Chapter 20

Spoil, waste management and resource use

20 Spoil, waste management and resource use

This chapter provides an assessment of the potential impact on spoil, waste management and resource use as a result of this proposal, and identifies mitigation measures to minimise these impacts.

20.1 Overview

Construction planning for this proposal has aimed to avoid or minimise potential spoil and waste through the selection of tunnelling equipment (tunnel boring machines) which cuts a circular profile ideal for a rail tunnel. Spoil, waste and resource use would be managed in accordance with Sydney Metro's Construction Environmental Management Framework (Appendix C).

The proposal has carefully considered the construction methodology, selection of materials and resources which are fit for purpose to ensure resource consumption is minimised. Resource consumption would be further minimised during construction through reuse of materials, where possible, consistent with the resource management hierarchy of the *Waste Avoidance and Resource Recovery Act 2001*.

It is estimated that the proposal would generate about 1.1 million cubic metres of in-situ spoil. Sydney Metro would target 100 per cent of beneficial reuse of the usable spoil generated during construction. Stockpiling of spoil at construction sites would be managed to balance impacts associated with truck movements and impacts associated with dust, runoff and sedimentation.

About 50,000 tonnes of demolition materials would be produced as a result of this proposal. Sydney Metro West would adopt a construction waste recycling target of 95 per cent, and existing metropolitan waste management facilities are anticipated to have capacity to receive the anticipated waste streams generated by this proposal.

20.2 Legislative and policy context

The Secretary's Environmental Assessment Requirements relating to spoil, waste management and resource use, and where these requirements are addressed in this Environmental Impact Statement, are outlined in Appendix A.

Waste management and recycling is regulated in NSW by the NSW Environment Protection Authority through the *Protection of the Environment Operations Act 1997*, the Protection of the Environment Operations (Waste) Regulation 2014 (including the requirement to track certain types of waste) and the *Waste Avoidance and Resource Recovery Act 2001.*

The *Waste Avoidance and Resource Recovery Act 2001* aims to promote waste avoidance and resource recovery through the establishment of the following waste hierarchy:

1. Avoidance of waste
2. Resource recovery
3. Disposal.

The following additional guidelines have been applied to the assessment of this proposal:

- *NSW Government Resource Efficiency Policy* (Office of Environment and Heritage, 2019)
- *NSW Waste Avoidance and Resource Recovery Strategy 2014-21* (Environment Protection Authority, 2014)
- *NSW Environment Protection Authority Waste Classification Guidelines* (NSW Environment Protection Authority, 2014)
- *Waste Classification Guidelines* (NSW Environment Protection Authority, 2014)
- *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004).

The Department of Planning, Industry and Environment (which includes the NSW Environment Protection Authority) is leading the development of a 20-year Waste Strategy for NSW. The Strategy will address key priorities for waste and resource recovery for NSW. An issues paper about the strategy was released in March and April 2020 for public consultation, to help shape its development. The NSW Government is reviewing the feedback received.

20.3 Assessment methodology

A desktop assessment was carried out and comprised:

- Review of spoil generation (quantity and type)
- Review of reuse opportunities and the likely resources required for construction of this proposal, including construction materials, water and power
- Identification of likely waste generating activities and likely waste types, including identification of possible waste streams in accordance with relevant legislation and guidelines
- Identification of the environmental impacts associated with the generation of waste materials and subsequent disposal, including consideration of waste minimisation, reuse potential and the capacity of disposal facilities to receive waste
- Development of a spoil management strategy to identify how spoil would be managed during construction, including likely spoil volumes, likely nature and classification of excavated material, opportunities for recycling, potential disposal sites, stockpile management, and method(s) and route of transportation
- Development of management strategies to adequately address waste during construction
- Consideration of the cumulative effects of spoil haulage, waste management and resource use with other major infrastructure projects within Sydney.

20.4 Avoidance and minimisation of impacts

The design development process for this proposal aimed to avoid or minimise potential spoil and waste management and resource use impacts. This included the selection of tunnel boring machines to excavate the mainline metro tunnels which would minimise spoil generation by cutting a circular profile ideal for a rail tunnel.

20.5 Potential impacts

The *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) assessed the impacts of The Bays Station construction site to:

- Carry out the excavation of The Bays Station
- Launch and support two tunnel boring machines for the drive west to the Sydney Olympic Park metro station construction site.

The Bays Station construction site is being established under the Sydney Metro West Concept and Stage 1 planning approval.

The Bays tunnel launch and support site in this proposal would be located within a part of The Bays Station construction site. The impacts of the proposed use of The Bays tunnel launch and support site are assessed below.

20.5.1 Spoil generation and management

Spoil generation

As discussed in Chapter 5 (Project description) spoil from tunnel boring machines and roadheader excavation of mined caverns would be extracted from the crossover cavern at The Bays tunnel launch and support site, Pyrmont Station construction sites and Hunter Street Station (Sydney CBD) construction sites. Spoil associated with the tunnelling work would be removed through The Bays tunnel launch and support site, and spoil associated with the turnback and stub tunnels excavation would be removed through the Hunter Street Station (Sydney CBD) eastern construction site. These two construction sites would have the highest volume of spoil to be removed during the proposal.

This proposal would generate about 1.1 million cubic metres of in-situ spoil. Indicative volumes of spoil generated at each construction site are outlined in Table 20-1.

Table 20-1 Indicative volumes of spoil generated during construction of this proposal

Construction site	Indicative volume of spoil generated by construction site (cubic metres)
The Bays tunnel launch and support site	43,000 (from crossover cavern) 263,000 (from tunnelling to Hunter Street Station (Sydney CBD))
Pyrmont Station western construction site	90,530
Pyrmont Station eastern construction site	190,250
Hunter Street Station (Sydney CBD) western construction site	123,100
Hunter Street Station (Sydney CBD) eastern construction site	396,200
Total	**1,106,080**

Spoil stockpiles

Spoil from tunnelling works of the mainline tunnels would be transported from the tunnel face to stockpiles within the construction sites. Spoil generated by other earthworks, such as mined cavern excavation, would also be stored in stockpiles within the construction sites.

These stockpiles would be bunded and managed to avoid potential impacts associated with runoff, sedimentation and leachate. Stockpiling of spoil at construction sites would be managed to balance impacts associated with truck movements and impacts associated with dust, runoff and sedimentation.

Potential dust impacts would be further minimised through the implementation of the environmental mitigation measures described in Chapter 19 (Air quality). Potential impacts from runoff and sedimentation would be further minimised through the implementation of the environmental mitigation measures described in Chapter 15 (Soils and surface water quality).

Spoil management

The design of the tunnels and station excavations and the preferred construction methodology has taken into consideration the waste hierarchy by aiming to reduce the volume of spoil generated, as far as practical. This has been achieved by considering vertical alignments as close to the surface as feasible with consideration to operational, safety, architectural, station design and other environmental constraints. Opportunities to further reduce the generation of spoil through tunnel and station optimisation would be considered during future design.

Spoil would be classified in accordance with *Waste Classification Guidelines* (NSW Environment Protection Authority, 2014).

Waste tracking procedures included in mitigation measure WR5 (refer to Section 20.6.2) and in the Construction Environmental Management Framework (Appendix C) would address the risk of unauthorised dumping of spoil.

The following spoil would be reused following a set of criteria for reuse, recycling and disposal of material as provided in Table 20-2:

- Spoil that is classified as Virgin Excavated Natural Material or Excavated Natural Material (ENM)
- Spoil that is subject to a resource recovery order/resource recovery exemption under the Protection of the Environment Operations (Waste) Regulation 2014
- Spoil that is otherwise reusable.

Spoil that would be reused would follow a set of criteria for reuse, recycling and disposal of material as shown in Table 20-2. Following the application of the criteria, a hierarchy of management options for spoil reuse is presented in Table 20-3.

Table 20-2 Reuse, recycling and disposal criteria

Option	Criteria
Reuse on Sydney Metro West sites	• The material is suitable for the final land use at the placement location in accordance with guidelines made or approved under the *Contaminated Land Management Act 1997* and would not cause pollution under the *Protection of the Environment Operations Act 1997* • The material meets engineering requirements for the placement location
Reuse off-site	• The material meets Virgin Excavated Natural Material or Excavated Natural Material definition • Suitable off-site reuse locations have been identified and have necessary approvals to receive the material
	• The material does not meet Virgin Excavated Natural Material or Excavated Natural Material definition but has potential for reuse and a Resource Recovery Exemption/Resource Recovery Order has been granted • Suitable off-site reuse locations have been identified and have necessary approvals to receive the material
Recycling off-site	• The material has value for recycling • Suitable off-site reuse locations have been identified and have necessary approvals to receive the material
Disposal off-site	• The material is classified as General Solid Waste, Restricted Solid Waste, Special Waste or Hazardous Waste • Appropriately licensed waste management facilities have been identified and have necessary approvals to receive the material

Table 20-3 Spoil management hierarchy for this proposal

Priority	Reuse options	Possible reuse options
1	Within the proposal footprint	• Reuse spoil for landscaping, structural fill, general fill, fill embankments and mounds within a short haulage distance of the source • Reuse spoil to restore any pre-existing contaminated sites within the construction footprint • Reuse spoil as a feed product in construction materials
2	Environmental projects (outside of the proposal footprint)	• Reuse spoil for coastal protection, such as beach nourishment and land raising • Reuse spoil in flood mitigation projects
3	Other development projects (including other Sydney Metro projects)	• Reuse spoil for landscaping, structural fill, general fill, fill embankments and mounds on projects within a financially feasible transport distance of the site • Reuse spoil for land reclamation or remediation projects • Reuse sand for manufacturing concrete and shale for manufacturing bricks and tiles
4	Land restoration	• Reuse spoil to fill disused facilities (for example mines and quarries) to enable either future development or site rehabilitation
5	Landfill management	• Reuse spoil to cap completed landfill cells • Reuse spoil in daily covering of landfill waste

Spoil reuse opportunities for this proposal and other projects

Sydney Metro would target 100 per cent beneficial reuse of the usable spoil generated during construction. The geology of the spoil material as well as its consistency and quality would determine the reuse options. It is envisaged the spoil produced by this proposal would have the characteristics and potential reuse opportunities suitable for priority 1, 2 and 3 spoil management options outlined in Table 20-44.

Table 20-4 Spoil characteristics and potential reuse opportunities for this proposal

Spoil characteristic	Potential reuse opportunities for priority 1, 2 and/or 3 spoil management options
Clean granular fill	Structural fill
Excavated moist clay and clayey sand material	General fill (following moisture conditioning)
Excavated weathered shale and sandstone	Structural fill (following moisture conditioning to reduce reactivity for shale)
Medium strength or better-quality shale	Non-reactive fill
Medium to high strength sandstone	Structural fill
Wet clay and wet shale spoil	Unlikely to be suitable for reuse without substantial moisture conditioning
Contaminated soils	General fill for priority 1 (in accordance with guidelines made or approved under the *Contaminated Land Management Act* and would not cause pollution under the *Protection of the Environment Operations Act 1997)* General fill for priority 2 (subject to a resource recovery order and/or exemption under the Protection of the Environment Operations (Waste) Regulation 2014)

It is expected there may be limited opportunities for additional spoil reuse at other construction sites associated with this proposal. The quantities and locations of any additional reuse opportunities would be determined during further design of this proposal. The use of spoil for construction work associated with this proposal would be maximised to the extent possible before alternative off-site opportunities for spoil reuse are pursued.

Where spoil cannot be reused for this proposal, opportunities to reuse this material in future stages or on other projects (preferably within the Sydney region to reduce transport distances) would be identified. Potential options for spoil reuse/disposal sites are included in Table 20-5.

Table 20-5 Potential spoil reuse/disposal opportunities

Potential re-use location	Haulage distance from the proposal (approximate)
Moorebank Intermodal Terminal and Freight Precinct	40 kilometres
Western Sydney Airport	55 kilometres
Port Kembla Outer Harbour land reclamation works	95 kilometres
Development and infrastructure projects in the Sydney metropolitan region	Various
Brick making businesses in the Sydney metropolitan region	Various

These sites have a need for spoil or fill material and represent viable reuse locations. Other reuse or disposal sites may be used depending on need at the time the spoil is generated.

Spoil reuse opportunities for land restoration and landfill management

Spoil could be used for filling former quarries in the Sydney region and beyond. Former quarries and other sites that are potentially available for large-scale reuse of Virgin Excavated Natural Material, Excavated Natural Material and material subject to resource recovery orders/exemptions are listed in Table 20-6. Spoil could also be used to cap completed landfill cells and to cover waste at active landfill sites. Potential opportunities for spoil reuse in land restoration and landfill management applications would be determined during further construction planning for this proposal, including potential opportunities for use of spoil as beach nourishment.

Table 20-6 Possible large-scale spoil reuse opportunities in the Sydney region and beyond

Potential reuse location	Haulage distance from nearest construction site
Kurnell Landfill	28 kilometres
Castlereagh Landfill	65 kilometres
Penrith Lakes Scheme	60 kilometres
Bombo Quarry	120 kilometres

Contaminated soil

There is potential to encounter contaminated soil or rock during spoil-generating construction work at all construction sites (refer to Chapter 16 (Contamination)).

Contamination is defined in the *Contaminated Land Management Act 1997* as the presence of a substance in, on or under the land at a concentration above which the substance is normally present and that presents a risk of harm to human health or any other aspect of the environment.

Sampling and testing of soils in high and moderate areas of potential contamination concern would be conducted, where required, to characterise the soils and determine the appropriate waste classification (which may include hazardous wastes or special wastes). Characterisation would be carried out in accordance with guidelines made or approved under the *Contaminated Land Management Act 1997.* Waste classification would be carried out in accordance with the *Waste Classification Guidelines Part 1: Classifying Waste* (NSW Environment Protection Authority, 2014).

The suitability for beneficial reuse of tested soils would also be determined via adoption of a risk-based approach in accordance with the National Environment Protection (Assessment of Site Contamination) Measure (National Environment Protection Council, 1999, as amended 2013) and the NSW Environment Protection Authority resource recovery framework. Soils would be considered for reuse within the spoil management hierarchy for this proposal if they would not cause harm to human health or the environment. Reuse of these soils for projects and opportunities outside of the construction footprint would require a resource recovery order and/or exemption under the Protection of the Environment Operations (Waste) Regulation 2014, on the assumption these soils would not meet the classification of Virgin Excavated Natural Material or Excavated Natural Material.

Soils that cannot be beneficially reused would be disposed off-site and be managed and transported in accordance with the waste classification and the Protection of the Environment Operations (Waste) Regulation 2014 and disposed of to an appropriately licensed waste management facility. There are several solid waste landfills in Sydney that are licensed to accept waste, including contaminated soils. It is anticipated that the volumes of contaminated spoil generated from works in this proposal could be readily accommodated at these facilities. Alternatively, materials may be transported to appropriately licenced facilities in NSW. If materials are required to be transported interstate, this would be carried out in consultation with the NSW Environment Protection Authority and relevant interstate regulatory bodies and in accordance with regulatory requirements. Further discussion of contamination, including asbestos and other hazardous materials, is provided in Chapter 16 (Contamination).

Acid sulfate soils

As discussed in Chapter 15 (Soils and surface water quality), there is potential to encounter acid sulfate soils during excavation and other ground disturbance at construction and tunnel launch sites.

Impacts associated with the disturbance of acid sulfate soils are described in Chapter 15 (Soils and surface water quality), as are measures to mitigate potential impacts. Acid sulfate soils would be disposed of in accordance with the *Waste Classification Guidelines Part 4: Acid Sulfate Soils* (Environment Protection Authority, 2014) and the NSW *Acid Sulfate Soils Manual* (1998).

20.5.2 Resource use

A variety of resources would be needed to construct this proposal. The indicative resource requirements for this proposal shown in Table 20-7 are typical for an infrastructure project of this scale.

The indicative resource requirements of this proposal have the potential to temporarily impact resource availability within the Sydney metropolitan region over the construction period. However, the recent concurrent construction of other major infrastructure projects; including NorthConnex, WestConnex, Sydney Metro Northwest and Sydney Metro City & Southwest, since 2015 demonstrates the market is able to manage the concurrent construction of major infrastructure projects given sufficient opportunity to forward plan.

The period between the approval of this proposal and the start of major construction would be sufficient to allow the market to prepare for the proposal resource needs in conjunction with potential concurrent infrastructure projects listed in Appendix G (Cumulative impacts assessment methodology).

Indicative quantities of the major resources to complete the construction of this proposal are provided in Table 20-7.

Table 20-7 Indicative quantities of resources required for construction

Material	Indicative quantity required
Electricity	34,670 megawatt hours
Fuel	15,890 kilolitres
Concrete	11,260 tonnes
Shotcrete	1,530 tonnes
Steel	4,000 tonnes
Water	165 megalitres

Under the *Water Management Act 2000*, water sharing plans provide the basis for equitable sharing of surface water and groundwater between water users, including the environment.

For groundwater, the proposal lies within the area covered by the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011. The Water Sharing Plan contains provisions for allocation of water to construction projects through a volume of 'unassigned water' or through the ability to purchase an entitlement where groundwater is available under the long-term average annual extraction limit (LTAAEL).

The LTAAEL for the Sydney Basin Central Groundwater Source is 45,915 megalitres per year, which is 25 per cent of the estimated annual recharge for the area. Under the Water Sharing Plan, there are currently 120 groundwater access licences, with a total licensed volume of 2,592 megalitres per year. As such there is up to 43,323 megalitres per year of water available under the LTAAEL. As a result, the 165 megalitres of water required for the proposal would be able to be supplied under the LTAAEL.

The proposal has carefully considered the construction methodology, selection of materials and resources which are fit for purpose to ensure resource consumption is minimised. Resource consumption would be further minimised during construction through reuse of materials, where possible, consistent with the resource management hierarchy of the *Waste Avoidance and Resource Recovery Act 2001.*

20.5.3 Waste generation and management

Waste generation

The construction waste would be manageable through the application of waste management strategies outlined in the following section. The volumes of construction waste for the proposal would be significantly smaller than recent Sydney Metro projects, due to the shorter length of the tunnel alignment.

The likely main construction waste streams for this proposal are outlined in Table 20-8 along with the likely waste classification under the *Waste Classification Guidelines* (NSW Environment Protection Authority, 2014). About 50,000 tonnes of demolition materials is anticipated to be produced during this proposal. The types and quantities of construction waste generated during this proposal would be site specific and would vary throughout the construction period. The quantities and classification of waste streams would be confirmed following further design and detailed construction planning.

Table 20-8 Indicative types of waste generated during construction

Activity	Waste stream	Examples of wastes	Likely waste classification
Demolition of buildings and other structures	General demolition wastes	• Concrete • Bricks • Tile • Timber • Metals • Plasterboard • Carpets • Electrical and plumbing fittings	• General solid waste (non-putrescible)
	Hazardous wastes	• Heavy metals	• Hazardous waste
	Special waste	• Asbestos	• Special waste
Clearing and grubbing of vegetation, landscaped and/or turfed areas	Vegetation wastes	• Trees • Shrubs • Ground cover • Soil	• General solid waste (non-putrescible)
Tunnelling, excavation and general earthworks	Spoil	• VENM (uncontaminated soil and crushed rock) • ENM • Acid sulfate soils • Soils and materials containing asbestos, heavy metals, hydrocarbons, pesticides and/or other industrial residues	• General solid waste (non-putrescible) • General solid waste (putrescible) • Special waste • Restricted solid waste • Hazardous waste
	Tunnel boring machine wastes	• Cutter heads • Associated equipment replacement (conveyer belts etc.)	• General solid waste (non-putrescible)
	Wastewater	• Groundwater inflows to tunnels and station excavations	• Liquid waste
Dust suppression, wash down of plant and equipment, and staff amenities at construction sites (such as toilets)	Wastewater	• Sediment-laden wastewater • Sewage • Grey water	• Liquid waste
General construction works and resource use	General construction wastes	• Timber formwork • Scrap metal • Steel • Concrete • Plasterboards • Soil • Packaging materials	• General solid waste (non-putrescible)
Maintenance of construction plant, vehicles and equipment	Mechanical wastes	• Adhesives • Lubricants • Waste fuels • Oils • Engine coolant • Batteries • Hoses • Tyres	• General Solid Waste (non-putrescible), Hazardous waste and/or special waste • Liquid waste
Works at site offices and crib rooms	General wastes	• Putrescibles • Paper • Cardboard • Plastics • Glass • Printer cartridges	• General solid waste (non-putrescible) • General solid waste (putrescible)

Waste management

Based on the construction performance of Sydney Metro Northwest and Sydney Metro City & Southwest, Sydney Metro West would adopt a construction waste recycling target of 95 per cent.

Potential waste management issues are manageable through standard mitigation measures. These measures would be developed in accordance with the Sydney Metro West Sustainability Plan (refer to Chapter 22 (Sustainability, climate change and greenhouse gas)) and the Sydney Metro Construction Environmental Management Framework (Appendix C) which requires the Principal Contractor to develop a waste management plan to address the following:

- Classification of waste in accordance with the current guidelines
- Handling of waste including measures to facilitate segregation of waste into stockpiles of concrete, steel, timber, paper and cardboard and vegetation to make it easier to recycle components and prevent cross contamination
- Management of waste
- Waste minimisation and reuse
- Lawful disposal or recycling locations for each type of waste using a hierarchy which prioritises higher value end use
- Contingencies for the above, including managing unexpected waste volumes.

Potential waste management issues during construction would be temporary and include:

- Waste potentially being unnecessarily directed to landfill due to the inadequate collection and/or incorrect classification which would increase the demand for landfill capacity within the Sydney region
- Potential contamination of soil, surface and/or groundwater from the inappropriate storage, transport and disposal of liquid and solid wastes
- Potential increase in vermin from the incorrect storage, handling and disposal of putrescible waste from construction sites
- Potential incorrect classification and/or disposal of waste, including the incorrect storage, handling and disposal of hazardous materials (for example, asbestos from building demolition)
- Potentially excessive amounts of materials being ordered, resulting in a large amount of left-over, unused resources
- Lack of identification of feasible options for recycling or reuse of resources.

Existing metropolitan waste management facilities would have capacity to receive the anticipated waste streams generated by this proposal. General construction and demolition wastes and wastes from site offices would be collected for off-site recycling wherever practicable. Wastes that contain hazardous, special or otherwise contaminated materials would be treated and disposed of off-site at a licensed facility in accordance with the relevant guidelines. Waste facilities in Sydney licensed to accept general solid waste and vegetation waste include, but are not limited to:

- Clyde Transfer Terminal
- Eastern Creek Resource Recovery Park
- Kemps Creek Advanced Resource Recovery Park
- Lucas Heights Resource Recovery Park.

A number of waste facilities in Sydney are licenced to accept special and/or hazardous waste, including:

- Chullora Resource Recovery Facility
- Elizabeth Drive Landfill, Kemps Creek
- Eastern Creek Resource Recovery Park
- Genesis Xero Waste – Landfill and Recycling
- Horsley Park Waste Management Facility
- Jacks Gully Waste and Recycling Centre
- Kimbriki Recycling and Waste Disposal Centre
- Lucas Heights Resource Recovery Park
- Wetherill Park Resource Recovery Facility.

Recyclables such as containers (plastics, glass, cans, etc), paper and cardboard would be collected by an authorised contractor for off-site recycling. There are a number of materials recovery facilities in Sydney. The recycling facility would be determined by the contractor engaged to collect the material.

Management strategies that would be developed to address specific construction wastes are discussed further below.

Spoil

The spoil management hierarchy and strategy are discussed in detail in Section 20.5.1.

Demolition wastes

As outlined in Chapter 5 (Project description), it is anticipated that construction of this proposal would require the demolition of about 14 buildings. Demolition waste would be managed through the waste hierarchy established under the *Waste Avoidance and Resource Recovery Act 2001*.

Demolition waste would be segregated and stockpiled on site, with materials such as bricks and tiles, timber, plastic and metals being separated where practicable. All demolition waste would be classified in accordance with the *Waste Classification Guidelines* (Environment Protection Authority, 2014) and sent to a waste facility with recycling capabilities, where appropriate, or directed to a waste management facility that is lawfully permitted to accept that type of waste.

Hazardous materials

There is the potential for materials to be present within demolished buildings/structures that meet the hazardous waste criteria within the *Waste Classification Guidelines* (NSW Environment Protection Authority, 2014). The presence of potentially hazardous wastes would be identified through a hazardous material survey which would be completed for those buildings and structures suspected of containing hazardous materials prior to their demolition (refer to Chapter 21 (Hazard)). If materials that meet the hazardous waste criteria are encountered, they would be handled and managed in accordance with relevant legislation, codes of practice and Australian standards.

The management of contaminated spoil and acid sulfate soils, which may be classified as hazardous wastes, are discussed further in Section 20.5.1.

Special wastes

There is the potential for asbestos containing materials to be present within demolished buildings/structures. Under the *Waste Classification Guidelines* (NSW Environment Protection Authority, 2014), asbestos is defined as a 'special waste'. The disturbance, movement and disposal of asbestos containing materials would be carried out in strict accordance with the Protection of the Environment Operations (Waste) Regulation 2014, Work Health and Safety Regulation 2017 and applicable guidelines.

The management of contaminated spoil, which may be classified as special wastes, are discussed further in Section 20.5.1.

Wastewater

As discussed in Chapter 14 (Groundwater and ground movement), the excavation of the tunnels, stations and shafts may intercept groundwater aquifers resulting in the need to capture, treat and discharge water. A construction water treatment plant would be required at The Bays tunnel launch and support site and each construction site which would treat all intercepted groundwater to meet the requirements of any environmental protection licence issued for this proposal and/or the relevant requirements of the *Protection of the Environment Operations Act 1997*. Treatment of construction water is discussed further in Chapter 15 (Soils and surface water quality).

The reuse of treated water would be maximised during the construction work by re-circulating water to the tunnel cutting face (where it is of suitable quality) and for surface dust suppression, however there would be a surplus of treated water requiring discharge from the sites. Sydney Metro is further investigating options to minimise potable water use and maximise wastewater reuse. Additionally, opportunities to treat wastewater to a higher standard to enable additional end uses onsite or offsite would be considered, to further reduce reliance on potable water supply. Where wastewater reuse is not required, water would be discharged to the local stormwater system or directly to a local surface watercourse following treatment, although options such as disposal via Sydney Water trade waste agreements would be investigated during construction planning. The water balance for this proposal is discussed further in Chapter 15 (Soils and surface water quality).

Wastewater would also be generated by the use of staff amenities at construction sites (such as toilets). Sewage and grey water from these amenities would be disposed to sewer or transported to an appropriately licenced liquid waste treatment facility.

20.5.4 Cumulative impacts

Potential cumulative impacts associated with spoil and waste management and resource use during this proposal would be limited to temporary increases in resource demand and availability, waste and spoil generation, and temporary impacts to reuse and disposal opportunities within the Sydney metropolitan region. As these impacts would be managed in accordance with relevant guidelines, cumulative spoil and waste management and resource use impacts would be adequately managed through the mitigation measures in Section 20.6 and in Chapter 23 (Synthesis of the Environmental Impact Statement).

20.6 Mitigation and management measures

The Construction Environmental Management Framework (Appendix C) describes the approach to environmental management, monitoring and reporting during construction. Specifically, it lists the requirements to be addressed by the construction contractor in developing the Construction Environmental Management Plans, sub-plans, and other supporting documentation for each specific environmental aspect. This includes standard mitigation measures, including the preparation of a Waste Management Plan.

The environmental management approach for the project is detailed in Chapter 23 (Synthesis of the Environmental Impact Statement). Under these broad frameworks and as outlined within the Concept assessment, a series of performance outcomes have been developed to define the minimum environmental standards that would be achieved during construction of the proposal (refer to Section 20.6.1). Mitigation measures that would be implemented during construction to manage potential identified impacts are in Section 20.6.2.

20.6.1 Performance outcomes

Construction performance outcomes were developed for the proposal as part of the Concept assessment. Performance outcomes for the proposal identify measurable, performance-based standards for environmental management. Identified performance outcomes in relation to spoil, waste management and resource use for construction of the proposal include:

- 100 per cent of useable spoil is reused in accordance with the spoil reuse hierarchy
- A minimum 95 per cent recycling target is achieved for construction and demolition waste
- Products made from recycled content are prioritised
- The use of potable water for non-potable purposes is avoided if non-potable water is available
- The reuse of water is maximised, either on site or off site.

Chapter 23 (Synthesis of the Environmental Impact Statement) describes how the proposal addresses these performance outcomes. The design of the proposal has taken into consideration the waste hierarchy and aimed to reduce and reuse spoil generated as far as practical. The proposal would adopt a construction waste recycling target of 95 per cent of waste and would minimise water use and use non-potable water where feasible and consistent with adopted sustainability initiatives and targets.

20.6.2 Mitigation measures

Specific mitigation measures that would be implemented to address potential spoil, waste management and resource use impacts are listed in Table 20-9.

Table 20-9 Summary of potential spoil, waste management and resource use impacts and management measures

Reference	Impact	Mitigation measure	Applicable location(s)
WR1	Compliance with legislative and policy requirements	All waste would be assessed, classified, managed, transported and disposed of in accordance with the *Waste Classification Guidelines* and the Protection of the Environment Operations (Waste) Regulation 2014.	All
WR2	Disposal of hazardous materials	A hazardous material survey would be completed for those buildings and structures suspected of containing hazardous or special waste materials (particularly asbestos) prior to their demolition. If hazardous waste or special waste (e.g. asbestos) is encountered, it would be handled and managed in accordance with relevant legislation, codes of practice and Australian standards.	All
WR3	Waste minimisation	Construction waste would be minimised by accurately calculating materials brought to the site and limiting materials packaging.	All
WR4	Reuse and recycling	Waste streams would be segregated to avoid cross-contamination of materials and maximise reuse and recycling opportunities.	All
WR5	Reuse on Sydney Metro West sites	A materials tracking system would be implemented for material transferred between Sydney Metro West sites and to offsite locations such as licensed waste management facilities.	All

20.6.3 Interactions between mitigation measures

Mitigation measures in other chapters that are relevant to the management of waste include:

- Chapter 15 (Soils and surface water quality) – Specifically measures which address potential acid sulfate soils and the potential interaction with contaminated soils
- Chapter 16 (Contamination) – Specifically measures which address the disturbance of contaminated land during construction
- Chapter 22 (Sustainability, climate change and greenhouse gas) – Specifically measures which address the implementation of sustainability initiatives and sustainable procurement.

Together, these measures would minimise the potential spoil, waste management and resource use impacts of this proposal. A full list of mitigation measures is presented in Chapter 23 (Synthesis of the Environmental Impact Statement).