles of the circular economy, opportunities for use of recycled and sustainable materials would be identified, for example supplementary cementitious material content in concrete, recycled aggregate products and recycled steel.

Material selection would be undertaken with consideration to optimising durability (thus reducing the frequency or need for replacement) and minimising embodied energy and carbon footprint.

Water

Water would be required during construction, including for the following activities:

- dust suppression
- concrete construction, including for light rail and bridge foundations and structures
- road works, including concreting and compaction of pavement
- cutting equipment, such as road saws and concrete cutters
- construction site office and amenities.
- wash down of plant and equipment
- landscaping
- non-destructive digging.

Measures to avoid and minimise water consumption, particularly of potable water, would be included in construction planning. This would include the use of non-potable water for dust suppression, which would form a large proportion of construction water demand, as far as practicable.

Energy

Construction would require the use of energy, including fuel and electricity. Diesel and petrol fuel would be used for machinery (such as cranes and excavators), vehicles (such as trucks and staff vehicles), equipment and generators. Electricity, which would be required at the construction compounds and work sites, would be sourced from the existing electricity supply system as a preference, with diesel generators used as backup.

As described in Chapter 20 (Air quality), Transport for NSW would consider the purchase of renewable energy during construction and identify opportunities to minimise energy consumption to meet the project's energy and carbon objectives.

Measures to avoid and minimise electricity consumption have been included in construction planning. Examples of these measures include:

- use of energy efficient site buildings and equipment at compounds and work sites, including use of solar powered lights and signage, where feasible and reasonable
- efficient design of electricity transmission systems to supply power as efficiently as possible.

22.3 Assessment of operation impacts

Potential impacts during operation relate to:

- generation and management of waste
- operational resource use, including operational materials, water and energy.

22.3.1 Waste generation

Operation would generate a relatively small quantity of waste, mainly as a result of maintenance activities. Waste generating activities include maintenance of light rail vehicles, stops, tracks and associated infrastructure, use of the stops by commuters (for example, domestic waste in stop bins), and office/administration operations at the stabling and maintenance facility.

It is estimated that about 150 to 200 tonnes per year of general waste is expected to be generated, based on annual waste reporting from other light rail projects in NSW. Very minimal quantities of hazardous waste would also be generated from maintenance activities.

Anticipated waste types and likely classifications are listed in Table 22.6.

Table 22.6 Key waste streams and classification – operation

Activity	Waste stream that may be produced	Likely classification
Light rail vehicle and stop litter and bin collection, cleaning and general maintenance	General waste	General solid waste (non-putrescible) General solid waste (putrescible)
Stabling, track and light rail corridor maintenance	Solvents, paints, adhesives and other chemicals	Restricted waste Hazardous waste Liquid waste
	Sewage, wastewater	Liquid waste
	Cable and conduit off-cuts, sand, vegetation and other general waste and recyclables	General solid waste (non-putrescible)

22.3.2 Operation waste management

The waste management measures proposed to align with the waste management hierarchy are listed in Table 22.7. The table also provides the contingency measures (disposal) for wastes that cannot be avoided, reused, recycled or treated. All operational waste would be managed by the network operator for the project.

Table 22.7 Management of operation waste

Waste type	Management
Oils, liquids and chemicals used for maintenance	Waste from maintenance activities would be collected and stored in designated waste storage areas, for collection by an authorised contractor for off-site disposal. Where feasible, any potentially hazardous waste would be stored separately in clearly labelled receptacles and disposed of in accordance with its waste classification. Waste oil and oil filters would be stored in recycling bins and collected by an authorised contractor, and recycled off site, where feasible.
General litter	Any litter would be collected by an authorised contractor for recycling or disposal at an appropriately licensed waste facility.

Waste type	Management
Landscape and vegetation waste	As far as practicable, weed-free green waste would be chipped, mulched and reused on site, or collected by an authorised contractor and recycled off site. Weeds would be disposed of in accordance with relevant guidelines/requirements.

22.3.3 Resource use

Materials consumption

Operation would involve the ongoing consumption of materials as part of maintenance and stabling activities, and ongoing refurbishment of infrastructure throughout the project lifecycle. This would include procurement of additional light rail vehicles, replacement of light rail vehicles and stop furniture, light rail vehicles maintenance materials (cleaning chemicals, oils, lubricants, and degreasers), and for traction sanding devices in light rail vehicles, batteries for rolling stock, and asphalt and concrete for track maintenance. The anticipated demand for these resources would be determined during design development.

Operational requirements, such as component replacement for light rail vehicles and associated project infrastructure, would be implemented in accordance with Transport for NSW's standard operating procedures, policies and guidelines (including the *Sustainable Design Guidelines* (Transport for NSW, 2020c), with respect to ongoing demands on available resources.

Consistent with the principles of the circular economy, opportunities for use of recycled and sustainable materials during operation would be identified. Material selection during operation would also be undertaken with consideration to optimising durability and minimising embodied energy and carbon footprint.

Water

An integrated approach to water management for the stabling and maintenance facility would be implemented to minimise the use of potable water for maintenance, light rail vehicle wash activities and irrigation. The existing stabling and maintenance facility includes a series of sustainability measures to minimise waste (particularly wastewater generation) including a series of stormwater tanks, a recycled water network, and the use of recycled water for the light rail vehicle wash facility.

While operation would increase demand on local and regional potable water resources, the project would look for opportunities to reduce water use, and increase the use of recycled water, where possible (such as for irrigation). As such, the project would not result in potable water becoming scarce or in short supply.

Energy

The project would require electricity for light rail vehicles, stops, the stabling and maintenance facility, lighting, and the operation of signalling and communication equipment. The project is seeking to meet net carbon zero emissions during operation in accordance with the *Future Transport 2056* (Transport for NSW, 2018) target of net zero emissions by 2050.

As described in Chapter 20 (Air quality) a number of management and mitigation measures would be considered for the project to set energy targets and reduce potential greenhouse gas during construction and operation. These would be documented in an energy and greenhouse gas strategy which would be underpinned by the application of the following hierarchy:

- avoid or reduce emissions – for example, minimising the weight of rolling stock to reduce the energy required to operate vehicles, or procuring low energy embodied materials
- improve efficiency – for example, using energy efficient lighting, or powering compounds through connection to grid electricity to reduce generator use

- source renewable energy (on site) – for example, incorporating solar voltaic cells at light rail stops
- source renewable energy (off site) – for example, purchasing renewable energy for construction and operational energy consumption throughout the project life cycle.

22.4 Cumulative impacts

There is potential for cumulative waste and resource use impacts if other projects being undertaken in the vicinity of the project site (particularly Sydney Metro West in the Parramatta CBD and Sydney Olympic Park, and urban development projects in Camellia/Rosehill, Melrose Park and Wentworth Point) also generate demand for resources and for recycling and disposal capacity in Sydney.

As described in section 22.2.3, there are a number of facilities in the Sydney region that would lawfully be able to accept waste from the project. These facilities are considered to have significant capacity. In addition, where resource recovery orders and exemptions are applicable, waste and materials would be beneficially reused on other sites where possible, which would preserve the capacity of licensed facilities.

While the project would increase demand on materials, water and electricity, measures are proposed to minimise resource consumption during construction. Construction materials expected to be required for the project are not considered to be scarce or in short supply.

As a result, there is not expected to be any substantial waste or resource use impacts during construction as a result of the interaction of the project with other projects locally and regionally.

Waste generation and resource use during operation of the project is expected to be minimal and therefore no cumulative impacts are expected.

22.5 Mitigation and management measures

22.5.1 Approach to mitigation and management

The approach to waste management would be guided by the waste management hierarchy, with a focus on reducing resource use and minimising waste generation as the highest priority (see section 22.1). Wastes generated during construction would be reused and recycled where possible. Wastes that cannot be reused/recycled would be disposed of at appropriately licensed facilities.

Waste would be managed during construction in accordance with the construction waste and resource management plan, which would form part of the CEMP. The plan would define the processes, responsibilities and management measures that would be implemented during construction to manage waste and resource use. The plan would be prepared consistent with the *NSW Waste and Sustainable Materials Strategy* (DPIE, 2021h) and applying the circular economy principles to waste management. The plan would include:

- measures to minimise resource and material, water and energy use
- classification of waste generated by the project waste in accordance with the Waste *Classification Guidelines* (NSW EPA, 2014a) and appropriate management options in accordance with the waste hierarchy principles and resource recovery orders and exemptions
- strategies to manage spoil, including reuse options
- procedure for waste storage, transport (including tracking where relevant), reuse and disposal
- identification of any approvals required for managing on and off-site waste, including application of any relevant resource recovery exemptions
- monitoring, record keeping and reporting, including any documentation management obligations arising from resource recovery exemptions.

There is the potential for unexpected volumes of waste to be generated, including potentially contaminated material. During construction planning, suitable areas would be identified to allow for contingency management of unexpected waste materials, including contaminated materials. Any previously unidentified contaminated material would be managed in accordance with the unexpected contaminated finds procedure (see mitigation measure CS13 in section 18.6.2).

22.5.2 List of mitigation measures

Measures that will be implemented to manage waste and resource use are listed in Table 22.8.

Table 22.8 Waste management and resource use mitigation measures

Impact/issue	Ref	Mitigation measure	Timing
Waste generation and recycling	WR1	Measures to minimise spoil generation will be confirmed during design development. This will include a focus on optimising the design to minimise spoil volumes, and the reuse of material on site.	Design
Sustainable procurement and resource use	WR2	Material procurement and resource use planning will be undertaken in accordance with the *Sustainable Design Guidelines* (Transport for NSW, 2020c).	Design
Construction waste and spoil management	WR3	A waste and resource management plan will be prepared as part of the CEMP and implemented during construction. The plan will adopt the circular economy principles and the waste hierarchy contained in the *Waste Avoidance and Resource Recovery Act 2001* and the *Infrastructure Sustainability Rating Scheme Technical Manual* (Infrastructure Sustainability Council, 2021). It will detail processes, responsibilities and measures to manage waste and resource use, and minimise the potential for impacts during construction. The plan will include strategies to manage spoil, including preferred reuse options.	Pre-construction, construction
	WR4	All waste will be classified in accordance with the *Waste Classification Guidelines* (NSW EPA, 2014a) and managed in accordance with the POEO Act and associated regulations.	Construction
	WR5	The disturbance, movement and disposal of special waste, including hazardous building materials such as asbestos containing materials, will be carried out in accordance with the Work Health and Safety Regulation 2011 and relevant guidelines.	Construction
Management of unexpected waste materials	WR6	Suitable areas will be identified to allow for contingency management of unexpected waste materials, including contaminated materials. Such areas will be hardstand or lined, appropriately stabilised and bunded, with sufficient space for stockpile storage.	Construction
Operational waste management	WR7	Operational waste, including general litter clean up, will be managed consistent with the Parramatta Light Rail Stage 1 Operations Environmental Management Plan and the waste hierarchy principles contained in the *Waste Avoidance and Resource Recovery Act 2001*.	Operation