20 Contamination – Stage 1

20 Contamination – Stage 1

This chapter provides a summary of the assessment of the potential impacts of Stage 1 on contamination and identifies management and mitigation measures to minimise these impacts. This chapter draws on information provided in Technical Paper 8 (Contamination). Information and assessment relating to groundwater and ground movement are discussed in Chapter 18 (Groundwater and ground movement – Stage 1). Information and assessment relating to soil erosion, acid sulfate soils, soil salinity and sensitive receiving environments are discussed in Chapter 19 (Soils and surface water quality – Stage 1).

20.1 Secretary's Environmental Assessment Requirements

The Secretary's Environmental Assessment Requirements relating to contamination, and where these requirements are addressed in this Environmental Impact Statement, are outlined in Table 20-1.

Table 20-1: Secretary's Environmental Assessment Requirements – Contamination Stage 1

Reference	Requirement	Where addressed
8. Contamination		
8.2	The risk of contamination and identify if remediation of the land is required, having regard to the ecological and human health risks posed by the contamination in the context of past, existing and future land uses. Where assessment and/or remediation is required, the Proponent must document how the assessment and/or remediation would be undertaken in accordance with current guidelines.	Section 20.5 to 20.16, and Section 20.17.

20.2 Legislative and policy context

The management of contaminated land in NSW is a tiered process where the NSW Environment Protection Authority (EPA), through the *Contaminated Land Management Act 1997*, regulates land which is considered to be significantly contaminated. Contaminated land that is not regulated by the NSW Environment Protection Authority is managed by planning authorities through the planning and development assessment process.

The NSW Environment Protection Authority also administers the NSW site auditor scheme, makes or approves guidelines for assessing and remediating contaminated land, and manages the public record of regulated sites under the *Contaminated Land Management Act 1997* (CLM Act). The NSW Environment Protection Authority may also issue and enforce licences that regulate waste treatment, storage and/or disposal facilities, under the *Protection of the Environment Operations Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*. Other legislation relevant to contamination is the *Work Health and Safety Act 2011*, which provides a legislative framework to protect the health and safety and welfare of workers.

The following guidelines inform or respond to the regulatory framework and have been applied to the assessment of Stage 1:

- Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land (Department of Urban Affairs and Planning and Environment Protection Authority, 1998)
- Guidelines for Consultants Reporting on Contaminated Sites (Office of Environment and Heritage, 2000)
- National Environment Protection (Assessment of Site Contamination) Measure 1999 (as revised 2013).

Other policy and guidelines that would be relevant should further investigations, remediation work and validation be required include:

- Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 (Environment Protection Authority, 2015a)
- Guidelines for the NSW Site Auditor Scheme (Environment Protection Authority, 2017b)
- Guidelines for the assessment and management of groundwater contamination (Department of Environment and Conservation, 2007)
- Other guidelines made or approved under section 105 of the *Contaminated Land Management Act 1997*.

20.3 Assessment approach

For the purposes of the contamination investigation, the study area included the Stage 1 construction site footprints, land within 500 metres of the Stage 1 sites and the tunnel alignment.

The contamination assessment involved:

- A desktop review of available information relevant to the study area to understand the site history, existing environment and potential risk for contamination, including a review of:
  - Landform topography, drainage, geology, soils (including erosion hazard, acid sulfate soils risk and salinity potential), hydrogeology and receiving environments in the study area
  - Site history including historical aerial photographs (from each decade from 1930 to 2005 (where available) and available aerial imagery services (Google Earth and SIX Maps)
  - The existing land uses and land use planning controls – further information on land use is provided in Chapter 14 (Property and land use – Stage 1)
  - Publicly available information via general internet searches for the key words (contamination, remediation and site investigation) for suburbs and major projects within and adjoining the study area
  - Publicly available information from the NSW Environment Protection Authority, the Commonwealth Scientific and Industrial Research Organisation 'Australian Soil Resource Information System' database and the former NSW Department of Primary Industries groundwater database
  - Data collected during site investigations for Sydney Metro West
- Site inspections in February and July 2019 of Stage 1 construction sites and nearby land uses and potential areas of environmental concern (areas with known or potential contamination associated with current or historical land uses)
- Meetings with the Environment Protection Authority to discuss the approach to the contamination assessment
- A high level risk prioritisation exercise to:
  - Identify areas of environmental concern (with respect to contamination)
  - Identify unmitigated risks to environmental and human receptors
  - Consider the nature of proposed construction activities
  - Determine the level of risk that Stage 1 could intersect areas of potential contamination (refer to Section 20.3.1)
- Identification of appropriate mitigation and management measures, or where further investigation or remediation may be required.

20.3.1 Risk prioritisation

A high-level risk prioritisation exercise was carried out to assess the potential impact from construction to expose contamination to human and/or ecological receptors. The prioritisation exercise considered source-pathway-receptor relationships in accordance with a conceptual site model as defined by the National Environment Protection (Assessment of Site Contamination) Measure 1999, as revised 2013 (NEPC, 2013). The prioritisation exercise considered the severity and extent of contamination sources (refer to Table 20-2), and the potential pathways from contamination sources to human and ecological receptors (refer to Table 20-3) for each media, that is soil, groundwater and vapour.

Table 20-2: Contamination severity and extent categories

Contamination severity and extent category	Description
SE1	Low potential for contamination to be present in the media of concern at concentrations above the relevant assessment criteria and is limited in spatial extent
SE2	Contamination possibly present in the media of concern at concentrations above the relevant assessment criteria and is limited in spatial extent
SE3	Contamination possibly present in the media of concern at concentrations above the relevant assessment criteria and potentially spatially widespread
SE4	Known contamination present in the media of concern at concentrations above the relevant assessment criteria and limited in spatial extent
SE5	Known contamination present in the media of concern at concentrations above the relevant assessment criteria and spatially widespread

Table 20-3: Contamination pathways and receptor categories

Pathways and receptors category	Description
PR1	Media of concern is unlikely to coincide with or otherwise impact on the construction scope and/or there is no or an unlikely exposure pathway for human or ecological receptors during Stage 1
PR2	Media of concern may intersect the construction scope and exposure pathway for human or ecological receptors that could be present and complete during Stage 1
PR3	Media of concern would intersect the construction scope and exposure pathway for human or ecological receptors that could be present and complete during Stage 1

To provide the overall potential contamination risk for Stage 1 construction sites, a matrix was used to combine the consideration of contamination severity and extent with contamination pathways and receptors as provided in Table 20-4.

Table 20-4: Potential contamination risk categories

Contamination severity and extent						
Pathways and receptors		SE1	SE2	SE3	SE4	SE5
	PR1	Very low	Low	Low	Moderate	Moderate
	PR2	Low	Moderate	Moderate	High	High
	PR3	Moderate	Moderate	High	High	Very high

20.4 Avoidance and minimisation of impacts

The design development process for Stage 1 aimed to avoid or minimise potential contamination risks. This included:

- Early identification of known contaminated sites and avoidance of these sites where possible
- Location of the stabling and maintenance facility at Clyde to avoid contaminated land (compared to alternative locations considered). This reduces challenges in relation to potentially constructing within substantially contaminated land, which could pose risks to the environment and worker health and safety.

20.5 Project-wide impacts

20.5.1 Contamination potential

Based on the desktop assessment and site inspection, there is the potential for contamination to be encountered at several locations within the Stage 1 construction footprint. Contaminants that could be encountered during excavation and other ground disturbing activities include those associated with:

- Leaks and spills from fuel storage infrastructure (hydrocarbons and heavy metals)
- Processing of heavy end hydrocarbons, heavy metals and metalloids
- Land reclamation and other uncontrolled fill material (metals, hydrocarbons, pesticides, polychlorinated biphenyls and asbestos)
- Demolition of buildings that may contain hazardous materials such as asbestos
- Former and current industrial land uses (that may contain contaminants such as hydrocarbons, heavy metals and metalloids, solvents, phenolics, pesticides, heavy metals and metalloids and asbestos in soil)
- Existing railways and associated activities (that may contain contaminants such as metals, hydrocarbons, pesticides, nutrients, phenols, carbamates, pesticides, herbicides and asbestos in soils).

The potential for contamination to be encountered at Stage 1 construction sites and potential construction impacts from soil, groundwater and vapour are outlined in the following sections.

20.5.2 Potential soil impact pathways

All potential soil contamination identified can be managed to acceptable levels with the implementation of appropriate management measures and/or remediation.

Potential impact pathways due to the disturbance of contaminated soil without appropriate management and/or remediation may include:

- Handling and transporting large volumes of natural and 'clean fill' spoil or naturally occurring actual or potential acid sulfate soil and rock
- Handling, transporting, treating or disposing of contaminated soils and wastes including asbestos-containing materials
- Contaminant exposure risk to construction personnel and the general public from the impacts of intercepting contaminated soil
- Contaminant exposure to environmental receptors from the impacts of intercepting contaminated soil
- Cross contamination associated with the incorrect handling or disposal of spoil/unexpected finds
- Contamination of previously clean areas.

Higher risks and increased management and/or remediation effort during construction are likely to be associated with soils containing dispersible fibres (i.e. fibrous asbestos), or soils which could generate vapours or odours (hydrocarbons and volatile organic compounds) or soils which contain concentrations of contaminants which categorise material at a higher waste classification (i.e. restricted solid waste or hazardous waste).

20.5.3 Potential groundwater impact pathways

All potential groundwater contamination identified can be managed to acceptable levels with the implementation of appropriate management measures and/or remediation.

Potential impact pathways which could cause contact with or discharge of contaminated groundwater may include:

- Contaminant exposure risk to construction personnel and the general public from the impacts of intercepting contaminated groundwater
- Contaminant exposure to environmental receptors from the impacts of intercepting contaminated groundwater.

Higher risks and increased management and/or remediation effort are likely to be associated with groundwater contamination where the source is not located on the construction site (i.e. where construction would not remove all and/or part of the contamination source) or where the source is located on-site and has the potential to migrate off-site.

20.5.4 Potential vapour and gas impact pathways

All potential vapour, odour and gas contamination identified can be managed to acceptable levels with the implementation of appropriate management measures and/or remediation.

Potential vapours from contaminated groundwater and landfill gas could accumulate within or below ground excavations and enclosed structures associated with Stage 1 at concentrations which could represent an asphyxiation risk, explosion risk or acute/chronic health risk. Vapours and gases may also represent an aesthetic risk where it accumulates or is otherwise observed by receivers.

20.6 Westmead metro station construction site

20.6.1 Existing environment and site contamination review

Land use

The construction site currently comprises low and medium residential, medical, commercial and rail infrastructure land uses. Existing land uses of interest from a contamination perspective include:

- A medical centre on the corner of Alexandra Avenue and Hawkesbury Road
- An automotive workshop on the corner of Alexandra Avenue and Hassall Street
- An unoccupied house on Hawkesbury Road.

Land use zones within and adjoining the construction site include:

- B4 – Mixed Use
- R2 – Low Density Residential
- R4 – High Density Residential
- SP2 – Infrastructure (rail).

Based on permitted land use with or without consent, the business (B4 – Mixed Use) and infrastructure (SP2 – Infrastructure (rail)) land use zones represent a higher potential contamination risk.

Site history

Historical aerial photography shows the construction site has had low density residential land uses since at least 1955, with scattered trees and vegetation. This land use has remained largely unchanged, with a number of extensions and subdivisions to properties within the construction site and widening of Alexandra Avenue in the 1960s.

Land uses in the area surrounding the construction site since the 1950s include low density residential development, commercial and industrial premises, large areas of open space including parks and ovals, and the existing Westmead Station. Former commercial and industrial premises may be associated with higher contamination risks.

Key developments in the surrounding area since the 1950s include:

- The development of local schools in the 1970s
- The development of Westmead Hospital in the 1980s and early 1990s.

Database searches

NSW EPA Contaminated Sites Register

There are no sites listed on the NSW Environment Protection Authority Contaminated Sites Register within 500 metres of the Stage 1 footprint.

NSW EPA Protection of the Environment Operations Act public register

There are no sites listed on the NSW EPA *Protection of the Environment Operations Act* public register within 500 metres of the Stage 1 footprint that have current environment protection licences.

20.6.2 Potential impacts

The potential contamination risk at the Westmead metro station construction site during Stage 1 is summarised in Table 20-5 and Figure 20-1. Overall, the soils and groundwater in the vicinity of the construction site and tunnel alignment have a moderate potential contamination risk due to current and historical activities. There is also the potential to expose contamination during the construction of the power supply route for the Westmead metro station construction site. Further data review and an appropriate management approach would be implemented in accordance with the measures in Section 20.17.

Table 20-5: Potential contamination risk – Westmead metro station construction site

Construction element and anticipated depth	Site of concern and potential source of contamination	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction footprint and scope				Potential contamination risk
		Media and COPCs	Contamination status	Rating	Location relative to Stage 1	Potential for contamination to be intersected by Stage 1	Exposure pathways	Rating	
Station (shallow excavation)	AEI 1 Existing Westmead Station – Residuals from historical and present railway usage	Surface soils Heavy metals, hydrocarbons (TRH, BTEX, PAH), pesticides, herbicides, asbestos	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and ecological receptors	PR1	Very low
Station and tunnel (shallow and depth)	AEI 2 Mechanical workshop / services – Leaks and spills from underground petroleum storage infrastructure / automotive repair work	Surface soils Heavy metals, hydrocarbons (TRH, BTEX, PAH), asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Contamination (if present) would be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate
		Groundwater Hydrocarbons (TRH, BTEX, PAH), volatile organic compounds (VOC)	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Contamination (if present) could be exposed during excavation of materials to the depth of construction	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
Station (shallow excavation)	AEI 3 Dumping of construction waste	Surface soils Heavy metals, hydrocarbons (TRH, PAH), pesticides, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust. Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate
Station (shallow excavation)	AEI 4 Dumping of construction waste and demolition of former structures	Surface soils Heavy metals, hydrocarbons (TRH, PAH), pesticides, asbestos	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate from source site and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Very low
Station (shallow excavation)	AEI 5 Former and existing structures – Hazardous building materials within or from on-site buildings / structures, demolition wastes	Surface soils Heavy metals, hydrocarbons (TRH, PAH), pesticides, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction site and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust. Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate
Westmead metro station construction site: Power supply route (shallow excavation)	Railway line and areas adjacent to waterways – Filling (material of unknown quality, construction wastes)	Surface soils Heavy metals, hydrocarbons (TRH, PAH), pesticides, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within PSR	Contamination (if present) would be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (der, ing, inh) with contaminated soils and dust Adjacent site users could be exposed to contamination via dust emissions (inh), namely asbestos	PR3	Moderate

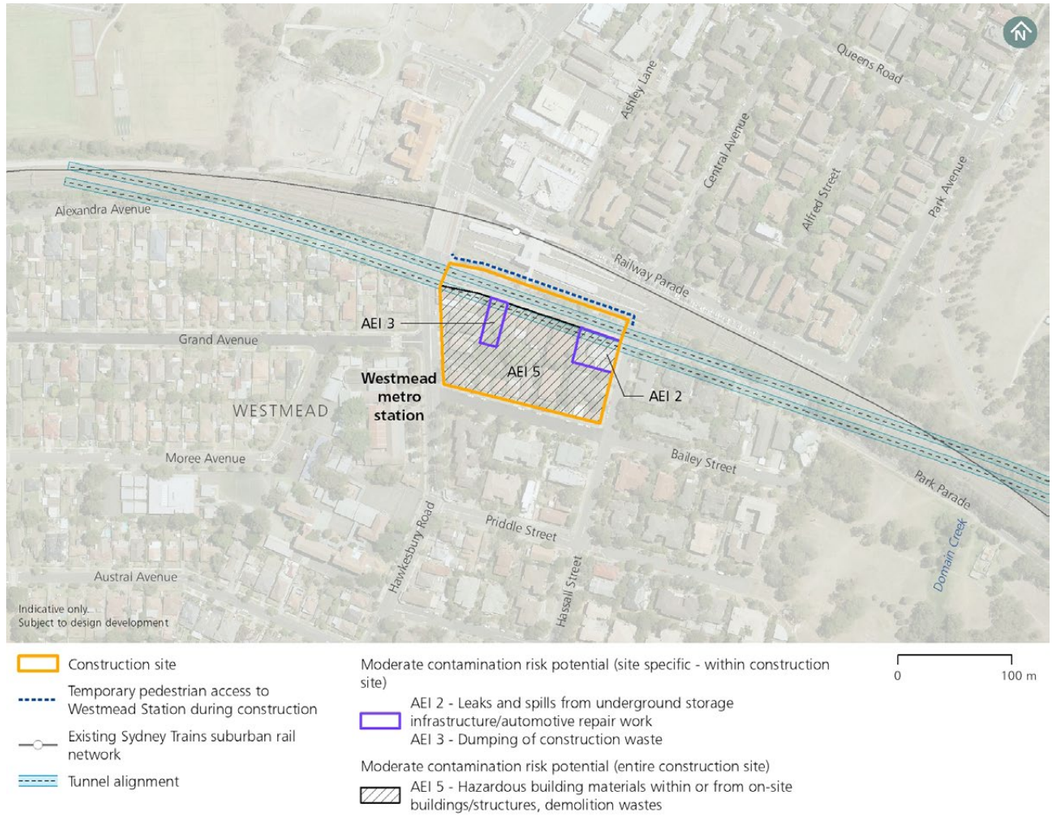

Figure 20-1: Potential contamination risk (moderate rating and above) – Westmead metro station construction site and tunnel alignment

20.7 Parramatta metro station construction site

20.7.1 Existing environment and site contamination review

Land use

The construction site currently comprises commercial, retail, services and education land uses and includes a multi-storey car park. Existing land uses of interest from a contamination perspective include (but are not limited to) a dry cleaning premises.

Land use zones within and adjoining the construction site include:

- B3 – Commercial Core
- B4 – Mixed Use.

Based on permitted land use with or without consent, the B4 – Mixed Use land use zone represents a higher potential contamination risk.

Site history

Historical aerial photography shows the construction site has comprised substantial commercial and industrial land uses since at least 1955. Commercial development at the site appears to intensify during the 1980s, with extensions and modifications to existing buildings and the development of multi-storey buildings and car parking. Minor changes are evident in the 1990s and 2000s, including increased streetscaping and vegetation.

In the area surrounding the construction site, land uses since the 1950s include large commercial and industrial premises, low density residential development, Parramatta Station, and large areas of open space in the vicinity of the current Parramatta Park and adjacent to Parramatta River. Commercial and industrial premises, and rail activities at Parramatta Station may be associated with higher contamination risks.

Key developments in the surrounding area since the 1950s include:

- Land reclamation along Parramatta River in the 1970s
- Construction of road bridges across Parramatta River in the 1980s.

Database searches

NSW EPA Contaminated Sites Register

There are two sites listed on the NSW EPA Contaminated Sites Register within 500 metres of the Stage 1 construction footprint at Parramatta. Details of the listings are provided in Table 20-6.

Table 20-6: Sites on the NSW EPA Contaminated Sites Register within 500 metres of the Stage 1 footprint – Parramatta

Site address	Site activity	Listing on the NSW EPA Contaminated Sites Register	Contamination status	Location relative to Stage 1
Corner of Pitt Street and Macquarie Street, Parramatta	Unclassified	Notified	Regulation under CLM Act not required	About 500 metres south-west of Parramatta metro station construction site and 100 metres south of the tunnel alignment
Parramatta Park toilet block demolition	Unclassified	Notified	Regulation under CLM Act not required	About 250 metres north of the tunnel alignment between Westmead and Parramatta metro station construction sites

NSW EPA Protection of the Environment Operations Act public register

There are no sites listed on the NSW EPA *Protection of the Environment Operations Act* public register within 500 metres of the Stage 1 footprint that have current environment protection licences.

20.7.2 Potential impacts

The potential contamination risk at the Parramatta metro station construction site during Stage 1 is summarised in Table 20-7 and Figure 20-2. Overall, the soils, groundwater and vapour in the vicinity of the construction site and tunnel alignment have a moderate potential contamination risk due to current and historical activities. Further data review and an appropriate management approach would be implemented in accordance with the measures in Section 20.17.

Table 20-7: Potential contamination risk – Parramatta metro station construction site

Construction element and anticipated depth	Site of concern and potential source of contamination	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction footprint and scope				Potential contamination risk
		Media and COPCs	Contamination status	Rating	Location relative to Stage 1	Potential for contamination to be intersected by Stage 1	Exposure pathways	Rating	
Station (shallow excavation)	AEI 6 Former and existing structures – Hazardous building materials within or from on-site buildings / structures, demolition wastes	Surface soil Heavy metals, hydrocarbons (TRH, PAH), pesticides, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust. Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate
Station and tunnel (shallow and depth)	AEI 7 Dry cleaners – Residuals from current dry cleaning activities. Inappropriate disposal of solvents, depth distribution associated with potential underground tanks	Surface soil Chlorinated hydrocarbons, VOCs	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent (volatilisation of compounds)	SE1	Within construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Very low
		Groundwater Chlorinated hydrocarbons, VOCs	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Contamination (if present) could be exposed during excavation of materials to the depth of construction	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
		Vapour Chlorinated hydrocarbons, VOCs	Contamination possibly present at concentrations above the relevant assessment criteria and potentially widespread	SE3	Within construction footprint and tunnel alignment	Contamination (if present) could be exposed during excavation of materials to the depth of construction	Construction workers could be exposed to contamination via vapour emissions. Adjacent site users could be exposed to contamination via vapour emissions (inhalation)	PR2	Moderate
Station and tunnel (shallow and depth)	AEI 8 Historical commercial / industrial use within locality – Inappropriate chemical storage and use, industrial operations, waste disposal and management etc	Surface soil Heavy metals, hydrocarbons (TRH, BTEX, PAH)	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust	PR3	Moderate
		Groundwater Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Contamination (if present) could be exposed during excavation of materials to the depth of construction	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
Station and tunnel (shallow and depth)	AEI9 Historical commercial / industrial use within locality – Inappropriate chemical storage and use, industrial operations, waste disposal and management etc	Surface soil Heavy metals, hydrocarbons (TRH, BTEX, PAH)	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Very low
		Groundwater Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Adjacent to construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
Sub-stations connections: All power supply routes (shallow excavation)	Sub-station including potential firefighting activities	Heavy metals, hydrocarbons (TRH, PAH), PCB, PFAS, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust. Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate

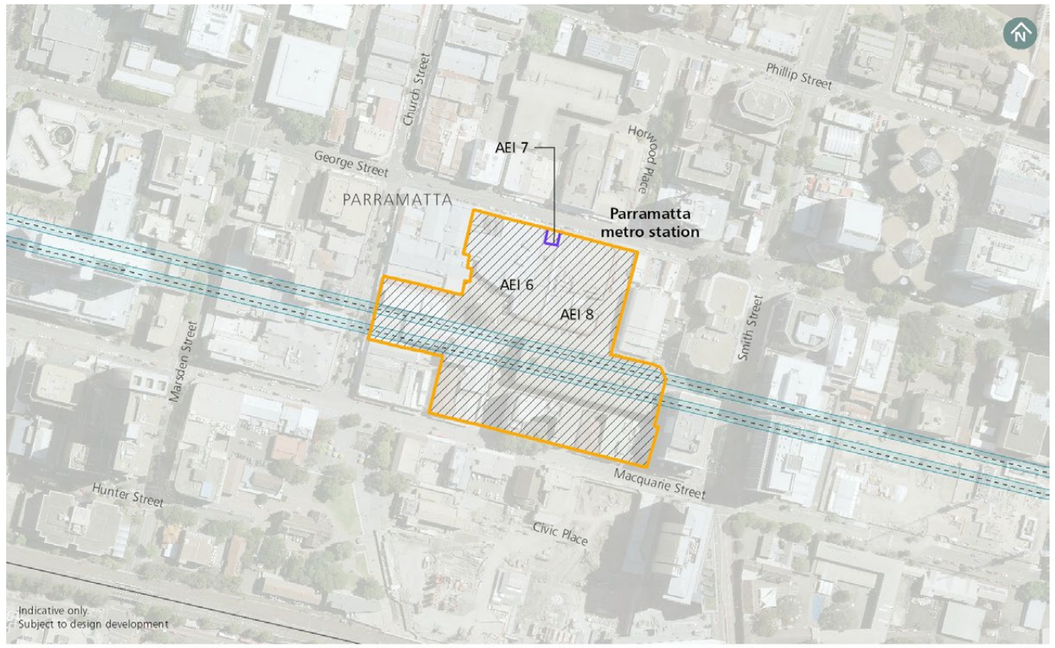

Figure 20-2: Potential contamination risk (moderate rating and above) – Parramatta metro station construction site and tunnel alignment

20.8 Clyde stabling and maintenance facility construction site

20.8.1 Existing environment and site contamination review

Land use

The construction site currently comprises commercial, industrial, rail infrastructure and private recreational land uses. Sydney Speedway (location on NSW Government owned land) is a key land use feature of the site. These existing land uses are all of interest from a contamination perspective. Duck Creek is also located within the construction site and is heavily vegetated.

Land use zones within and adjoining the construction site include:

- IN1 – General Industrial
- IN3 – Heavy Industrial
- SP2 – Infrastructure (Road and rail)
- B5 – Business Development
- W1 – Natural Waterways
- RE2 – Private Recreation.

Based on permitted land uses with or without consent, the infrastructure (SP2 – Infrastructure (Road and rail)), business (B5 – Business Development) and industrial (IN1 – General Industrial and IN3 – Heavy Industrial) land use zones represent a higher potential contamination risk.

Site history

Historical aerial photography shows that the construction site has comprised commercial, industrial and recreational land uses since the 1940s, including a race track on the current Sydney Speedway site. A'Becketts Creek and Duck Creek are also visible within the construction site from the 1950s, including areas of riparian vegetation. Reclamation and realignment work appears to have been carried out on some sections of these watercourses in the 1970s, along with increasing development of large industrial and warehousing land uses. There does not appear to have been substantial modification to land uses at the site since this time.

In the area surrounding the construction site, land uses since the 1940s include low density residential development, commercial and industrial premises, rail infrastructure, Rosehill Gardens racecourse and the former Shell Refinery (Viva Energy). Commercial and industrial premises, rail infrastructure and activities at Rosehill Gardens racecourse may be associated with higher contamination risks.

Key developments in the surrounding area since the 1940s include:

- Intensified commercial and industrial development in the 1970s
- Revegetation along the Parramatta River in the 1980s.

Database searches

NSW EPA Contaminated Sites Register

There are eight sites listed on the NSW EPA Contaminated Sites Register within 500 metres of the Stage 1 footprint at Clyde. Details of the listings are provided in Table 20-8.

Table 20-8: Sites on the NSW EPA Contaminated Sites Register within 500 metres of the Stage 1 footprint – Clyde

Site address	Site activity	Listing on the NSW EPA Contaminated Sites Register	Contamination status	Location relative to Stage 1
2 Ritchie Street, Rosehill	Unclassified	Formerly regulated	Contamination formerly regulated under the CLM Act	About 500 metres west of the Clyde stabling and maintenance facility construction site and tunnel alignment
Devon Street, Rosehill	Landfill (James Hardie Australia and former James Hardie lands)	Regulated	Asbestos contamination	About 500 metres north-east of the Clyde stabling and maintenance facility construction site and tunnel alignment
3 Parramatta (corner Harbord Street) Road, Clyde	Service station	Notified	Ongoing maintenance required to manage residual contamination (CLM Act)	About 250 metres south of the Clyde stabling and maintenance facility construction site and tunnel alignment
15-17 Berry Street, Granville	Other industry	–	Buried asbestos waste	About 500 metres south of the Clyde stabling and maintenance facility construction site and tunnel alignment
1 Grand Avenue, Camellia	Other industry activities (former James Hardie factory)	Regulated	Regulation under CLM Act not required	About 500 metres north-east of the tunnel alignment
9 Short Street, Auburn	Other industry (former Ajax chemical factory)	Regulated	Contamination being managed via the planning process (EP&A Act)	About 300 metres south-east of the Clyde stabling and maintenance facility construction site and 500 metres south of the tunnel alignment
Durham Street, Rosehill	Other industry (Former Shell Clyde Refinery)	Regulated	Ongoing maintenance required to manage residual contamination (CLM Act)	About 200 metres north-east of the Clyde stabling and maintenance facility construction site and within the tunnel alignment
Carnarvon Road, Silverwater	Landfill	Notified	Asbestos contamination in the fill material throughout most of the site	About 300 metres east of the Clyde stabling and maintenance facility construction site and 200 metres south of the tunnel alignment

NSW EPA Protection of the Environment Operations Act public register

There are eight sites listed on the NSW EPA *Protection of the Environment Operations Act* public register within 500 metres of the Stage 1 footprint at Clyde that have current environment protection licences. Details of the listings are provided in Table 20-9.

Table 20-9: Sites with current environment protection licences within 500 metres of the Stage 1 footprint – Clyde

Site address	Licence holder	Activity	Location relative to construction footprint and tunnel alignment
322 Parramatta Road, Clyde	Boral Cement Ltd	Cement of lime handling	• 360 metres from construction site
Parramatta Road, Clyde	Veolia Environmental Services (Australia) Pty Ltd	Non-thermal treatment of general waste Waste storage – other types of waste	• 400 metres from construction site
1A Unwin Street, Rosehill	Downer EDI Works Pty Ltd	Recovery of general waste Waste storage – other types of waste	• Within construction site • 200 metres from tunnel alignment
10 Colqhoun Street, Rosehill	James Hardie Australia Pty Ltd	Cement or lime handling Crushing, grinding or separating Concrete works	• 300 metres from construction site • 400 metres from tunnel alignment
Durham Street, Camellia	Viva Energy Australia Pty Ltd	Non-thermal treatment of hazardous and other waste Petroleum products storage	• 240 metres from tunnel alignment
181 James Ruse Drive, Camellia	Statewide Planning Pty Ltd	Contaminated soil treatment	• 360 metres from tunnel alignment
25 Wentworth Street, Granville	Heliport Developers Pty Ltd	Helicopter-related activity	• Within construction footprint
Corner of Newton Street North and Carnarvon Street, Silverwater	MET Recycling Pty Ltd	Recovery of general waste Waste storage – other types of waste	• 130 metres from tunnel alignment

20.8.2 Potential impacts

The potential contamination risk at the Clyde stabling and maintenance facility construction site during Stage 1 is summarised in Table 20-10 and Figure 20-3. Overall, the soils, groundwater and vapour in the vicinity of the construction site and tunnel alignment have a moderate potential contamination risk associated with current and historical activities. There is also potential to expose contamination during the construction of the power supply route for the Clyde stabling and maintenance facility construction site. Further data review and an appropriate management approach would be implemented in accordance with the measures in Section 20.17.

Table 20-10: Potential contamination risk – Clyde stabling and maintenance facility construction site

Construction element and anticipated depth	Site of concern and potential source of contamination	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction footprint and scope				Potential contamination risk
		Media and COPCs	Contamination status	Rating	Location relative to Stage 1	Potential for contamination to be intersected by Stage 1	Exposure pathways	Rating	
Tunnel (depth)	AEI 10 Historical industrial use (former James Hardie factory – 1 Grand Avenue, Camellia) – Known contamination in the fill material and groundwater at 1 Grand Avenue, Camellia	Surface soil Asbestos, arsenic	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Approx. 500 metres north east of tunnel alignment	Surficial contamination from source site unlikely to migrate and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and ecological receptors	PR1	Very low
		Groundwater Zinc, phenol, PAH	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 500 metres north east of tunnel alignment	Contaminated groundwater from the source site unlikely to migrate towards alignment (groundwater flow direction likely to be towards Parramatta River)	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and ecological receptors	PR1	Low
Clyde stabling and maintenance facility – civil construction works (land formation, services installation, drainage infrastructure) **Rosehill dive and tunnel portal structures (depth)**	AEI 11 Rosehill Gardens Racecourse – Equestrian related activities	Surface soil Pesticides, nutrients, disinfectants	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and ecological receptors	PR1	Very low
Clyde stabling and maintenance facility – civil construction works (land formation, services installation, drainage infrastructure)	AEI 12 Sydney Speedway – Leaks and spills from vehicle maintenance and use	Surface soil Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils Ecosystems of A'Becketts Creek, Duck Creek and Duck River could be exposed to contamination via uncontrolled releases (sediment) during construction	PR3	Moderate
Clyde stabling and maintenance facility – civil construction works (land formation, services installation, drainage infrastructure)	AEI 13 Former and existing structures – Hazardous building materials within or from on-site buildings / structures, demolition wastes	Surface soil Heavy metals, hydrocarbons (TRH, PAH), pesticides, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate
Tunnel and Rosehill services facility (depth)	AEI 14 Historical industrial use (former Shell Clyde Refinery – Durham Street, Rosehill) – Known groundwater contamination and current EPL	Groundwater Light non-aqueous phase liquid, hydrocarbons (TPH, BTEX, PAH), lead, chromium and perfluoroctane sulfonate.	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 200 metres north east of the construction footprint. Approx. 200 metres east of services facility shaft. Within tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater. Ecosystems of A'Becketts Creek, Duck Creek and Duck River could be exposed to contamination via uncontrolled releases (water) during construction	PR2	Moderate
		Vapor Hydrocarbons (TPH, BTEX)	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 200 metres north east of the construction footprint and within alignment	Contamination (if present) could be exposed during excavation of materials to the depth of construction	Construction workers could be exposed to contamination via contact (inhalation) with vapours. Adjacent site users could be exposed to contamination via vapour emissions (inhalation)	PR2	Moderate

Construction element and anticipated depth	Site of concern and potential source of contamination	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction footprint and scope				Potential contamination risk
		Media and COPCs	Contamination status	Rating	Location relative to Stage 1	Potential for contamination to be intersected by Stage 1	Exposure pathways	Rating	
Clyde stabling and maintenance facility – civil construction works (land formation, services installation, drainage infrastructure) **Rosehill services facility (surface and depth)**	AEI 15 Current commercial / industrial use within locality – Inappropriate chemical storage and use, industrial operations, waste disposal (e.g. James Hardie asbestos disposal sites) and management etc and current EPL (Downer EDI Works)	Surface soil Heavy metals, hydrocarbons (TRH, BTEX, PAH) and asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust	PR3	Moderate
		Groundwater Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater Ecosystems of A'Becketts Creek, Duck Creek and Duck River could be exposed to contamination via uncontrolled releases (sediment and water) during construction	PR2	Moderate
Clyde stabling and maintenance facility – civil construction works (land formation, services installation, drainage infrastructure) **Rosehill dive structure and tunnel portal (surface and depth)** **Rosehill services facility (surface and depth)**	AEI 16 Current commercial / industrial use within locality – Inappropriate chemical storage and use, industrial operations, waste disposal and management etc	Surface soil Heavy metals, hydrocarbons (TRH, BTEX, PAH)	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Very low
		Groundwater Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Adjacent to construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
Clyde stabling and maintenance facility – civil construction works (land formation, services installation, drainage infrastructure)	AEI 17 Land reclamation – Historical use of potentially contaminated fill within former waterways	Surface soil and soils at depth Heavy metals, hydrocarbons (TRH, PAH), pesticides, PCB, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Contamination (if present) will be exposed during excavation of surface and deeper materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust. Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos. Ecosystems of A'Becketts and Duck Creeks and Duck River could be exposed to contamination via uncontrolled releases (sediment) during construction	PR3	Moderate
Clyde stabling and maintenance facility – civil construction works (land formation, services installation, drainage infrastructure) **Tunnel (depth)**	AEI 18 Rosehill Helipad (Wentworth Street, Rosehill) – Leaks and spills from petroleum storage infrastructure, maintenance and refuelling, PFAS from hydraulic fluids and current EPL	Surface soil Hydrocarbons (TRH, BTEX, PAH), VOC, PFAS	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust Ecosystems of A'Becketts Creek, Duck Creek and Duck River could be exposed to contamination via uncontrolled releases (sediment) during construction	PR3	Moderate

Construction element and anticipated depth	Site of concern and potential source of contamination	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction footprint and scope				Potential contamination risk
		Media and COPCs	Contamination status	Rating	Location relative to Stage 1	Potential for contamination to be intersected by Stage 1	Exposure pathways	Rating	
	AEI 18 cont.	Groundwater Hydrocarbons (TRH, BTEX, PAH), VOC, PFAS	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Contamination (if present) could be exposed during excavation of materials to the depth of construction	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater Ecosystems of A'Becketts Creek, Duck Creek and Duck River could be exposed to contamination via uncontrolled releases (sediment and water) during construction Possible hydraulic separation for groundwater contamination between the tunnel and the source site by Duck River	PR2	Moderate
Clyde stabling and maintenance facility – civil construction works (land formation, services installation, drainage infrastructure) **Tunnel (depth)**	AEI 19 Rapid Oil Distributors (Deniehy Street, Rosehill) – Leaks and spills from petroleum storage infrastructure	Surface soil Hydrocarbons (TRH, BTEX, PAH)	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust Ecosystems of A'Becketts Creek, Duck Creek and Duck River could be exposed to contamination via uncontrolled releases (sediment) during construction	PR3	Moderate
		Groundwater Hydrocarbons (TRH, BTEX, PAH)	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Within construction footprint and tunnel alignment	Contamination (if present) could be exposed during excavation of materials to the depth of construction	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater. Ecosystems of A'Becketts Creek, Duck Creek and Duck River could be exposed to contamination via uncontrolled releases (water) during construction Possible hydraulic separation for groundwater contamination between the tunnel and the source site by Duck River	PR2	Low
Tunnel (depth) – East of Duck River only	AEI 20 Landfill (Carnavon Road, Silverwater) – PFAS containing waste materials	Groundwater PFAS	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 200 metres south south-east of the construction footprint and 100 metres west of tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint Groundwater contamination from source site unlikely to migrate and be exposed during construction of stabling facility (hydraulic separation from the source site by Duck River)	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater Ecosystems of Duck River could be exposed to contamination via uncontrolled releases (water) during construction	PR2	Moderate
Clyde stabling and maintenance facility construction site: Power supply route (shallow excavation)	Industrial wastes (potential asbestos wastes) may have been used in the construction of the roadways and as fill in the general locality	Surface soils Heavy metals, hydrocarbons (TRH, PAH), asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within PSR	Contamination (if present) would be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate
Clyde stabling and maintenance facility construction site: Power supply route (shallow excavation)	Historical industrial use (former Shell Clyde Refinery – Durham Street, Rosehill) – Known groundwater contamination	Groundwater Zinc, phenol, PAH	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Within PSR	Contamination (if present) unlikely to be exposed during excavation of surface materials at significant volumes	Significant contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and ecological receptors	PR1	Low

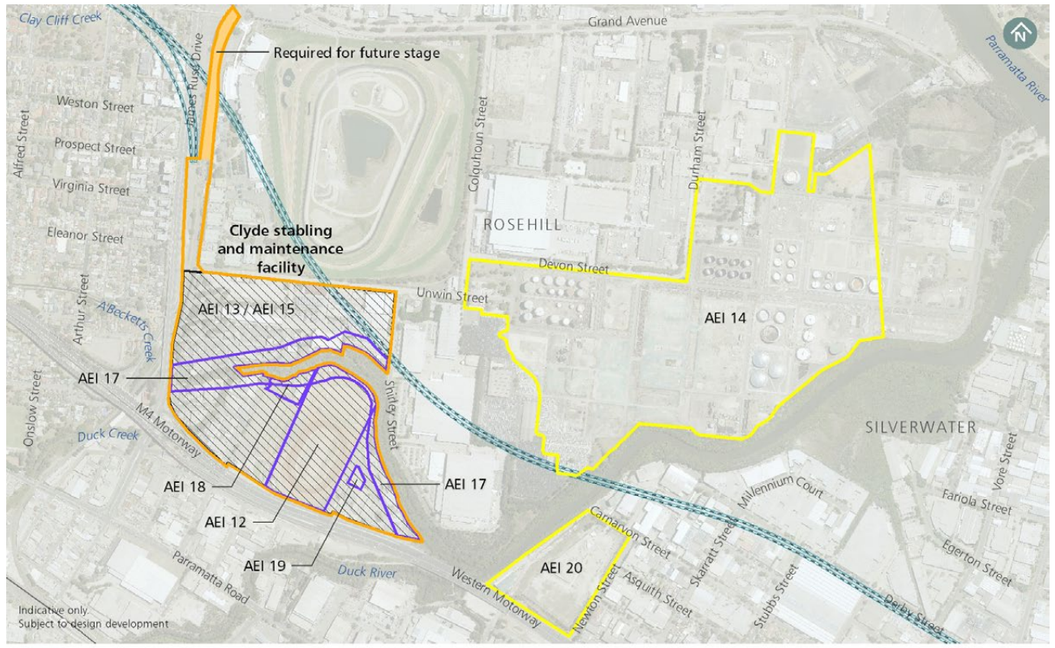

Figure 20-3: Potential contamination risk (moderate rating and above) – Clyde stabling and maintenance facility construction site and tunnel alignment

20.9 Silverwater services facility construction site

20.9.1 Existing environment and site contamination review

Land use

The construction site is currently vacant. The construction site comprises exposed, sandy soils, with a shipping container on the north-eastern boundary and a soil stockpile on the south-eastern boundary. The site is partially vegetated, with overgrown grasses, shrubs and trees on the western part of the construction site.

Land use zones within and adjoining the construction site include:

- IN1 – General Industrial
- SP2 – Infrastructure.

Based on permitted land use with or without consent, these land use zones represent a higher potential contamination risk.

Site history

Historical aerial photography shows that the construction site comprised a number of buildings, unsealed surfaces and vacant land in the 1950s. The site appears to have been developed in the 1970s, with the development of paved car parking and additional buildings. These buildings were demolished sometime after the 1970s.

Land uses in the area surrounding the construction site since the 1950s include low density residential development, medium-sized commercial and industrial premises and large areas of vacant land. Key developments in the surrounding area since the 1950s include the development of larger industrial, commercial and warehouses premises on surrounding vacant land in the 1970s and 1980s. Commercial and industrial premises may be associated with higher contamination risks.

Database searches

NSW EPA Contaminated Sites Register

There are three sites listed on the NSW EPA Contaminated Sites Register within 500 metres of the Stage 1 footprint at Silverwater. Details of the listings are provided in Table 20-11.

Table 20-11: Sites on the NSW EPA Contaminated Sites Register within 500 metres of the Stage 1 footprint – Silverwater

Site address	Site activity	Listing on the NSW EPA Contaminated Sites Register	Contamination status	Location relative to Stage 1
103-105 Silverwater Road, Silverwater	Other industry	Notified	Regulation under CLM Act not required	Within the Silverwater services facility construction site and above tunnel alignment
46-58 Derby Street, Silverwater	Unclassified (Former printing facility)	Notified	Under assessment	Adjacent to the Silverwater services facility construction site and above the tunnel alignment
54-58 Derby Street, Silverwater	Unclassified (Storage facility)	Regulated	Under assessment	Adjacent to the Silverwater services facility construction site and above the tunnel alignment

NSW EPA Protection of the Environment Operations Act public register

There are two sites listed on the NSW EPA *Protection of the Environment Operations Act* public register within 500 metres of the Stage 1 footprint at Silverwater that have current environment protection licences. Details of the listings are provided in Table 20-12.

Table 20-12: Sites with current environment protection licences within 500 metres of the Stage 1 footprint – Silverwater

Site address	Licence holder	Activity	Location relative to construction footprint and tunnel alignment
2-16 Wiblin Street, Silverwater	Cleanaway Daniels NSW Pty Ltd	Thermal treatment of hazardous and other waste Non-thermal treatment of hazardous and other waste Waste storage – hazardous, restricted solid, liquid, clinical and related waste and asbestos waste	• 150 metres from construction site • 60 metres from tunnel alignment
19-23 Fariola Street, Silverwater	Silverwater Recycling Pty Ltd	Waste storage – other types of waste Recovery of general waste	• 480 metres from tunnel alignment

20.9.2 Potential impacts

The potential contamination risk at the Silverwater services facility construction site during Stage 1 is summarised in Table 20-13 and Figure 20-4. Overall, the soils, groundwater and vapour in the vicinity of the construction site and tunnel alignment have a moderate to high potential contamination risk associated with current and historical activities. Further data review and an appropriate management approach would be implemented in accordance with the measures in Section 20.17.

Table 20-13: Potential contamination risk – Silverwater services facility construction site

Construction element and anticipated depth	Site of concern and potential source of contamination	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction footprint and scope				Potential contamination risk
		Media and COPCs	Contamination status	Rating	Location relative to Stage 1	Potential for contamination to be intersected by Stage 1	Exposure pathways	Rating	
Services facility (shallow excavation)	AEI 21 Former and existing structures – Hazardous building materials within or from on-site buildings / structures, demolition wastes	Surface soil Heavy metals, hydrocarbons (TRH, PAH), pesticides, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate
Services facility and tunnel (shallow and depth)	AEI 22 Historical industrial use (former storage facility – 54-58 Derby Street, Silverwater) – Known groundwater contamination	Vapour Chlorinated hydrocarbons, VOCs	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Within construction footprint and tunnel alignment	Contamination (if present) could be exposed during excavation of materials to the depth of construction	Construction workers could be exposed to contamination via vapour emissions (inhalation) Adjacent site users could be exposed to contamination via vapour emissions (inhalation)	PR2	Moderate
		Groundwater Chlorinated hydrocarbons, VOCs	Known contamination present at concentrations above the relevant assessment criteria and widespread	SE5	Within construction footprint and tunnel alignment	Contamination could be exposed during excavation of materials to the depth of construction	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	High
Services facility (shallow excavation)	AEI 23 Dumping / storage of construction waste (soil stockpile and general wastes)	Surface soils Heavy metals, hydrocarbons (TRH, PAH), pesticides, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust. Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate
Services facility and tunnel (shallow and depth)	AEI 24 Current commercial / industrial use within locality (construction machinery hire, mechanical workshops, offices, storage facilities, service station warehouses, offices, plastic fabrications and metal works, concrete recycling, metal manufacturing) – Inappropriate chemical storage and use, industrial operations, waste disposal and management etc and current EPL (Cleanaway Daniels NSW)	Surface soil Heavy metals, hydrocarbons (TRH, BTEX, PAH)	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Very low
		Groundwater Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Adjacent to construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
Services facility and tunnel (shallow and depth)	AEI 25 Historical commercial / industrial use within locality – Inappropriate chemical storage and use, industrial operations, waste disposal and management etc	Surface soil Heavy metals, hydrocarbons (TRH, BTEX, PAH)	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Very low
		Groundwater Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Adjacent to construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
Sub-stations connections: All power supply routes (shallow excavation)	Sub-station including potential firefighting activities	Heavy metals, hydrocarbons (TRH, PAH), PCB, PFAS, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust. Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate

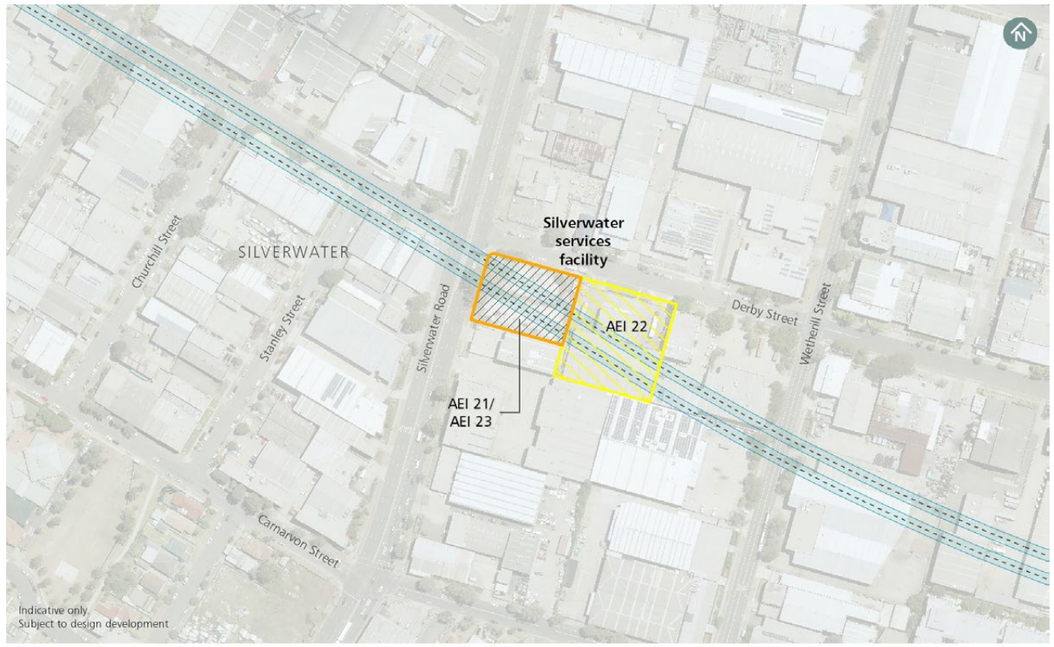

Figure 20-4: Potential contamination risk (moderate rating and above) – Silverwater services facility construction site and tunnel alignment

20.10 Sydney Olympic Park metro station construction site

20.10.1 Existing environment and site contamination review

Land use

The construction site currently comprises large commercial buildings and large carparking areas surrounded by street trees. The gardens and gatehouse associated with a federation-style building is located on the northern portion of the construction site.

Land use zones within and adjoining the construction site include B4 – Mixed Use. Based on permitted land use with or without consent, this land use zone represents a higher potential contamination risk.

Site history

Historical aerial photography shows that the construction site comprised large areas of open space and various road infrastructure in the 1950s. Railway infrastructure was developed in the 1970s and removed in the 1980s. Substantial development occurred at the site during the 1990s in preparation for the redevelopment of Homebush Bay for the 2000 Sydney Olympic Games. This current land use has remained consistent since the late 1990s.

Land uses in the area surrounding the construction site in the 1950s include large commercial and industrial premises, livestock holding yards and paddocks, a brick pit and mangroves along Parramatta River. These land uses (except for mangroves) may be associated with higher contamination risks.

Key developments in the surrounding area since the 1950s include:

- The substantial removal of vegetation and disturbance of terrain in the 1970s
- Landfill works in the 1970s
- Substantial development for the 2000 Sydney Olympic Games.

Database searches

NSW EPA Contaminated Sites Register

There are seven sites listed on the NSW EPA Contaminated Sites Register within 500 metres of the Stage 1 footprint at Sydney Olympic Park. Details of the listings are provided in Table 20-14.

Table 20-14: Sites on the NSW EPA Contaminated Sites Register within 500 metres of the Stage 1 footprint – Sydney Olympic Park

Site address	Site activity	Listing on the NSW EPA Contaminated Sites Register	Contamination status	Location relative to Stage 1
Kevin Coombes Drive, Sydney Olympic Park	Landfill (Haslams Creek South Area 3)	Formerly regulated	Contamination formerly regulated under the CLM Act	About 500 metres north of the tunnel alignment
Kevin Coombes Drive, Sydney Olympic Park	Landfill (Kronos Hill Landfill)	Regulated	Uncontrolled landfilling	About 500 metres north of the tunnel alignment
Sarah Durack Avenue, Sydney Olympic Park	Landfill (Former Golf Driving Range Landfill)	Regulated	Ongoing maintenance required to manage residual contamination (CLM Act)	About 400 metres south-east of the Sydney Olympic Park metro station construction site and above the tunnel alignment
Shane Gould Avenue, Sydney Olympic Park	Landfill (Aquatic Centre)	Regulated	Uncontrolled landfilling	About 100 metres south west of the Sydney Olympic Park metro station construction site and the tunnel alignment
Bicentennial Drive, Sydney Olympic Park	Landfill (Bicentennial Park)	Regulated	Ongoing maintenance required to manage residual contamination (CLM Act)	About 400 metres east of the Sydney Olympic Park metro station construction site and adjacent to the tunnel alignment
1 Underwood Road, Homebush	Other Industry (Mason park Substation)	Notified	Uncontrolled landfilling	About 400 metres south of the tunnel alignment
Corner Pondage Link and Hill Road, Homebush Bay	Landfill	Notified	Ongoing maintenance required to manage residual contamination (CLM Act)	Adjacent (north) to the tunnel alignment

NSW EPA Protection of the Environment Operations Act public register

There are two sites listed on the NSW EPA *Protection of the Environment Operations Act* public register within 500 metres of the Stage 1 footprint at Sydney Olympic Park that have current environment protection licences. Details of the listings are provided in Table 20-15.

Table 20-15: Sites with current environment protection licences within 500 metres of the Stage 1 footprint – Sydney Olympic Park

Site address	Licence holder	Activity	Location relative to construction footprint and tunnel alignment
Corner of Pondage Link and Hill Roads, Homebush Bay	Cleanaway Operations Pty Ltd	Waste storage – hazardous, restricted solid, liquid, clinical and related waste and asbestos waste Non-thermal treatment of hazardous and other waste	• Above tunnel alignment
Hill Road, Homebush Bay	Suez Recycling and Recovery Pty Ltd	Recovery of general waste Non-thermal treatment of general waste Waste storage – waste tyres Waste storage – hazardous, restricted solid, liquid, clinical and related waste and asbestos waste Waste storage – other types of waste	• 70 metres from tunnel alignment

20.10.2 Potential impacts

The potential contamination risk at the Sydney Olympic Park metro station construction site during Stage 1 is summarised in Table 20-16 and Figure 20-5. Overall, the groundwater and landfill gas in the vicinity of the construction site and tunnel alignment have a high potential contamination risk associated with current and historical activities. Further data review and an appropriate management approach would be implemented in accordance with the measures in Section 20.17.

Table 20-16: Potential contamination risk – Sydney Olympic Park metro station construction site

Construction element and anticipated depth	Site of concern and potential source of contamination	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction footprint and scope				Potential contamination risk
		Media and COPCs	Contamination status	Rating	Location relative to Stage 1	Potential for contamination to be intersected by Stage 1	Exposure pathways	Rating	
Tunnel (depth)	AEI 26 Waste storage – hazardous, restricted solid, liquid, clinical and related waste and asbestos waste Non-thermal treatment of hazardous and other waste	Groundwater Nutrients, heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC, PFAS.	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE2	Above the tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within the alignment	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater. Ecosystems of Haslams Creek and receiving waters could be exposed to contamination via uncontrolled releases (water) during construction	PR2	Moderate
Tunnel (depth)	AEI 27 Uncontrolled landfilling (former Haslams Creek South Area 3 Landfill – Kevin Coombes Drive, Sydney Olympic Park) – Known areas of waste and groundwater contamination	Waste Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC, PFAS, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 500 metres north of the tunnel alignment	Surficial contamination from source site unlikely to migrate from source site and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Low
		Groundwater Nutrients, heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC, PFAS	Known contamination present at concentrations above the relevant assessment criteria and widespread	SE5	Approx. 500 metres north of the tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within the alignment	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater. Ecosystems of Haslams Creek and receiving waters could be exposed to contamination via uncontrolled releases (water) during construction	PR2	High
		Vapour and landfill gas Methane, Hydrogen sulphide, carbon dioxide, VOC	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 500 metres north of the tunnel alignment	Potential for landfill gas and vapour from off-site source to be present at depth within the alignment	Construction workers could be exposed to contamination via landfill gas and vapour emissions (inhalation) Adjacent site users could be exposed to contamination via landfill gas and vapour emissions (inhalation)	PR2	Moderate
Tunnel (depth)	AEI 28 Uncontrolled landfilling (former Kronos Hill Landfill – Kevin Coombes Drive, Sydney Olympic Park) – Known areas of waste and groundwater contamination	Waste Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC, PFAS, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 500 metres north of the tunnel alignment	Surficial contamination from source site unlikely to migrate from source site and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Low

Construction element and anticipated depth	Site of concern and potential source of contamination	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction footprint and scope				Potential contamination risk
		Media and COPCs	Contamination status	Rating	Location relative to Stage 1	Potential for contamination to be intersected by Stage 1	Exposure pathways	Rating	
	AEI 28 cont.	Groundwater Nutrients, heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC, PFAS	Known contamination present at concentrations above the relevant assessment criteria and widespread	SE5	Approx. 500 metres north of the tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within the alignment	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater Ecosystems of Haslams Creek and receiving waters could be exposed to contamination via uncontrolled releases (water) during construction	PR2	High
		Vapour and landfill gas Methane, Hydrogen sulphide, carbon dioxide, VOC	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 500 metres north of the tunnel alignment	Potential for landfill gas and vapour from off-site source to be present at depth within the alignment	Construction workers could be exposed to contamination via landfill gas and vapour emissions (inhalation) Adjacent site users could be exposed to contamination via landfill gas and vapour emissions (inhalation)	PR2	Moderate
Tunnel (depth)	AEI 29 Uncontrolled landfilling (Corner Pondage Link and Hill Road, Sydney Olympic Park) – Known areas of waste and groundwater contamination	Waste Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC, PFAS, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Adjacent (north) of the tunnel alignment	Surficial contamination from source site unlikely to migrate from source site and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Low
		Groundwater Nutrients, heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC, PFAS	Known contamination present at concentrations above the relevant assessment criteria and widespread	SE5	Adjacent (north) of the tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within the alignment	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater. Ecosystems of Haslams Creek and receiving waters could be exposed to contamination via uncontrolled releases (water) during construction	PR2	High
		Vapour and landfill gas Methane, Hydrogen sulphide, carbon dioxide, VOC	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Adjacent (north) of the tunnel alignment	Potential for landfill gas and vapour from off-site source to be present at depth within the alignment	Construction workers could be exposed to contamination via landfill gas and vapour emissions (inhalation). Adjacent site users could be exposed to contamination via landfill gas and vapour emissions (inhalation)	PR2	Moderate
Station and tunnel (shallow and depth)	AEI 30 Uncontrolled landfilling (former Golf Driving Range Landfill – Sarah Durack Avenue, Sydney Olympic Park) – Known areas of waste and groundwater contamination	Waste Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC, PFAS, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 400 metres south-east of construction footprint and above the tunnel alignment	Surficial contamination from source site unlikely to migrate from source site and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Low
		Groundwater Nutrients, heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC, PFAS	Known contamination present at concentrations above the relevant assessment criteria and widespread	SE5	Approx. 400 metres south-east of construction footprint and above the tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater. Ecosystems of Lake Belvedere and receiving waters could be exposed to contamination via uncontrolled releases (water) during construction	PR2	High
		Vapour and landfill gas Methane, Hydrogen sulphide, carbon dioxide, VOC	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 400 metres south-east of construction footprint and above the tunnel alignment	Potential for landfill gas and vapour from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via landfill gas and vapour emissions (inhalation). Adjacent site users could be exposed to contamination via landfill gas and vapour emissions (inhalation)	PR2	Moderate

Construction element and anticipated depth	Site of concern and potential source of contamination	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction footprint and scope				Potential contamination risk
		Media and COPCs	Contamination status	Rating	Location relative to Stage 1	Potential for contamination to be intersected by Stage 1	Exposure pathways	Rating	
Station and tunnel (shallow and depth)	AEI 31 Uncontrolled landfilling (Aquatic Centre Landfill – Shane Gould Avenue, Sydney Olympic Park) – Known areas of waste and groundwater contamination	Waste Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC, PFAS, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 100 metres south west of construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate from source site and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Low
		Groundwater Nutrients, heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC, PFAS	Known contamination present at concentrations above the relevant assessment criteria and widespread	SE5	Approx. 100 metres south west of construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater. Ecosystems of Lake Belvedere and receiving waters could be exposed to contamination via uncontrolled releases (water) during construction	PR2	High
		Vapour and landfill gas Methane, Hydrogen sulphide, carbon dioxide, VOC	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 100 metres south west of construction footprint and tunnel alignment	Potential for landfill gas and vapour from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via landfill gas and vapour emissions (inhalation). Adjacent site users could be exposed to contamination via landfill gas and vapour emissions (inhalation)	PR2	Moderate
Station and tunnel (shallow and depth)	AEI 32 Uncontrolled landfilling (Bicentennial Park Landfill – Bicentennial Drive, Sydney Olympic Park) – Known areas of waste	Waste Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC, PFAS, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 400 metres east of construction footprint and adjacent to tunnel alignment	Surficial contamination from source site unlikely to migrate from source site and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Low
		Groundwater Nutrients, heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC, PFAS	Known contamination present at concentrations above the relevant assessment criteria and widespread	SE5	Approx. 400 metres east of construction footprint and adjacent to tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater. Ecosystems of Lake Belvedere and receiving waters could be exposed to contamination via uncontrolled releases (water) during construction	PR2	High
		Vapour and landfill gas Methane, Hydrogen sulphide, carbon dioxide, VOC	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 400 metres east of construction footprint and adjacent to tunnel alignment	Potential for landfill gas and vapour from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via landfill gas and vapour emissions (inhalation). Adjacent site users could be exposed to contamination via landfill gas and vapour emissions (inhalation)	PR2	Moderate
Station and tunnel (shallow and depth)	AEI 33 Former abattoir – Inappropriate chemical storage and use, waste disposal and burials	Surface soil Pathogens, pesticides	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate from source site and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Very low
		Groundwater Nutrients, pathogens	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Adjacent to construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater. Ecosystems of Lake Belvedere and receiving waters could be exposed to contamination via uncontrolled releases (water) during construction	PR2	Moderate

Construction element and anticipated depth	Site of concern and potential source of contamination	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction footprint and scope				Potential contamination risk
		Media and COPCs	Contamination status	Rating	Location relative to Stage 1	Potential for contamination to be intersected by Stage 1	Exposure pathways	Rating	
Tunnel (depth)	AEI 34 Mason Park Substation – Potential firefighting activities	PFAS	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 400 metres metres south of the tunnel alignment	Potential for contaminated groundwater to be present within the alignment	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater. Ecosystems of Lake Belvedere and receiving waters could be exposed to contamination via uncontrolled releases (water) during construction	PR2	Moderate
Sub-stations connections: All power supply routes (shallow excavation)	Sub-station including potential firefighting activities	Heavy metals, hydrocarbons (TRH, PAH), PCB, PFAS, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust. Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate

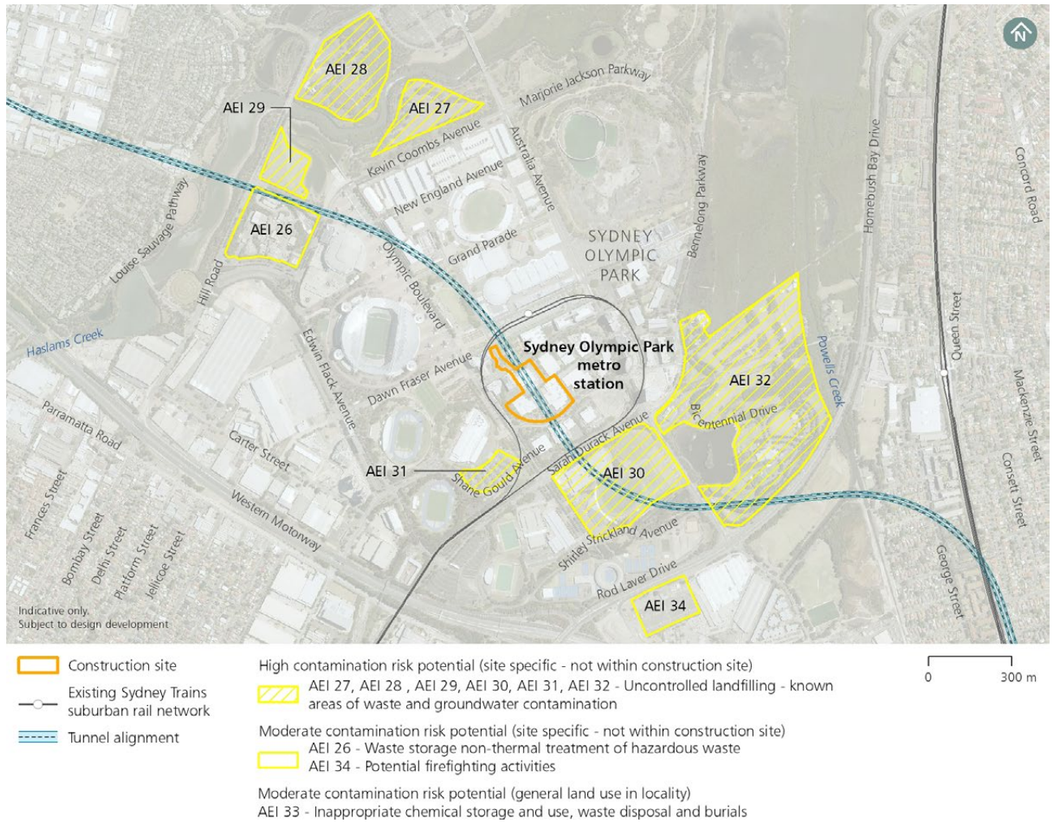

Figure 20-5: Potential contamination risk (moderate rating and above) – Sydney Olympic Park metro station construction site and tunnel alignment

20.11 North Strathfield metro station construction site

20.11.1 Existing environment and site contamination review

Land use

The construction site currently comprises areas within the existing North Strathfield Station. The northern construction site is currently vacant and includes vegetation along Queen Street. The southern construction site comprises restricted car parking and rail infrastructure.

Land use zones within and adjoining the construction site include:

- R2 – Low Density Residential
- R3 – Medium Density Residential
- SP2 – Infrastructure (rail)
- RE1 – Public Recreation
- B1 – Neighbourhood Centre
- B3 – Commercial Core
- B4 – Mixed Use.

Based on permitted land use with or without consent, the infrastructure (SP2 – Infrastructure (rail)) and mixed use (B4 – Mixed Use) land use zones represent a higher potential contamination risk.

Site history

Historical aerial photography shows that the construction site between the existing North Strathfield station and Queen Street has been vacant land since at least 1950. This land use has remained largely unchanged, with the development of a number of small buildings and structure in the 1980s and 1990s.

Land uses in the area surrounding the construction site since the 1950s include low density residential development, commercial and industrial premises, and the existing North Strathfield Station. Key developments in the surrounding area since the 1950s include the demolition of large commercial and industrial buildings to the west of the construction site in the 1980s, and development of medium density residential premises in the late 1990s and early 2000s. Commercial and industrial premises may be associated with higher contamination risks.

Database searches

NSW EPA Contaminated Sites Register

There are two sites listed on the NSW EPA Contaminated Sites Register within 500 metres of the Stage 1 footprint at North Strathfield. Details of the listings are provided in Table 20-17.

Table 20-17: Sites on the NSW EPA Contaminated Sites Register within 500 metres of the Stage 1 footprint – North Strathfield

Site address	Site activity	Listing on the NSW EPA Contaminated Sites Register	Contamination status	Location relative to Stage 1
143 Concord Road, North Strathfield	Service station	Notified	Regulation under CLM Act not required	About 340 metres south-east from the North Strathfield metro station construction site and tunnel alignment
92A Concord Road, North Strathfield	Service station (former)	Notified	Regulation under CLM Act not required	About 450 metres south-east from the North Strathfield metro station construction site and 50 metres north of the tunnel alignment

NSW EPA Protection of the Environment Operations Act public register

There is one site listed on the NSW EPA *Protection of the Environment Operations Act* public register within 500 metres of the Stage 1 footprint at North Strathfield that have current environment protection licences. Details of the listings are provided in Table 20-18.

Table 20-18: Sites with current environment protection licences within 500 metres of the Stage 1 footprint – North Strathfield

Site address	Licence holder	Activity	Location relative to construction footprint and tunnel alignment
25-27 Pomeroy Street, Homebush	Ausgrid Operator Partnership	Waste storage – hazardous, restricted solid, liquid, clinical and related waste and asbestos waste	460 metres from tunnel alignment

20.11.2 Potential impacts

The potential contamination risks at the North Strathfield metro station construction site during Stage 1 is summarised in Table 20-19 and Figure 20-6. Overall, the soils and groundwater in the vicinity of the construction site and tunnel alignment have a moderate potential contamination risk associated with current and historical activities. Further data review and an appropriate management approach would be implemented in accordance with the measures in Section 20.17.

Table 20-19: Potential contamination risk – North Strathfield metro station construction site

Construction element and anticipated depth	Site of concern and potential source of contamination	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction footprint and scope				Potential contamination risk
		Media and COPCs	Contamination status	Rating	Location relative to Stage 1	Potential for contamination to be intersected by Stage 1	Exposure pathways	Rating	
Station (shallow excavation)	AEI 35 Existing North Strathfield Station – Residuals from historical and current railway use	Surface soils Heavy metals, hydrocarbons (TRH, BTEX, PAH), pesticides, herbicides, asbestos	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and ecological receptors	PR1	Very low
Station and tunnel (depth)	AEI 36 Funeral home – Embalming chemicals	Groundwater Hydrocarbons (TRH, BTEX), solvents (namely formaldehyde)	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Adjacent to construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
Station and tunnel (shallow and depth)	AEI 37 Dry cleaners – Residuals from current dry cleaning activities	Surface soil Chlorinated hydrocarbons, VOCs	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Very low
		Groundwater Chlorinated hydrocarbons, VOCs	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Adjacent to construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
		Vapour Chlorinated hydrocarbons, VOCs	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Within construction footprint and tunnel alignment	Contamination (if present) could be exposed during excavation of materials to the depth of construction	Construction workers could be exposed to contamination via vapour emissions (inhalation) Adjacent site users could be exposed to contamination via vapour emissions (inhalation)	PR2	Moderate

Construction element and anticipated depth	Site of concern and potential source of contamination	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction footprint and scope				Potential contamination risk
		Media and COPCs	Contamination status	Rating	Location relative to Stage 1	Potential for contamination to be intersected by Stage 1	Exposure pathways	Rating	
Station (shallow excavation)	AEI 38 Former and existing structures – Hazardous building materials within or from on-site buildings / structures, demolition wastes	Surface soil Heavy metals, hydrocarbons (TRH, PAH), pesticides, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate
Station and tunnel (shallow and depth)	AEI 39 Historical commercial / industrial use within locality – Inappropriate chemical storage and use, industrial operations, waste disposal and management etc	Surface soil Heavy metals, hydrocarbons (TRH, BTEX, PAH)	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Very low
		Groundwater Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Adjacent to construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
Station and tunnel (shallow and depth)	AEI 40 Switch Yard (Underwood Road, North Strathfield) – Potential firefighting activities	Groundwater PFAS	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 500 metres west of construction site and the tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
Sub-stations connections: All power supply routes (shallow excavation)	Sub-station including potential firefighting activities	Heavy metals, hydrocarbons (TRH, PAH), PCB, PFAS, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust. Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate

Figure 20-6: Potential contamination risk (moderate rating and above) – North Strathfield metro station construction site and tunnel alignment

20.12 Burwood North Station construction site

20.12.1 Existing environment and site contamination review

Land use

The northern construction site currently comprises commercial, industrial and low-density residential land uses. The southern construction site currently includes commercial and industrial land uses. Existing land uses of interest from a contamination perspective include:

- Car mechanics
- An automotive dealership.

Parramatta Road is located between the northern and southern construction sites. Burwood Road is located adjacent to both construction sites.

Land use zones within and adjoining the construction site include:

- B6 – Enterprise Corridor
- SP2 – Infrastructure (road)
- B4 – Mixed Use
- R3 – Medium Density Residential
- R2 – Low Density Residential
- RE1 – Public Recreation.

Based on permitted land use with or without consent, the business (B6 – Enterprise Corridor and B4 – Mixed Use) and infrastructure (SP2 – Infrastructure (road)) land use zones represent a higher potential contamination risk.

Site history

Historical aerial photography shows that the construction site has comprised small-scale commercial, retail and industrial land uses in the 1950s, with low density residential premises in the north. This land use has remained largely unchanged, except for small structural extensions, modifications and demolitions in the 1980s and 1990s.

Land uses in the area surrounding the construction site since the 1950s include low density residential development, commercial, industrial and retail premises, and a large area of open space in the vicinity of the current Concord Oval site. Commercial and industrial premises may be associated with higher contamination risks.

Key developments in the surrounding area since the 1950s include:

- The formalisation of Burwood Road in the 1970s
- Development of Burwood Bus Depot in 1970s
- The development of Concord Oval in the 1980s, including grandstands and associated landscaping.

Database searches

NSW EPA Contaminated Sites Register

There are two sites listed on the NSW EPA Contaminated Sites Register within 500 metres of the Stage 1 footprint at Burwood. Details of the listings are provided in Table 20-20.

Table 20-20: Sites on the NSW EPA Contaminated Sites Register within 500 metres of the Stage 1 footprint – Burwood North

Site address	Site activity	Listing on the NSW EPA Contaminated Sites Register	Contamination status	Location relative to Stage 1
89 Parramatta Road, Concord	Service station	Notified	Regulation under CLM Act not required	About 100 metres south-west of the tunnel alignment
Corner Shaftesbury and Parramatta Road, Burwood	Other industry (Burwood STA Depot)	Formerly regulated	Contamination formerly regulated under the CLM Act.	About 100 metres south of the Burwood North Station construction site and the tunnel alignment

NSW EPA Protection of the Environment Operations Act public register

There are no sites listed on the NSW EPA *Protection of the Environment Operations Act* public register within 500 metres of the Stage 1 footprint that have current environment protection licences.

20.12.2 Potential impacts

The potential contamination risks at the Burwood North Station construction site during Stage 1 is summarised in Table 20-21 and Figure 20-7. Overall, the soils and groundwater in the vicinity of the construction site and tunnel alignment have a moderate potential contamination risk associated with current and historical activities. Further data review and an appropriate management approach would be implemented in accordance with the measures in Section 20.17.

Table 20-21: Potential contamination risk – Burwood North Station construction site

Construction element and anticipated depth	Site of concern and potential source of contamination	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction footprint and scope				Potential contamination risk
		Media and COPCs	Contamination status	Rating	Location relative to Stage 1	Potential for contamination to be intersected by Stage 1	Exposure pathways	Rating	
Station and tunnel (shallow and depth)	AEI 41 Mechanical workshop – Leaks and spills from automotive facilities, car dealerships and bus depot	Surface soil Heavy metals, hydrocarbons (TRH, BTEX, PAH), asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate
		Groundwater Hydrocarbons (TRH, BTEX, PAH), volatile organic compounds (VOC)	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
Station and tunnel (shallow and depth)	AEI 42 Car wash and detailing – Chemical and wax use	Surface soil Solvents (VOC), surfactants, PFAS	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate from source site and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Very low
		Groundwater Solvents (VOC), surfactants, PFAS compounds (VOC)	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Adjacent to construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
Station (shallow excavation)	AEI 43 Former and existing structures – Hazardous building materials within or from on-site buildings / structures, demolition wastes	Surface soil Heavy metals, hydrocarbons (TRH, PAH), pesticides, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate
Station (shallow excavation)	AEI 44 Parramatta Road – Vehicle particulate deposition	Surface soil Lead, PAHs, asbestos	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint	Surficial contamination (if present) could be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust	PR2	Moderate
Station and tunnel (shallow and depth)	AEI 45 Historical commercial / industrial use within locality – Inappropriate chemical storage and use, industrial operations, waste disposal and management etc	Surface soil Heavy metals, hydrocarbons (TRH, BTEX, PAH)	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Very low
		Groundwater Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Adjacent to construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
Sub-stations connections: All power supply routes (shallow excavation)	Sub-station including potential firefighting activities	Heavy metals, hydrocarbons (TRH, PAH), PCB, PFAS, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust. Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate

Figure 20-7: Potential contamination risk (moderate rating and above) – Burwood North Station construction site and tunnel alignment

20.13 Five Dock Station construction site

20.13.1 Existing environment and site contamination review

Land use

The western construction site currently comprises commercial land uses with external car parking facilities and street landscaping. The eastern construction site comprises low-density residential land uses with an external car parking facility and street landscaping.

Land use zones within and adjoining the construction site include:

- B4 – Mixed Use
- R3 – Medium Density Residential
- R2 – Low Density Residential
- RE1 – Public Recreation.

Based on permitted land use with or without consent, the mixed use land use zone represents a higher potential contamination risk.

Site history

Historical aerial photography shows that the construction site comprised low density residential and small-scale commercial, retail and industrial land uses fronting Great North Road in the 1950s. This land use remained largely unchanged until the late 1990s and early 2000s, with substantial demolition and redevelopment commercial, industrial and residential premises on the western construction site.

Land uses in the area surrounding the construction site since the 1950s include low density residential development, small commercial and industrial premises, and a large open space in the vicinity of the current Five Dock Park. These land uses have remained largely consistent, except for localised demolition and redevelopment works. Commercial and industrial premises may be associated with higher contamination risks.

Database searches

NSW EPA Contaminated Sites Register

There are two sites listed on the NSW EPA Contaminated Sites Register within 500 metres of the Stage 1 footprint at Five Dock. Details of the listings are provided in Table 20-22.

Table 20-22: Sites on the NSW EPA Contaminated Sites Register within 500 metres of the Stage 1 footprint – Five Dock

Site address	Site activity	Listing on the NSW EPA Contaminated Sites Register	Contamination status	Location relative to Stage 1
231-235 Great North Road, Five Dock	Service Station	Notified	Regulation under CLM Act not required	About 200 metres north of the Five Dock Station construction site and tunnel alignment
47 Ramsay Road, corner Fairlight Street, Five Dock	Service Station	Notified	Regulation under CLM Act not required	Approximately 120 metres south of the Five Dock Station construction site and tunnel alignment

NSW EPA Protection of the Environment Operations Act public register

There are no sites listed on the NSW EPA *Protection of the Environment Operations Act* public register within 500 metres of the Stage 1 footprint that have current environment protection licences.

20.13.2 Potential impacts

The potential contamination risk at the Five Dock Station construction site during Stage 1 is summarised in Table 20-23 and Figure 20-8. Overall, the soils and groundwater in the vicinity of the construction site and tunnel alignment have a moderate potential contamination risk associated with current and historical activities. Further data review and an appropriate management approach would be implemented in accordance with the measures in Section 20.17.

Table 20-23: Potential contamination risk – Five Dock Station construction site

Construction element and anticipated depth	Site of concern and potential source of contamination	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction footprint and scope				Potential contamination risk
		Media and COPCs	Contamination status	Rating	Location relative to Stage 1	Potential for contamination to be intersected by Stage 1	Exposure pathways	Rating	
Station and tunnel (depth)	AEI 46 Funeral home – Embalming chemicals	Groundwater Hydrocarbons (TRH, BTEX), solvents (namely formaldehyde)	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Approx. 150 metres north and south of the construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
Station (shallow excavation)	AEI 47 Former and existing structures – Hazardous building materials within or from on-site buildings / structures, demolition wastes	Surface soil Heavy metals, hydrocarbons (TRH, PAH), pesticides, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate
Station (shallow excavation)	AEI 48 Chamber Substation – Operational sub-station	Surface soil PCB	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate from source site and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Very low
Station and tunnel (depth)	AEI 49 Former service station – Leaks and spills from underground petroleum storage infrastructure	Groundwater Hydrocarbons (TRH, BTEX)	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Low
Station and tunnel (shallow and depth)	AEI 50 Historical commercial / industrial use within locality – Inappropriate chemical storage and use, industrial operations, waste disposal and management etc	Surface soil Heavy metals, hydrocarbons (TRH, BTEX, PAH)	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Very low
		Groundwater Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Adjacent to construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
Sub-stations connections: All power supply routes (shallow excavation)	Sub-station including potential firefighting activities	Heavy metals, hydrocarbons (TRH, PAH), PCB, PFAS, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust. Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate

Figure 20-8: Potential contamination risk (moderate rating and above) – Five Dock Station construction site and tunnel alignment

20.14 The Bays Station construction site

20.14.1 Existing environment and site contamination review

Land use

The construction site is located within the White Bay industrial area adjacent to the former White Bay Power Station. The site is largely vacant and comprises paved asphalt surfaces with some grassed areas. Land use features includes:

- A large fenced-off stockpile comprising soil and ballast
- A bus stop
- Two historical rail lines extending from the south-west to the north-east of the site
- Several historical groundwater wells
- A historical pond associated with the power station along the north-western boundary of the site
- A storage area for old timber and electrical infrastructure in the south-western portion of the site.

Land use zones within and adjoining the construction site include:

- Port and Employment
- IN2 – Light Industrial
- W1 – Maritime Waters.

Based on permitted land use with or without consent, the IN2 – Light Industrial land use zone represents a higher potential contamination risk.

Site history

Historical aerial photography shows that the construction site has comprised heavy industrial land uses associated with the former White Bay Power Station since at least 1930, including stockpiling, rail and wharf infrastructure. This land use remained largely unchanged until the 1980s, following the decommissioning of White Bay Power Station. Since the 1980s, the site has undergone minor changes, including increases in vacant land and the addition of road or rail infrastructure across the site.

Land uses in the area surrounding the construction site since the 1930s include residential development, commercial and industrial premises, and White Bay. Commercial and industrial premises may be associated with higher contamination risks. Key developments in the surrounding area since the 1930s include:

- The use of bulk storage tanks between the 1940s and 1970s
- Potential land reclamation in White Bay in the 1970s
- Commercial and industrial development, including disturbance of terrain and earth works in the 1970s and 1990s
- Extensions and modifications to residential and commercial/industrial areas in the 1980s
- The use of Glebe Island for the storage of motor vehicles in the 1990s.

Database searches

NSW EPA Contaminated Sites Register

There are five sites listed on the NSW EPA Contaminated Sites Register within 500 metres of the Stage 1 footprint at The Bays. Details of the listings are provided in Table 20-24.

Table 20-24: Sites on the NSW EPA Contaminated Sites Register within 500 metres of the Stage 1 footprint – The Bays

Site address	Site activity	Listing on the NSW EPA Contaminated Sites Register	Contamination status	Location relative to Stage 1
Robert Street, Rozelle	Other Industry (White Bay Power Station)	Formerly regulated	EHC Act Revocation Notice (Former)	Within The Bays Station construction site and above tunnel alignment
Reynolds Street, Rozelle	Former Unilever Sulphonation Plant	Formerly regulated	Asbestos and PCB contamination	About 400 metres north-west of The Bays Station construction site and tunnel alignment
178-180 Victoria Road, Rozelle	Service station	Notified	EHC Act Revocation Notice (Former)	About 300 metres north of the tunnel alignment
121 Victoria Road, Rozelle	Service station	Notified	Heavy metals, polycyclic aromatic hydrocarbons, linear alkylbenzene and linear alkylbenzene sulphonate compound contamination	About 350 metres north of the tunnel alignment
15-39 Wellington Street, Rozelle	Other petroleum	Notified	Regulation under CLM Act not required	About 450 metres north of the tunnel alignment

NSW EPA Protection of the Environment Operations Act public register

There are nine sites listed on the NSW EPA *Protection of the Environment Operations Act* public register within 500 metres of the Stage 1 footprint at The Bays that have current environment protection licences. Details of the listings are provided in Table 20-25.

Table 20-25: Sites with current environment protection licences within 500 metres of the Stage 1 footprint – The Bays

Site address	Licence holder	Activity	Location relative to construction footprint and tunnel alignment
Sommerville Road, Rozelle	Cement Australia Holdings Pty Ltd	Shipping in bulk Cement or lime handling	• Adjacent to construction site • 50 metres from tunnel alignment
Sommerville Road, Rozelle	Gypsum Resources Australia Pty Ltd	Shipping in bulk	• Adjacent to construction site • 50 metres from tunnel alignment
WestConnex between the M4-M5 Mainline Tunnels and Rozelle, Rozelle	John Holland Pty Ltd	Road construction (WestConnex)	• Adjacent to construction site
Sommerville Road, Rozelle	Newcastle Port Corporation	Shipping in bulk	• Adjacent to construction site
James Craig Road, Rozelle	Transport for NSW	Boat construction/maintenance (general)	• 150 metres from construction site • 200 metres from tunnel alignment
Lot 1 Sommerville Road, Rozelle	Sugar Australia Pty Ltd	General agricultural processing Shipping in bulk	• Adjacent to construction site • 50 metres from tunnel alignment
James Craig Road, Rozelle	Sydney Boathouse Holdings Pty Ltd	Boat mooring and storage	• 130 metres from construction site • 160 metres from tunnel alignment
37 James Craig Road, Rozelle	Sydney City Marine Pty Ltd	Boat construction/maintenance (general)	• 210 metres from construction site • 200 metres from tunnel alignment
Berth 4 White Bay Robert Street, Balmain	Port Authority of NSW	Shipping in bulk	• Adjacent to construction site • 50 metres from tunnel alignment

20.14.2 Potential impacts

The potential contamination risks at The Bays Station construction site during Stage 1 is summarised in Table 20-26 and Figure 20-9. Overall, the soils and groundwater in the vicinity of the construction site and tunnel alignment have a moderate potential contamination risk associated with current and historical activities. There is also potential to expose contamination during the construction of the power supply route for the Bays Station construction site. Further data review and an appropriate management approach would be implemented in accordance with the measures in Section 20.17.

Table 20-26: Potential contamination risk – The Bays Station construction site

Construction element and anticipated depth	Site of concern and potential source of contamination	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction footprint and scope				Potential contamination risk
		Media and COPCs	Contamination status	Rating	Location relative to Stage 1	Potential for contamination to be intersected by Stage 1	Exposure pathways	Rating	
Tunnel (depth)	AEI 51 Historical commercial / industrial use (including 469-483 Balmain Road, Lilyfield) – Inappropriate chemical storage and use, industrial operations, waste disposal and management etc	Groundwater Heavy metals, hydrocarbons (TRH, BTEX, PAH), volatile organic compounds (VOC)	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Adjacent to construction footprint and alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (der, ing) with contaminated groundwater	PR2	Moderate
Station and tunnel (shallow and depth)	AEI 52 Mechanical workshop – Leaks and spills from automotive facilities	Surface soil Heavy metals, hydrocarbons (TRH, BTEX, PAH), asbestos	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate from source site and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Very low
		Groundwater Hydrocarbons (TRH, BTEX, PAH), VOC	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Adjacent to construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater Ecosystems of White Bay could be exposed to contamination via uncontrolled releases (sediment and water) during construction	PR2	Moderate

Construction element and anticipated depth	Site of concern and potential source of contamination	Contamination severity and extent assessment			Pathways and receptors Assessment of relationship to construction footprint and scope				Potential contamination risk
		Media and COPCs	Contamination status	Rating	Location relative to Stage 1	Potential for contamination to be intersected by Stage 1	Exposure pathways	Rating	
Station and tunnel (shallow and depth)	AEI 53 Former White Bay Power Station activities (with substation) and structures (including potential firefighting activities)	Surface soil Heavy metals, hydrocarbons (TRH, PAH), PCB, asbestos, PFAS	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate
		Groundwater Heavy metals, hydrocarbons (TRH, PAH), PFAS	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Contamination (if present) could be exposed during excavation of materials to the depth of construction	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater Ecosystems of White Bay could be exposed to contamination via uncontrolled releases (water) during construction	PR2	Moderate
Station and tunnel (shallow and depth)	AEI 54 Land reclamation – Historical use of potentially contaminated fill adjacent to waterways	Surface soil Heavy metals, hydrocarbons (TRH, PAH), pesticides, PCB, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate
		Groundwater Heavy metals, hydrocarbons (TRH, PAH)	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Contamination (if present) could be exposed during excavation of materials to the depth of construction	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater Ecosystems of White Bay could be exposed to contamination via uncontrolled releases (water) during construction	PR2	Moderate
Station and tunnel (shallow and depth)	AEI 55 Historical commercial / industrial use – Inappropriate chemical storage and use, industrial operations, waste disposal and management etc	Surface soil Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC, PFAS	Low potential for contamination to be present at concentrations above the relevant assessment criteria and limited in extent	SE1	Adjacent to construction footprint and tunnel alignment	Surficial contamination from source site unlikely to migrate and be exposed during construction	Contamination unlikely to be exposed during construction and therefore unlikely to impact upon human and environmental receptors	PR1	Very low
		Groundwater Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC, PFAS	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Adjacent to construction footprint and tunnel alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
Station and tunnel (depth)	AEI 56 Switch Yard (Manning Street, Rozelle) – Potential firefighting activities	Groundwater PFAS	Contamination possibly present at concentrations above the relevant assessment criteria and widespread	SE3	Approx. 300 metres north of the alignment	Potential for contaminated groundwater migration from off-site source to be present at depth within construction footprint	Construction workers could be exposed to contamination via contact (direct contact, ingestion) with contaminated groundwater	PR2	Moderate
The Bays metro station construction site: Power supply route (shallow excavation)	Wastes associated with historical industry within the general locality or from harbourside industry (potential coal/coke wastes, ash and slag) to have been used in the construction of the roadways and as fill in the general locality	Surface soils Heavy metals, hydrocarbons (TRH, PAH), PCB, PFAS, asbestos	Contamination possibly present at concentrations above the relevant assessment criteria and limited in extent	SE2	Within construction footprint and tunnel alignment	Surficial contamination (if present) will be exposed during excavation of surface materials	Construction workers could be exposed to contamination via contact (direct contact, ingestion, inhalation) with contaminated soils and dust. Adjacent site users could be exposed to contamination via dust emissions (inhalation), namely asbestos	PR3	Moderate

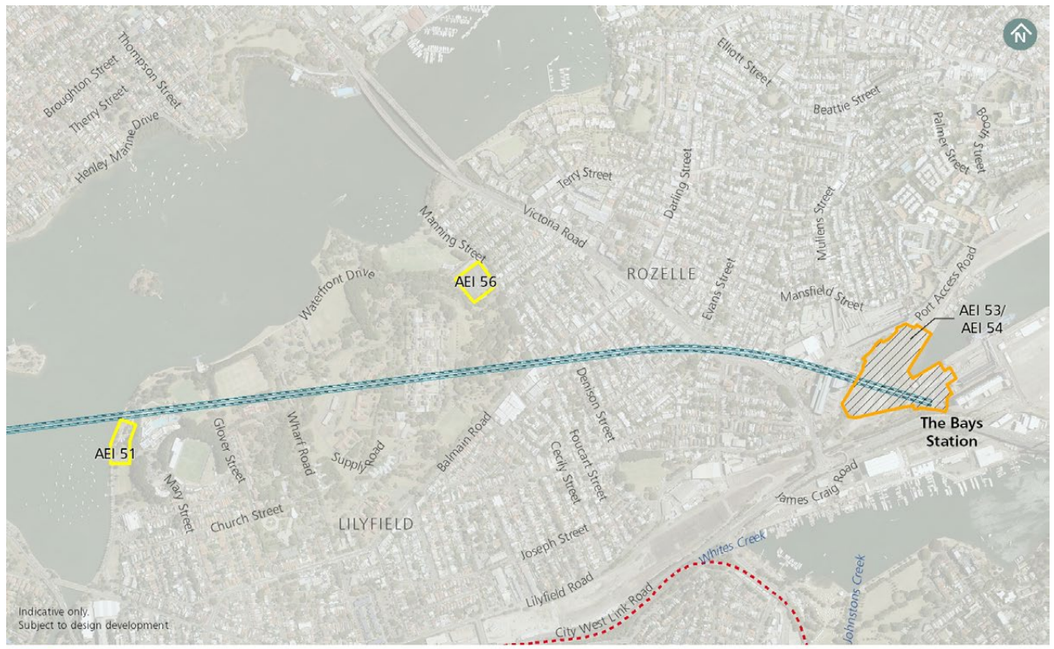

Figure 20-9: Potential contamination risk (moderate rating and above) – The Bays Station construction site and tunnel alignment

20.15 Contamination overall assessment

A summary of the potential contamination risks at the Stage 1 construction sites is provided in Table 20-27.

Table 20-27: Summary of potential contamination risks to Stage 1

Construction site	Potential contamination risks to Stage 1			Overall potential contamination risk
	Soil	Groundwater	Vapour/gas	
Westmead metro station	●	●		Moderate
Parramatta metro station	●	●	●	Moderate
Clyde stabling and maintenance facility	●	●	●	Moderate
Silverwater services facility	●	●	●	Moderate to high
Sydney Olympic Park metro station		●	●	High
North Strathfield metro station	●			Moderate
Burwood North Station	●	●		Moderate
Five Dock Station	●			Moderate
The Bays Station	●	●		Moderate

20.16 Cumulative impacts

Potential cumulative impacts were considered for assessment based on the likely interactions of Stage 1 with other projects and plans that met the adopted screening criteria. The approach to assessment and the other projects considered are described further in Appendix G (Cumulative impacts assessment methodology – Stage 1).

Potential cumulative contamination impacts could occur if Stage 1 activities were to interact with existing contamination or remediation activities of adjoining or nearby sites which could potentially cause a greater impact.

Provided that contamination assessed as part of this report is managed in accordance with the measures in Section 20.17, Stage 1 is unlikely to generate cumulative impacts with other projects and plans.

20.17 Management and mitigation measures

20.17.1 Approach to management and mitigation

Stage 1 contamination impacts would be managed in accordance with the Construction Environmental Management Framework.

The Construction Environmental Management Framework includes a requirement to prepare a Soil and Water Management Plan which would include management measures for contaminated material (soils, water and building materials) and a contingency plan in the case of unanticipated discovery of contaminated material.

More details of the Construction Environmental Management Framework are provided in Chapter 27 (Synthesis of the Environmental Impact Statement) and Appendix D.

20.17.2 Mitigation measures

Specific mitigation measures to address potential contamination risks associated with Stage 1 are listed in Table 20-28.

Table 20-28: Mitigation measures – Contamination Stage 1

Reference	Impact/issue	Mitigation measure	Applicable location(s)[1]
C1	Management of low risk contamination	For sites where potential contamination risk is moderate, high or very high, a further review of data would be performed. Where the additional data review provides sufficient information to confirm that contamination is likely to have a very low or low risk, the site would then be managed in accordance with the Soil and Water Management Plan. This would typically occur where there is minor, isolated contamination that can be readily remediated through standard construction practices such as excavation and off-site disposal.	All
C2	Detailed Site Investigation	Where data from the additional data review (mitigation measure C1) is insufficient to understand the risk of contamination, a Detailed Site Investigation would be carried out in accordance with the National Environment Protection Measure (2013) and other guidelines made or endorsed by the NSW EPA. The sites requiring a Detailed Site Investigation would be confirmed following the additional data review (mitigation measure C1), however on the basis of the Stage 1 assessment, it is anticipated that Detailed Site Investigations would be required at the applicable locations.	CSMF, SSF, SOPMS, TBS
C3	Remediation	Where data from the additional data review (mitigation measure C1) or the Detailed Site Investigation (mitigation measure C2) confirms that contamination would have a moderate, high or very high risk, a Remediation Action Plan would be developed for the area of the construction footprint. Each Remediation Action Plan would detail the remediation works required to mitigate risks from contamination throughout and following completion of construction. The Remediation Action Plan would be prepared in accordance with relevant NSW EPA guidelines and where applicable, detail remediation methodologies in accordance with Australian Standards and other relevant government guidelines and codes of practice. Remediation would be performed as an integrated component of construction and to a standard commensurate with the proposed end use of the land. The sites requiring Remediation Action Plans and remediation would be confirmed following the additional data review (mitigation measure C1) and Detailed Site Investigation (mitigation measure C2), however on the basis of the Stage 1 assessment, it is anticipated that Remediation Action Plans and remediation could be required at the specified application locations.	CSMF, SSF, SOPMS, TBS
C4	Site Audit Statement	Where contamination is highly complex, such as significant groundwater contamination; contamination associated with vapour; contamination that requires specialised remediation techniques; or contamination that requires ongoing active management during and beyond construction; an accredited Site Auditor would review and approve the Remediation Action Plan and would develop a Site Audit Statement and Site Audit Report upon completion of remediation. The sites requiring Site Audit Statements would be confirmed following the preparation of Remediation Action Plans (mitigation measure C3), however on the basis of the Stage 1 assessment, it is anticipated that site auditing would be required at the specified applicable locations.	CSMF, SOPMS, TBS, and as applicable
C5	Residual contamination following construction	Ongoing management and monitoring measures would be documented in an appropriate form and implemented for any areas where minor, residual contamination remains following construction.	As applicable

Note 1: WMS: Westmead metro station; PMS: Parramatta metro station; CSMF: Clyde stabling and maintenance facility; SSF: Silverwater services facility; SOPMS: Sydney Olympic Park metro station; NSMS: North Strathfield metro station; BNS: Burwood North Station; FDS: Five Dock Station; TBS: The Bays Station; Metro rail tunnels: Metro rail tunnels not related to other sites (e.g. tunnel boring machine works); PSR: Power supply routes.

20.17.3 Interactions between mitigation measures

Mitigation measures in other chapters that are relevant to the management of potential contamination impacts include:

- Chapter 18 (Groundwater and ground movement – Stage 1), specifically measures which address monitoring of groundwater for contaminants of concern
- Chapter 19 (Soils and surface water quality – Stage 1), specifically measures which address the disturbance of contaminated soils during construction
- Chapter 24 (Spoil, waste management and resource use – Stage 1), specifically measures which address waste classification and disposal.

Together, these measures would minimise the potential impacts of Stage 1.

There are no mitigation measures identified in the assessment of other environmental aspects that are likely to affect the assessment of contamination impacts.

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