

Chapter 16

Contamination

16 Contamination

This chapter provides an assessment of the potential contamination impacts as a result of this proposal and identifies mitigation measures to minimise these impacts. This chapter draws on information provided in Technical Paper 8 (Contamination).

16.1 Overview

The design of the proposal has avoided known contaminated sites present at or nearby the Pyrmont Station or Hunter Street Station (Sydney CBD) construction sites. The potential risks of encountering contamination would be appropriately managed to minimise impacts on human health and ecological receivers.

Based on the findings of the desktop review and site inspections, several known and potential contamination sources or areas of specific geological conditions have been identified as areas of environmental interest (AEIs) within and/or adjacent to the proposal. Most of these areas of environmental interest would represent a very low or low potential contamination risk to receivers as a result of the proposal.

Potential groundwater contamination in the vicinity of the Pyrmont Station construction sites resulting from historic 'general industrial use' in the Pyrmont area is considered to have a moderate risk of potential impacts to receivers during construction. In addition, potential acid sulfate soils have been identified as representing a moderate potential contamination risk for the Pyrmont Station eastern construction site. Saline soils may also be present within the same extent as the potential acid sulfate soils.

Mitigation measures would be implemented to manage potential contamination impacts. Where required, additional data review will be undertaken to inform these measures. Where there is insufficient data available, detailed site investigations may be required. Where contamination is identified to present a moderate or higher risk to receivers, a Remediation Action Plan or other management plan will be implemented as required.

16.2 Legislative and policy context

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

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

- *Environmental Planning and Assessment Act 1979*
- *Contaminated Land Management Act 1997*
- *Protection of the Environment Operations Act 1997*
- Protection of the Environment Operations (Waste) Regulation 2014
- *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as revised 2013)*
- *PFAS National Environmental Management Plan* (Heads of Environment Protection Authorities, January 2020)
- *Guidelines for Consultants Reporting on Contaminated Sites* (NSW Environment Protection Authority), 2020)
- *Managing Land Contamination: Planning Guidelines SEPP 55 - Remediation of Land* (Department of Urban Affairs and Planning and EPA, 1998)
- *Acid Sulfate Soils Assessment Guidelines* (Department of Planning, 2008)
- *Acid Sulfate Soils Manual* (Acid Sulfate Soils Management Advisory Committee, 1998)
- *Site Investigations for Urban Salinity* (Department of Land and Water Conservation, 2002)
- *Urban salinity - causes and impacts* (Department of Industry and Investment, 2009)
- *Soil and Landscape Issues in Environmental Impact Assessment* (Department of Land, Water and Conservation, 2000).

16.3 Assessment methodology

16.3.1 Study area

The study area for the contamination investigation included the construction sites, a 500 metre buffer surrounding the construction sites and the tunnel alignment between The Bays and Sydney CBD and includes the power supply route identified in Chapter 5 (Project description). When considering per-and poly-fluoroalkyl substances (PFAS), the buffer was extended to one kilometre around construction sites and the tunnel alignment due to the highly mobile and persistent nature of PFAS.

16.3.2 Approach

The methodology for the contamination assessment included:

- A desktop review of available information sources relevant to the study area to understand the site history, existing environment and potential risk for contamination, including a review of relevant databases, aerial photographs and previous contamination investigations
- Reliance on information from the site inspection and assessment carried out for The Bays Station construction site as part of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) for the assessment of The Bays tunnel launch and support site
- Visual inspections of the Pyrmont Station and Hunter Street Station (Sydney CBD) construction sites surrounding land uses and potential areas of environmental interest on 17 May 2021.
- A high-level risk prioritisation exercise to assess areas of environmental concern regarding potential contamination or specific geological conditions and unmitigated risks to receivers, while considering the nature of proposed construction activities and the risk the proposal could intersect areas of potential contamination. 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) (refer to Section 16.3.3).
- Identification of appropriate mitigation and management responses for contamination or specific geological conditions, or where further investigation or remediation may be required.

16.3.3 Risk prioritisation

A high-level risk prioritisation exercise was carried out to assess the potential for construction to expose contamination and/or specific geological conditions and result in an impact to human and/or ecological receivers. 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 16-1), and the potential pathways from contamination sources to human and ecological receivers that may be present during construction (refer to Table 16-2) for each media, that is, soil, groundwater and vapour.

Table 16-1 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 16-2 Contamination pathways and receiver categories

Pathways and receivers 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 receivers during construction
PR2	Media of concern may intersect the construction scope and exposure pathway for human or ecological receivers that could be present and complete during construction
PR3	Media of concern would intersect the construction scope and exposure pathway for human or ecological receivers that could be present and complete during construction

To provide the overall potential contamination risk of an impact to receivers occurring for the proposal, a matrix was used to combine the consideration of contamination severity and extent with contamination pathways and receivers as provided in Table 16-3.

Table 16-3 Potential contamination risk categories

Pathways and receivers	Contamination severity and extent					
		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

16.4 Avoidance and minimisation of impacts

The design of the proposal has considered known contaminated sites present at or nearby the Pyrmont Station or Hunter Street Station (Sydney CBD) construction sites.

16.5 Potential tunnelling impacts

16.5.1 Contamination potential

Based on the desktop assessment and site inspection, there is the potential for contamination to be encountered at several locations. 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 the construction sites and potential construction impacts from soil, groundwater and vapour are outlined in the following sections.

16.5.2 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 receivers 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 the potential disturbance and oxidation of acid sulfate soils and formation of sulfuric acid. Increased management and/or remediation would also be required if soils containing dispersible fibres (i.e. fibrous asbestos), 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) are encountered during construction.

16.5.3 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 receivers 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 proposal may result in migration of potential contamination towards receivers.

The proposed construction methodology of Pymont Station and Hunter Street (Sydney CBD) Station will likely result in some groundwater inflow during the estimated two-year construction period. The estimated inflow rates during construction are outlined in Technical Paper 7 (Hydrogeology). The proposed construction methodology includes progressive lining of the tunnel during construction as the tunnel boring machine advances. As a result of this, groundwater inflow to the tunnel is expected to be limited however there is potential of higher inflows at the cutting face, depending on the operating mode.

16.6 The Bays tunnel launch and support site

16.6.1 Existing environment and site contamination review

The Bays tunnel launch and support site would be located within a portion of the approved The Bays Station construction site, which is being established under the approved Stage 1 of the planning approval process as described in *Sydney Metro West Environmental Impact Statement - Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). The site is within the White Bay industrial area adjacent to the former White Bay Power Station. A summary of the existing conditions is presented below. Further details, including a summary of available site investigation information, is presented in Technical Paper 8 (Contamination).

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, these land use zones could represent a potential contamination risk.

Site history

Historical aerial photography shows the construction site 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 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

There are three sites listed on the NSW EPA Contaminated Sites Register within 500 metres of The Bays tunnel launch and support site and/or tunnel alignment. One additional site where PFAS is a potential contaminant of concern is listed within one kilometre of the site. This is consistent with the results from the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). Details of the listings are provided in Table 16-4.

Table 16-4 Sites listed on the NSW EPA Contaminated Sites Register and PFAS within The Bays tunnel launch and support site study area

Site address	Site activity	Listing on the NSW EPA Contaminated Sites Register	PFAS	Contamination status	Location relative to the proposal
Robert Street, Rozelle	White Bay Power Station	Regulated	✓ Firefighting activities	EHC Act Revocation Notice (Former) Asbestos and PCB contamination	150 metres west of the tunnel alignment
Reynolds Street, Rozelle	Former Unilever Sulphonation Plant	Regulated	-	EHC Act Revocation Notice (Former) Heavy metals, polycyclic aromatic hydrocarbons, linear alkylbenzene and linear alkylbenzene sulphonate compound contamination	About 420 metres north-west of The Bays tunnel launch and support site and 500 metres north-west of the tunnel alignment
Buchanan Street, Rozelle	Former Ampol Terminal	Regulated	✓ Firefighting activities	EHC Act Revocation Notice (Former) Heavy metals and hydrocarbon contamination. Remediation (soil) completed prior to 1994	About 350 metres north-west of The Bays tunnel launch and support site and 430 metres north-west of the tunnel alignment

Site address	Site activity	Listing on the NSW EPA Contaminated Sites Register	PFAS	Contamination status	Location relative to the proposal
15-39 Wellington Street, Rozelle	Other petroleum	Notified	-	Regulation under CLM Act not required	About 1 kilometre north-west of The Bays tunnel launch and support site More than 1 kilometre from the tunnel alignment

There are nine sites listed on the NSW EPA *Protection of the Environment Operations Act* public register within 500 metres of The Bays tunnel launch and support site that have current environment protection licences. Some environment protection licences vary from the assessment in the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a) however in general the locations and activities are consistent. Details of the listings are provided in Table 16-5. Where a specific address is not provided on the licence, an approximate distance relative to the proposal is provided.

Table 16-5 Sites with current environmental protection licences within The Bays tunnel launch and support site study area

Site address	Licence holder	Activity	Location relative to construction footprint and tunnel alignment
Sommerville Road, Rozelle	Cement Australia Holdings Pty Ltd	<ul style="list-style-type: none"> Shipping in bulk Cement or lime handling 	<ul style="list-style-type: none"> Adjacent to The Bays tunnel launch and support site 50 metres from the tunnel alignment
Sommerville Road, Rozelle	Gypsum Resources Australia Pty Ltd	<ul style="list-style-type: none"> Shipping in bulk 	<ul style="list-style-type: none"> Adjacent to The Bays tunnel launch and support site 50 metres from the tunnel alignment
WestConnex between the M4-M5 Mainline Tunnels and Rozelle, Rozelle	John Holland Pty Ltd	<ul style="list-style-type: none"> Road construction (WestConnex) 	<ul style="list-style-type: none"> Adjacent to The Bays tunnel launch and support site
Sommerville Road, Rozelle	Newcastle Port Corporation	<ul style="list-style-type: none"> Shipping in bulk 	<ul style="list-style-type: none"> Adjacent to The Bays tunnel launch and support site
Robert Street, Balmain	Newcastle Port Corporation	<ul style="list-style-type: none"> Shipping in bulk 	<ul style="list-style-type: none"> Adjacent to The Bays tunnel launch and support site and tunnel alignment (<100 metres)
Lot 1 Sommersville Road, Rozelle	Sugar Australia Pty Ltd	<ul style="list-style-type: none"> General agricultural processing Shipping in bulk 	<ul style="list-style-type: none"> Adjacent to The Bays tunnel launch and support site 50 metres from the tunnel alignment
James Craig Road, Rozelle	Sydney Boathouse Holdings Pty Ltd	<ul style="list-style-type: none"> Boat mooring and storage 	<ul style="list-style-type: none"> 130 metres from The Bays tunnel launch and support site 160 metres from the tunnel alignment
37 James Craig Road, Rozelle	Sydney City Marine Pty Ltd	<ul style="list-style-type: none"> Boat construction/maintenance (general) 	<ul style="list-style-type: none"> 210 metres from The Bays tunnel launch and support site 200 metres from the tunnel alignment
Berth 4 White Bay Robert Street, Balmain	Port Authority of NSW	<ul style="list-style-type: none"> Shipping in bulk 	<ul style="list-style-type: none"> Adjacent to The Bays tunnel launch and support site 50 metres from the tunnel alignment

16.6.2 Potential impacts

The impact of major civil construction work between Westmead and The Bays on contamination at The Bays Station construction site is summarised in Section 20.14 of the *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a). This included the use of The Bays Station construction site to:

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

The Bays Station construction site is being established under the existing approval (Stage 1 of the planning approval process). The Bays tunnel launch and support site would be located entirely within the construction footprint of the approved The Bays construction site. As such, this Environmental Impact Statement only assesses the proposed use of the eastern and southern part of The Bays Station construction site to launch and support two tunnel boring machines for the drive east to the proposed Hunter Street Station (Sydney CBD) construction sites. This will also include excavation of a crossover cavern using roadheaders at depth.

A number of previously recorded contaminated sites within The Bays tunnel launch and support site are considered to represent a low potential for contamination or specific geological conditions to impact upon construction. These areas are further described in Section 5.4 of Technical Paper 8 (Contamination).

As part of the assessment carried out for the major civil construction work for Westmead to The Bays (Stage 1 of the planning approval process), several moderate potential contamination impacts were identified for The Bays Station construction site, namely the potential for soil and groundwater contamination to be present within the site. The resulting Conditions of Approval require completion of a detailed site investigation where disturbance of moderate or high risk contaminated sites are identified, and subsequent remediation may be completed if required to make the land suitable for the final intended use. Therefore, further investigation and potential remediation of potential impacts from contamination (where integrated into construction works carried out under the Stage 1 planning approval) may be completed prior to the start of work for this proposal.

Compliance with the Conditions of Approval for major civil construction work for Westmead to The Bays (Stage 1 of the planning approval process) will therefore reduce the potential for contamination to be present and reduce the risk of impact as part of this proposal. As a result, there were no identified areas of environmental interest that are considered to have moderate, high or very high potential contamination impact for the proposed construction activities at The Bays tunnel and launch support site under this proposal.

Further data review and an appropriate management approach would be implemented in accordance with mitigation measures in Section 16.10.

16.7 Pyrmont Station construction sites

16.7.1 Existing environment and site contamination review

Based on the desktop assessment, land use zones within and surrounding the Pyrmont Station construction sites include:

- Port and Employment
- W1 – Maritime Waters
- SP1 – Infrastructure (Railways, classified road)
- B2 – Local Centre
- B3 – Commercial Core
- B4 – Mixed Use
- R1 – General Residential
- RE1 – Public Recreation.

Based on permitted land use with or without consent, the SP1 – Infrastructure, W1 – Maritime Waters and Port and Employment land use zones represent a potentially higher potential contamination risk.

During the site inspection, the surrounding area consisted of medium density residential and commercial land uses, with some high-density commercial buildings. Two additional potential areas of concern were identified during the site inspection:

- **Enviro Laundrette** – 155 Harris Street, Pyrmont (about 100 metres north-west of western construction site)
- **Pyrmont Quality Dry Cleaners and Alteration** – 204 Harris Street, Pyrmont (about 40 metres west of western construction site).

A summary of the existing conditions is presented below. Further details, including a summary of available site investigation information, is presented in Technical Paper 8 (Contamination).

Site history

Historical aerial photography from the 1930s shows the Pyrmont Station study area comprised a mixture of residential and commercial/industrial land use including rail yards to the east and the former Pyrmont Power Station to the north. The Pyrmont incinerator and the former Pyrmont Power Station were further developed in the 1940s, with only minor changes to the area from the 1950s to the 1970s. Substantial development occurred since the 1980s, including the demolition of the former Pyrmont Power Station, redevelopment of areas and construction of high-density residential apartments and The Star Sydney Casino.

Based on historical aerial photography, the Pyrmont Station western construction site appears to be residential on the northern portion and largely vacant on the southern portion from the 1930s. In the late 1940s, a commercial building is constructed in the southern portion of the site. The site remains largely unchanged until the late 1960s when the northern portion of the site appears to be converted to a car park. In 2005 construction over the northern portion of the site has occurred.

In the 1930s, the northern portion of the Pyrmont Station eastern construction site appears to be used as a laydown area and the southern portion appears to be used for stockpiling. In the late 1940s, the construction site appears to contain small residential/ commercial dwellings with the site being used for earthworks/stockpiling then truck/machinery parking from the 1950s to 1980s. In the 1980s the site appears to have been flattened and is occupied by a concrete slab, with what appears to be two commercial buildings with a central car park being constructed by the late 1980s.

Database searches

Based on a desktop assessment the following has been identified:

- One site listed on the NSW EPA Contaminated Sites Register within the Pyrmont Station study area as (refer to Table 16-6)
- One potential PFAS source within the Pyrmont Station study area (refer to Table 16-6)
- There were no sites within 500 metres of the Pyrmont Station construction sites identified that have current environmental protection licences.

Table 16-6 Sites listed on the NSW EPA Contaminated Sites Register and PFAS within the Pyrmont Station study area

Site address	Site activity	Listing on the NSW EPA Contaminated Sites Register	PFAS	Contamination status	Location relative to the proposal
Pyrmont Road, Pyrmont	Former Pyrmont Power Station	Regulated	✓ Firefighting activities	EHC Act Revocation Notice Hydrocarbon, polychlorinated biphenyls, and asbestos contamination	About 100 metres north of Pyrmont Station eastern construction site

16.7.2 Potential impacts

Six previously recorded contaminated sites within the Pyrmont Station study area are considered to represent a low or very low potential for contamination including the former Pyrmont Power Station. These areas are further described in Section 6.2 of Technical Paper 8 (Contamination). One of the identified areas of environmental interest (AEI 11) is considered to have moderate potential contamination impact as summarised in Table 16-7 and Figure 16-1. AEI 11 on Figure 16-1 is a 'general industrial use' in the vicinity of the construction site and does not correspond to a specific geographic location as it reflects broad historical land uses in the area. This area of environmental interest relates to evidence of a long history of industrial land use in Pyrmont including historic railyards, factories, bulk fuel storage and warehousing and includes land in the area identified in historic aerial imagery that are not recorded in public databases as specific sources of potential or actual contamination (e.g. on EPA databases).

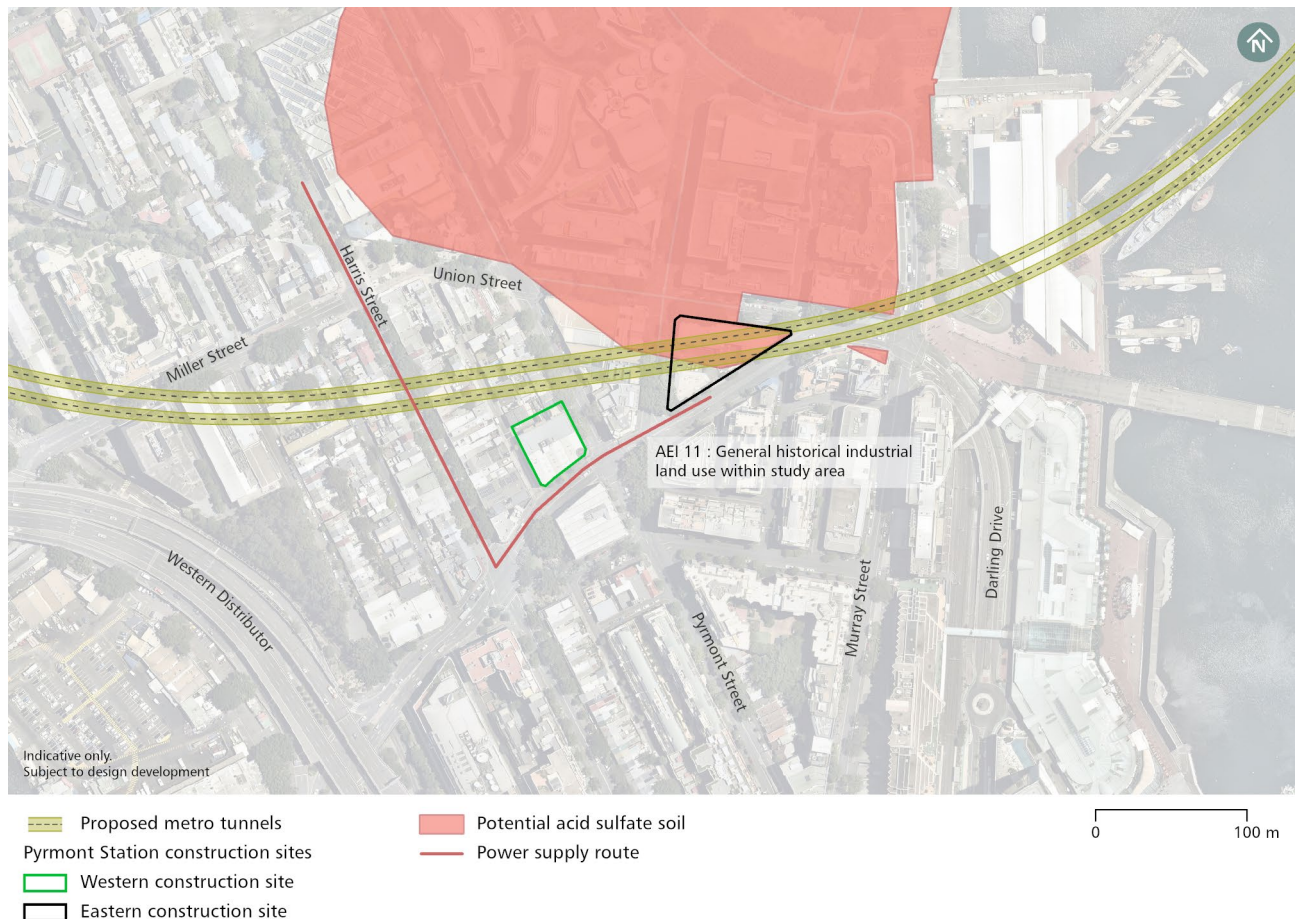


Figure 16-1 Areas of environmental interest assessed as moderate or higher potential contamination risk – Pyrmont Station study area

In addition, potential acid sulfate soils have been identified as representing a moderate potential impact for the eastern construction site. Saline soils may also be present within the same approximate extent as potential acid sulfate soils.

No specific potential contamination impacts associated with the proposed use and activities within the Pyrmont Station power supply route have been identified, except for the general potential of encountering fill soils that may contain asbestos or other contaminants (low risk of potential impacts to receivers). Acid sulfate soils and saline soils within the same extent may be encountered nearby to where power supply routes for the Pyrmont Station construction sites would be located. Shallow excavation is assumed as the method for the development of the power supply routes, thus interaction with groundwater is unlikely.

Further reviews of data and an appropriate management approach would be implemented in accordance with the measures in Section 16.10.

Potential impacts associated with acid sulfate soils and relevant mitigation measures are also discussed in Chapter 15 (Soils and surface water quality).

Table 16-7 Areas of environmental interest assessed as moderate or higher for Pyrmont Station study area

Site of concern and potential source of contamination	Contamination severity and extent assessment		Pathways and receivers			Potential contamination risk
	Media and COPCs	Contamination status	Location relative to the proposal	Potential for contamination to be intersected by the proposal	Exposure pathways	
AEI 11 General historical commercial / industrial use including rail yards – Inappropriate chemical storage and use, industrial operations, waste disposal and management etc	Groundwater Heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC, PFAS	Contamination possibly present in the media of concern at concentrations above the relevant assessment criteria and potentially widespread. Land surrounding the Pyrmont Station construction sites has a long history of industrial use broadly across the Pyrmont peninsula. The potential nature and extent of contamination from a range of sites where industrial land use has occurred is not known. Groundwater monitoring completed by Sydney Metro near the Pyrmont Station eastern construction site reported concentrations of metals above guideline criteria for protection of marine ecosystems. It is noted however that analysis for all contaminants of potential concern has not been undertaken to date (e.g. PFAS).	Adjacent to construction sites	Potential for contaminated groundwater migration from off-site source to be present at depth within construction sites, particularly from up-gradient sources to the south of the station site based on modelled groundwater drawdown and zone of influence	Construction workers could be exposed to contamination via contact (skin contact or ingestion) with contaminated groundwater	Moderate
Acid sulfate soils	Soil Potential formation of sulfuric acid	Contamination possibly present in the media of concern at concentrations above the relevant assessment criteria and limited in extent.	Within eastern construction site	Potential ASS likely to be disturbed during surface soil work	Ecosystems of Darling Harbour or Blackwattle Bay could be exposed to sulfuric acid via uncontrolled releases during construction	Moderate

16.8 Hunter Street Station (Sydney CBD) construction sites

16.8.1 Existing environment and site contamination review

Based on the desktop assessment, land use zones within and surrounding the Hunter Street Station (Sydney CBD) construction sites include:

- B8 – Metropolitan Centre
- RE1 – Public Recreation
- SP2 – Infrastructure (Railways, classified road, boating facilities)
- W1 – Maritime Waters.

Based on permitted land use with or without consent, the SP2 – Infrastructure and W1 – Maritime Waters land use zones represent a higher potential contamination risk.

During the site inspection, the surrounding area consisted of medium to high density commercial and residential land uses, including dry cleaners. There is also the potential for fuel storage in commercial buildings where there are back-up generators.

Dry cleaners within commercial buildings appear to be shop fronts with off-site cleaning, however there potentially could be chemical storage and use on site. One dry cleaning site noted from desktop review (447 Kent St, Sydney) is no longer present at this location.

A summary of the existing conditions is presented below. Further details, including a summary of available site investigation information, is presented in Technical Paper 8 (Contamination).

Site history

Historical aerial photography from the 1940s shows the Hunter Street Station (Sydney CBD) study area primarily comprised commercial land use with open space including The Domain further east and Wynyard Park to the west. Development, including the demolition of existing buildings and construction and redevelopment of higher density and commercial buildings, occurred since the 1970s.

Based on historical aerial photography, high rise commercial buildings were present on the Hunter Street Station (Sydney CBD) western construction site from prior to the 1940s until the early 1990s. Prior to 1994, the site appears to have been redeveloped/ extended with additional buildings/storeys.

Similarly, high rise commercial buildings were present on the Hunter Street Station (Sydney CBD) eastern construction site in the 1940s with the site appearing to have undergone minor changes to existing buildings prior to 1994.

Database searches

Based on a desktop assessment the following has been identified:

- Five sites listed on the NSW EPA Contaminated Sites Register within the Hunter Street Station (Sydney CBD) study area (refer to Table 16-8)
- Two sites within the Hunter Street Station (Sydney CBD) study area that have current environmental protection licences (refer to Table 16-9). Potential contamination risk may be associated with current licensed activities
- There were no potential PFAS sources identified within one kilometre of the Hunter Street Station (Sydney CBD) construction sites.

Table 16-8 Sites listed on the NSW EPA Contaminated Sites Register within the Hunter Street Station (Sydney CBD) study area

Site address	Site activity	Listing on the NSW EPA Contaminated Sites Register	Contamination status	Location relative to the proposal
38 Hickson Road, Millers Point	Gasworks	Notified	Contamination being managed via the planning process (<i>Environmental Planning and Assessment Act 1979</i>)	About 300 metres west of Hunter Street Station (Sydney CBD) western construction site
36 Hickson Road, Millers Point	Gasworks	Regulated	Contamination currently regulated under CLM Act	
Road reserve fronting 30-38 Hickson Road, Millers Point	Gasworks	Regulated	Contamination currently regulated under CLM Act	
30-34 Hickson Road, Millers Point	Gasworks	Notified	Regulation under CLM Act not required	
447 Kent Street, Sydney	Chemical Industry (dry cleaning)	Notified	Regulation under CLM Act not required	About 500 metres south of Hunter Street Station (Sydney CBD) western construction site

Table 16-9 Sites with current environmental protection licences within the Hunter Street Station (Sydney CBD) study area

Site address	Licence holder	Site activity	Location relative to the proposal
Australian Rail Track Corporation (ARTC) Network, Sydney	Australian Rail Track Corporation Limited	Railway infrastructure operations	400 metres south of the Hunter Street Station (Sydney CBD) construction sites
Between Chatswood dive site and Sydenham dive site, Sydney (associated with Sydney Metro)	CPB Contractors Pty Limited	Railway infrastructure construction (<50,000T)	400 metres south of Hunter Street Station (Sydney CBD) eastern construction site

16.8.2 Potential impacts

Three recorded contaminated sites within and the Hunter Street Station (Sydney CBD) study area are considered to represent a low or very low potential for contamination. These areas are further described in Section 6.3 of Technical Paper 8 (Contamination).

There were no identified areas of environmental interest that are considered to have moderate or higher potential contamination impact for the proposed construction activities at Hunter Street Station (Sydney CBD) construction sites.

Further data review and an appropriate management approach would be implemented in accordance with the mitigation measures in Section 16.10.

16.9 Cumulative impacts

The approach to assessment and the other projects considered are described further in Appendix G (Cumulative impacts assessment methodology).

Potential cumulative contamination impacts could occur if the proposal 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 mitigation measures in Section 16.10, the proposal is unlikely to generate cumulative impacts with other projects.

16.10 Mitigation and management measures

A Construction Environmental Management Framework (Appendix C) describes the approach to environmental management, monitoring and reporting during construction. Specifically, it lists the requirements to be addressed by the construction contractor in developing the Construction Environmental Management Plans, sub-plans, and other supporting documentation for each specific environmental aspect. This includes measures for contaminated material (soils, water and building materials) and a contingency plan in the case of unanticipated discovery of contaminated material.

The environmental management approach for the project is detailed in Chapter 23 (Synthesis of the Environmental Impact Statement). Under these broad frameworks, a series of performance outcomes have been developed to define the minimum environmental standards that would be achieved during construction of the proposal (refer to Section 16.10.1), and mitigation measures that would be implemented during construction to manage potential identified impacts (refer to Section 16.10.2).

16.10.1 Performance outcomes

Construction performance outcomes were developed for the project as part of the Concept approval. Performance outcomes for the project identify measurable, performance-based standards for environmental management. Identified performance outcomes in relation to contamination for construction of the proposal include:

- Contamination risks to human health and ecological receivers are minimised through effective management of existing contaminated land
- Contaminated land is remediated to be suitable for the intended future land use.

Chapter 23 (Synthesis of the Environmental Impact Statement) describes how the proposal addresses these performance outcomes. The design of the proposal has aimed to avoid or minimise potential interaction with known contaminated sites and has included measures to better understand contaminated related risks and management/remediation requirements.

16.10.2 Mitigation measures

Specific mitigation measures that would be implemented to address potential contamination impacts are described in Table 16-10.

Table 16-10 Mitigation measures – Contamination

Reference	Impact	Mitigation measure	Applicable location(s)
C1	Low risk contamination	For sites where potential contamination risk is moderate, high or very high, a further review of data (if available), including a detailed site inspection, would be carried out. Where this Environmental Impact Statement or the additional data review provides sufficient information to confirm that contamination conditions are likely to have a very low or low impact to receivers at a construction site, the site would then be managed as part of construction and in accordance with the relevant subplan in the Construction Environmental Management Framework (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	Unknown risk of contamination	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 based on the impact assessment, it is anticipated that a Detailed Site Investigation would be required at the applicable location.	Pymont Station eastern construction site

Reference	Impact	Mitigation measure	Applicable location(s)
C3	Moderate, High or Very High risk of contamination	<p>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 and remediation is required to make the site suitable for its proposed use, a Remediation Action Plan would be developed for the relevant area of the construction site/s.</p> <p>Each Remediation Action Plan would detail the remediation or management work required to mitigate risks from contamination in order to make the site suitable for its proposed use. 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.</p> <p>Remediation would be performed as an integrated component of construction and to a standard commensurate with the proposed end use of the land.</p> <p>The sites requiring Remediation Action Plans would be confirmed following the additional data review (mitigation measure C1) and Detailed Site Investigation (mitigation measure C2).</p>	As applicable
C4	Impacts to receivers occurring from highly complex contamination	<p>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.</p> <p>The sites requiring Site Audit Statements would be confirmed following the preparation of Remediation Action Plans (mitigation measure C3).</p>	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
C6	Migration of contaminated groundwater	<p>Where off-site sources of groundwater contamination have been identified, development and implementation of controls to manage the potential impacts of contamination due to drawdown and resulting migration of contaminated groundwater into the construction footprint would be implemented.</p> <p>A review of available groundwater data would be completed to inform the relevant subplan in the CEMF (the Groundwater Management Plan). Where insufficient data is available to understand groundwater conditions and the potential for contamination to migrate as a result of the proposal, further investigation would be carried out if considered necessary and if not already undertaken under mitigation measure C2.</p>	All

16.10.3 Interactions between mitigation measures

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

- Chapter 14 (Groundwater and ground movement) – Specifically measures which address monitoring of groundwater for contaminants of concern
- Chapter 15 (Soils and surface water quality) – Specifically measures which address the disturbance and management of acid sulfate soils and saline soils during construction and management of water quality (including from potential contamination)
- Chapter 20 (Spoil, waste management and resource use) – Specifically measures which address waste classification and disposal.

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