17 Contamination

This chapter provides a summary of the Technical working paper: Contamination (Appendix O), which was prepared to inform this environmental impact statement (EIS) and address the Secretary’s Environmental Assessment Requirements (SEARs) for the project as they relate to contamination.

The Technical working paper: Contamination (Appendix O):

- Identified potential areas and contaminants of concern
- Provided a preliminary and qualitative assessment of contamination risk posed to the environment, construction work and proposed future land use
- Assessed where further investigation should be undertaken or appropriate management procedures should be put in place for the project
- Incorporated the findings of a number of environmental site assessments that have been prepared for the project.

Table 17-1 sets out the SEARs that relate to contamination and lists where in the EIS they have been addressed.

<table>
<thead>
<tr>
<th>SEAR</th>
<th>Section Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>An assessment of contaminated sites in accordance with the guidelines made or approved under section 105 of the Contaminated Land Management Act 1997. The assessment must include details of proposed remediation measures and justification for the proposed measures in terms of the proposed final use of that land;</td>
<td>An assessment of contaminated sites is included in the Technical working paper (Contamination) (Appendix O) and summarised in Section 17.2. Proposed remediation measures and other mitigation measures are presented in Section 17.4.</td>
</tr>
<tr>
<td>Status of site contamination and suitability of the site for the proposal, including the suitability of the Alexandria landfill site for the St Peters interchange;</td>
<td>The status and suitability of the land affected by the project, including the Alexandria Landfill, is addressed in Section 17.2 and Section 17.3.</td>
</tr>
<tr>
<td>An assessment of the potential disturbance of contaminated bed sediments in the Alexandra Canal, and interception of contaminated water from the Botany Sand Beds aquifer; and</td>
<td>The potential disturbance of contaminated bed sediments in the Alexandra Canal is discussed in Section 17.3. The potential for the project to intercept contaminated water from the Botany Sand beds aquifer is discussed in Section 17.3.2.</td>
</tr>
<tr>
<td>Having reference to the assessments conducted in satisfaction of the above, consideration of whether or not a site auditor, accredited under the Contaminated Land Management Act 1997, has or will be engaged to issue a site audit statement to certify on the suitability of the current or proposed uses.</td>
<td>Consideration of whether or not a site auditor is required to certify the suitability of land use is discussed in Section 17.3.</td>
</tr>
</tbody>
</table>
17.1 Assessment methodology

The Technical working paper: Contamination (Appendix O) has been completed in the form of a Phase 1 Environmental Site Assessment (Phase 1 ESA). The purpose of the Phase 1 ESA was to provide a preliminary assessment of contamination risks associated with the surface disturbance areas of the project. Potential areas of contamination that may pose a potential risk to the environment, construction work and proposed future land use were identified.

The Phase 1 ESA considered the following key guidelines applicable to contamination identification, assessment and management:

- Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd Edition) (DEC, 2006b)
- Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites (OEH, 2011)

The assessment methodology for the Phase 1 ESA included:

- Defining the study area for the Phase 1 ESA based on the project footprint
- A preliminary screening assessment and data review based on historical records to identify potential areas of contamination concern
- A field inspection in order to confirm the outcomes of the preliminary screening assessment
- A secondary data review and preliminary assessment of identified areas of contamination concern to further evaluate the potential for contamination to be present.

Details of these assessment stages are outlined between Section 17.1.1 and Section 17.1.4.

17.1.1 Phase 1 ESA study area

The Phase 1 ESA targeted project surface disturbance areas associated with tunnel entry and exit points, ventilation facility locations, construction compounds and potential disturbance areas within the Alexandra Canal. These areas are identified in Figure 17-1 and included:

- Western surface works (Project area 1), extending west of King Georges Road, Beverly Hills to Kingsgrove Road, Kingsgrove
- Kingsgrove Road surface works (Project area 2)
- Bexley road surface works (Project area 3), located near the Bexley Road / M5 East Motorway interchange
- Arncliffe surface works (Project area 4) at Kogarah Golf Course
- St Peters interchange and local road upgrades (Project area 5) in St Peters, Alexandria and Mascot.

Areas where the main alignment tunnels are proposed to be located at depth within the bedrock have not been assessed due to the low likelihood of contamination being encountered. Given the depth, location of the tunnels in relation to contaminant sources, and low inflow rates, the risk of encountering contamination along the tunnel alignment would be low. Groundwater details across the project are detailed in Chapter 19 (Groundwater).
17.1.2 Preliminary screening assessment and data review

A preliminary screening assessment and data review was undertaken to identify areas of potential contamination concern that may pose a risk during construction of the project. The preliminary screening assessment and data review included:

- A review of previous environmental reports relevant to the Phase 1 ESA study area, including:
  - *Phase 1 Environmental Site Assessment Alexandria Landfill Site Acquisition Area* (AECOM, 2014d)
  - *Phase 1 Environmental Site Assessment, Local Road Upgrades, St Peters, Mascot and Alexandria, NSW* (AECOM, 2015c)
  - *Phase 2 Environmental Site Assessment Alexandria Landfill, 5 Canal Road, St Peters, NSW* (AECOM, 2015d)
  - *Phase 2 Environmental Site Assessment Alexandria Landfill, 10-16 Albert Street, NSW* (AECOM, 2015e)
  - *WestConnex Stage 2: M5 KGRIU Noise Mound Stockpile, Factual Stockpile Contamination Characterisation Report* (AECOM, 2015f)
  - *WestConnex Stage 2: M5 Factual Contamination Assessment* (AECOM, 2015g)
  - *Alexandria Landfill Closure Hydrogeological Assessment, Alexandria Landfill, 10-16 Albert Street, St Peters, NSW* (AECOM, 2015k)
  - *Preliminary Waste Classification: Stockpile 21* (AECOM, 2015i)
  - *Phase 2 Area Preliminary Stockpile Characterisation* (ENVIRON, 2015)
  - *Sediment Remediation Options Study* (URS, 2003)
  - *Marrickville Council, Camdenville Park, May Street, St Peters, NSW. Remedial and Construction Environmental Management Action Plan* (GHD, 2013)
  - *Advice Regarding the Contamination Status of the Property at 6A Huntley Street, Alexandria, NSW* (SMEC, 2012).

- A review of current and former potentially contaminating land uses along and adjacent to the project and in proximity to surface disturbance areas

- Database searches, including identification of contaminated sites listed under:
  - Either section 58 or 60 of the *Contaminated Land Management Act 1997* (CLM Act)
  - Australian Government Department of the Environment National Pollutant Inventory (NPI).

The NSW Environment Protection Authority (NSW EPA) contaminated sites register lists both former and current contaminated sites which have had regulatory involvement (listed under section 58 of the CLM Act). The register identifies the location of these sites and specifies the contaminants of concern and their nature of harm to the environment and human health. A search of the register identified 12 properties with current or former notices located within one kilometre of the project surface disturbance areas.

When a ‘notice’ has been issued by the NSW EPA, it indicates that a site is known to be contaminated to an extent that warrants regulation. A ‘notified site’ indicates that the landowner or person whose activities have contaminated land has informed the NSW EPA that a site may be contaminated at a level triggering regulatory action. Notified sites may or may not be contaminated to an extent to warrant regulation by the NSW EPA.
A search of properties within a one kilometre radius of the project surface areas was also conducted to identify properties that have been previously notified to the NSW EPA under section 60 (duty to report) of the CLM Act. Twelve ‘notified sites’ were identified within one kilometre of the project surface areas. The majority of sites reported have been determined by the NSW EPA as not requiring regulation under the CLM Act.

The POEO Act licence register identifies premises that are licenced for certain activities under the POEO Act. The register provides information in regard to location, activity type, clean up notices and non-compliance information. Ten sites within or near the surface disturbance areas were identified.

17.1.3 Field inspection

A field inspection was undertaken on 30 April 2015 at and in the vicinity of the project surface areas (refer to Figure 17-1) to visually identify any potentially contaminated areas identified during the preliminary screening assessment and data review (a full list is provided in the Technical working paper: Contamination (Appendix O)). During the inspection, digital photographs, GPS coordinates of potentially contaminating / contaminated features, and observations were recorded and marked against the corresponding property Lot and deposited plans (DP).

Areas of contamination concern were inspected for typical evidence of contamination including features such as:

- Contaminating businesses / activities
- Areas of stressed vegetation
- Evidence of filling such as unnatural landforms and subsidence
- Stockpiled waste
- Disturbed soil
- Discolouration
- Sheen on water
- Odours
- Proximity to suspected contamination source areas
- Sign of old infrastructure and asbestos buildings.

17.1.4 Secondary data review

Potential areas of contamination concern identified during the preliminary screening assessment were subject to a secondary data review which allowed for further investigation to confirm the likelihood that contaminated materials may be present.

The secondary data review involved additional desktop investigations and database searches, including:

- Identification of properties which are listed on the NSW Government Land and Property Information central register of restrictions
- Review of historical aerial photographs for the surface disturbance areas and historical certificates of title
- Sourcing and review of Section 149 and Section 149(5) certificates for identified properties of concern within surface disturbance areas
- Review of published maps of the area to gain an understanding of surface and subsurface conditions (e.g. geology, hydrogeology, soil and topography)
- Search and review of information readily available through the internet (e.g. historical parish maps and NSW Department of Primary Industries: Water registered groundwater bore database)
- WorkCover NSW records for licensed dangerous goods of selected properties
- Search of Australian Department of Defence unexploded ordnance contamination database.
17.2 Existing environment

The predominant land uses within the project corridor are mixed commercial/industrial, residential and open space. Some areas within the project corridor have a long history of heavy industrial land use, particularly in the vicinity of Tempe, Alexandria and St Peters.

Potential sources of contamination that might have resulted from land uses (current and historical) within and in the vicinity of the project corridor include:

- Landfilling operations (waste disposal)
- Use of fill material of unknown origin
- Fuel and chemical spills associated with traffic accidents, use and storage.

Discussion of surface water pathways and management is provided in Chapter 16 (Soil and water quality) and asbestos management is provided in Chapter 24 (Resource use and waste minimisation).

This section provides an overview of the existing environment and potential contamination, with particular reference to the following surface disturbance areas:

- Western surface works (Project area 1)
- Kingsgrove Road surface works (Project area 2)
- Bexley road surface works (Project area 3)
- Arncliffe surface works (Project area 4)
- St Peters interchange and local roads upgrades (Project area 5).

17.2.1 Western surface works (Project area 1) and Kingsgrove Road surface works (Project area 2)

Four areas of potential contamination concern are located within the western surface works. These properties consist of sites that may have historically been the subject of uncontrolled filling, various commercial/industrial land uses, including brick works and fertiliser manufacturing and storage for supply, market gardening, laundering and various public utility and/or council works sites. More recently, these sites have been subject to various warehousing and commercial/industrial uses.

The areas of potential contamination concern are shown on Figure 17-2 and include:

- M5 Linear Park (noise mounds). The site potentially contains asbestos and other contaminants commonly associated with uncontrolled fill. Recent investigations (AECOM, 2015f and 2015g) detected friable asbestos in soil within a soil noise mound on the southern side of the existing M5 Motorway near Kirrang Street and within M5 Linear Park near Tallawalla Street
- 27-31 Garema Circuit, Kingsgrove. Potential sources of contamination relate to historical fertiliser manufacturing and storage for supply, brick and pipe work manufacturing, uncontrolled filling and various commercial/industrial land uses
- 30A and 32 Commercial Road, Kingsgrove (two areas). Potential sources of contamination relate to historical land use activities including laundering, market gardens, public and council works sites and various other commercial/industrial land uses.

Table 17-2 details potential contaminants for each individual area of contamination concern located within the western surface works.

No areas of potential contamination concern were identified in association with Kingsgrove Road surface works.
### Table 17-2 Western surface works: identified potential areas of contamination concern

<table>
<thead>
<tr>
<th>Item name and / or address</th>
<th>Surface disturbance area</th>
<th>Potential source of contamination</th>
<th>Potential contaminants</th>
</tr>
</thead>
<tbody>
<tr>
<td>M5 Linear Park</td>
<td>Western surface works</td>
<td>Fill material used for noise mound creation along the M5 Motorway</td>
<td>Asbestos</td>
</tr>
<tr>
<td>27-31 Garema Circuit, Kingsgrove</td>
<td>Western surface works</td>
<td>Former fertiliser manufacture and/or storage, brick and pipe works, and potential uncontrolled filling and various other commercial/industrial land use including warehousing</td>
<td>Calcium phosphate, calcium sulphate, copper chloride, sulphur, sulphuric acid, metals (boron, cadmium, copper, magnesium, molybdenum), herbicides, fungicides, asbestos, hydrocarbons, pesticides and PCBs</td>
</tr>
<tr>
<td>30A and 32 Commercial Road, Kingsgrove</td>
<td>Western surface works</td>
<td>Laundering, market gardens, public and council works site, various commercial / industrial land uses including bus storage</td>
<td>Hydrocarbons, pesticides and heavy metals</td>
</tr>
</tbody>
</table>
Figure 17-2 Potential contamination at Western surface works
17.2.2 Bexley Road surface works (Project area 3)

Three areas of potential contamination concern are located within or immediately adjacent to the Bexley Road surface works (Figure 17-3). The potential contaminants of concern relate to a former ammunition storage site for World War II, a vacant Roads and Maritime owned site (part of M5 Linear Park) and Kingsgrove Avenue Reserve.

A review of historical aerial photographs identified a potential ammunition storage site that may have been associated with an anti-aircraft battery located near Homer Street and Bexley Road during World War II. It appears that most of the site would have been excavated for the construction of the M5 East Motorway in the late 1990s and remaining parts developed as residential housing, M5 Linear Park or road reserve. The vacant Roads and Maritime site and Kingsgrove Avenue Reserve have been identified as a result of potential historical uncontrolled fill activities.

Table 17-3 details potential contaminants on these sites.

<table>
<thead>
<tr>
<th>Item name and / or address</th>
<th>Surface disturbance area</th>
<th>Potential source of contamination</th>
<th>Potential contaminants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Former ammunition storage</td>
<td>Bexley Road surface works</td>
<td>Former ammunition storage for World War II Anti-Aircraft Battery unit located between Flatrock Road, Bexley Road and Wolli Creek</td>
<td>Unexploded ordnance and heavy metals</td>
</tr>
<tr>
<td>Vacant Roads and Maritime owned site, west of Bexley Road (part of M5 Linear Park)</td>
<td>Bexley Road surface works</td>
<td>Uncontrolled fill material</td>
<td>Asbestos, heavy metals and hydrocarbons</td>
</tr>
<tr>
<td>Kingsgrove Avenue Reserve</td>
<td>Bexley Road surface works</td>
<td>Open space with potential uncontrolled filling</td>
<td>Asbestos, heavy metals and hydrocarbons</td>
</tr>
</tbody>
</table>

17.2.3 Arncliffe surface works (Project area 4)

The Kogarah Golf Course was identified as an area of potential contamination concern (Figure 17-4) relevant to the Arncliffe surface works due to:

- Historical land use activities at and around the site including:
  - Market gardens
  - Sewerage board works
  - Potential uncontrolled filling for golf course creation
- Current pesticide and herbicide use
- The proximity of the site to the Cooks River and Alexandra Canal, both of which drain industrialised catchments
- The likelihood of acid sulfate soils being present. Acid sulfate soils are further discussed in Chapter 16 (Soil and water quality).

The Kogarah Golf Course also contains Green and Golden Bell Frog habitat including breeding pond, foraging, sheltering and dispersal habitat. Potential impacts and management measures relating to this habitat are discussed in Chapter 21 (Biodiversity).

Table 17-4 details the potential contaminants associated with the Kogarah Golf Course.
<table>
<thead>
<tr>
<th>Item name and / or address</th>
<th>Surface disturbance area</th>
<th>Potential source of contamination</th>
<th>Potential contaminants</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 Marsh Street, Arncliffe</td>
<td>Arncliffe surface works</td>
<td>Market gardens, public works including sewerage board. Potential uncontrolled filling for golf course creation, current pesticide and herbicide use. Cooks River and Alexandra Canal also lie within the immediate vicinity of the study area</td>
<td>Hydrocarbons, pesticides, heavy metals, PCBs, herbicides, fungicides, acid sulfate soils and asbestos</td>
</tr>
</tbody>
</table>
Figure 17-3 Potential contamination at Bexley surface works
Figure 17-4 Potential contamination at Arncliffe surface works
17.2.4 St Peters interchange and local roads upgrades (Project area 5)

Areas of potential contamination concern identified within and immediately surrounding the St Peters interchange and local road upgrades can be divided into three general geographies, namely:

- Alexandria Landfill including Bradshaw Mountain (10-16 Albert Street, St Peters) and 5/5A Canal Road, St Peters which have been assessed by Phase 2 ESAs (AECOM, 2015d and AECOM, 2015e respectively)
- Alexandra Canal, which is listed under section 58 of the CLM Act and regulated by the NSW EPA due to sediment contamination and has been subject to previous intrusive investigations
- ‘Other Lands’, referring to areas within and immediately surrounding the St Peters interchange and local roads area footprint which have not been subject to a Phase 2 ESA.

Areas of contamination concern have been split into categories and described in Table 17-5.

Discussion on asbestos management and acid sulfate soils is provided in Chapter 24 (Resource use and waste minimisation) and Chapter 16 (Soils and water quality) respectively.

### Table 17-5  St Peters interchange and local roads upgrades: identified potential areas of contamination concern

<table>
<thead>
<tr>
<th>Item name and / or address</th>
<th>Surface disturbance area</th>
<th>Potential contaminants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Landfills and uncontrolled filled quarries</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alexandria Landfill (including Boiling Pty Ltd and Bradshaw Mountain), 10-16 Albert Street St Peters (listed under POEO Act) (Phase 2 ESA completed)</td>
<td>St Peters interchange and local roads upgrades</td>
<td>Landfill gases (including methane, carbon dioxide, carbon monoxide, hydrogen sulphide, VOCs), hydrocarbons, semi-volatile organic compounds (SVOCs), VOCs, nutrients, heavy metals, herbicides, fungicides, asbestos and biological hazards.</td>
</tr>
<tr>
<td>Sydney Park</td>
<td>St Peters interchange and local roads upgrades</td>
<td></td>
</tr>
<tr>
<td>Camdenville Park (listed under CLM Act section 60)</td>
<td>St Peters interchange and local roads upgrades</td>
<td></td>
</tr>
<tr>
<td>3-7 Unwin’s Bridge Road</td>
<td>St Peters interchange and local roads upgrades</td>
<td></td>
</tr>
<tr>
<td><strong>Metal smelter sites</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/5A Canal Road, St Peters (Phase 2 ESA completed)</td>
<td>St Peters interchange and local roads upgrades</td>
<td>Heavy metals, hydrocarbons, asbestos and dioxins/furans</td>
</tr>
<tr>
<td>34 Burrows Road, St Peters</td>
<td>St Peters interchange and local roads upgrades</td>
<td></td>
</tr>
<tr>
<td><strong>Manufacturing sites</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dial a Dump Industries, 1 Holland Street, St Peters</td>
<td>St Peters interchange and local roads upgrades</td>
<td>Heavy metals, hydrocarbons, SVOCs, PCBs, dioxins and total cyanide</td>
</tr>
<tr>
<td>Burrows Industrial Estate, 1-3 Burrows Road, St Peters</td>
<td>St Peters interchange and local roads upgrades</td>
<td></td>
</tr>
<tr>
<td>Pioneer Plating Works, 25-29 Ricketty Street, Mascot (listed under CLM Act Section 60)</td>
<td>St Peters interchange and local roads upgrades</td>
<td></td>
</tr>
<tr>
<td><strong>Fuel storage and dispensing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dynamo Workshop, 318 Princes Highway, St Peters</td>
<td>St Peters interchange and local roads upgrades</td>
<td>Lead and hydrocarbons</td>
</tr>
<tr>
<td>City of Sydney, Material Recycling Depot 19-25 Burrows Road, St Peters (listed under POEO Act)</td>
<td>St Peters interchange and local roads upgrades</td>
<td></td>
</tr>
<tr>
<td>Item name and / or address</td>
<td>Surface disturbance area</td>
<td>Potential contaminants</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Greyhound Bus Depot (also former metal smelter), 34 Burrows Road, St Peters</td>
<td>St Peters interchange and local roads upgrades</td>
<td></td>
</tr>
<tr>
<td>Shipping Container Logistics, 12-18 Burrows Road, St Peters</td>
<td>St Peters interchange and local roads upgrades</td>
<td></td>
</tr>
<tr>
<td>Car rental outlet, 532-536 Gardeners Road, Mascot</td>
<td>St Peters interchange and local roads upgrades</td>
<td></td>
</tr>
<tr>
<td><strong>Waste facilities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIMS Metal and Taxi Depot, 33 Burrows Road, St Peters</td>
<td>St Peters interchange and local roads upgrades</td>
<td>Heavy metals, hydrocarbons, SVOCs, PCBs, pesticides, dioxins and asbestos.</td>
</tr>
<tr>
<td>Good River Properties Pty Ltd, 33 Burrows Road, St Peters (listed under POEO Act)</td>
<td>St Peters interchange and local roads upgrades</td>
<td></td>
</tr>
<tr>
<td>SITA Alexandria Pty Ltd, 33 Burrows Road, St Peters (listed under POEO Act)</td>
<td>St Peters interchange and local roads upgrades</td>
<td></td>
</tr>
<tr>
<td>Former Drum Reconditioning Facility, 53 Barwon Park Road, St Peters (listed under CLM Act section 58)</td>
<td>St Peters interchange and local roads upgrades</td>
<td></td>
</tr>
<tr>
<td>Australian Refined Alloys, 202-212 Euston Rd, Alexandria (listed under CLM Act section 60 and on National Pollutant Inventory register)</td>
<td>St Peters interchange and local roads upgrades</td>
<td></td>
</tr>
<tr>
<td>Visy Paper Pty Ltd and SPRC Pty Ltd, 6-10 Burrows Road South, St Peters (listed under POEO Act)</td>
<td>St Peters interchange and local roads upgrades</td>
<td></td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alexandra Canal (listed under section 58 of the CLM Act)</td>
<td>St Peters interchange and local roads upgrades</td>
<td>OCPs, PCBs, Metals,</td>
</tr>
<tr>
<td>Cooks River Rail Terminal, 20 Canal Road, St Peters (listed under CLM Act section 60)</td>
<td>St Peters interchange and local roads upgrades</td>
<td>Hydrocarbons, asbestos, heavy metals, pesticides and PCBs.</td>
</tr>
<tr>
<td>Uncontrolled filling for land reclamation and levelling</td>
<td>St Peters interchange and local roads upgrades</td>
<td>Heavy metals, hydrocarbons, pesticides, PCBs, asbestos</td>
</tr>
<tr>
<td>Acid sulfate soils</td>
<td>St Peters interchange and local roads upgrades</td>
<td>Due to the presence of Holocene sediments within the area, potential acid sulfate soils are likely to be present. The potential presence and implications of acid sulfate soils across the project is discussed in Chapter 16 (Soils and water quality).</td>
</tr>
</tbody>
</table>
Alexandria Landfill

The main known source of contamination within the footprint of the proposed St Peters interchange is
the Alexandria Landfill. The Alexandria Landfill site was acquired by the NSW Government in
December 2014 and the operations of the previous landowner ceased at that time. Activities
consistent with the existing planning approvals are continuing on site. However, the site no longer
operates commercially as a landfill.

Alexandria Landfill is licensed by the NSW EPA under the POEO Act for the following scheduled
activities:

- Environment Protection Licence No. 4627: Waste Disposal (Application to Land)

Roads and Maritime is presently operating Alexandria Landfill in accordance with the provisions of
these Environment Protection Licences and the conditions of consent previously provided for the
premises by City of Sydney Council and Marrickville Council. Typical operations include:

- Sorting through the various stockpiles of waste and materials stored for resource recovery
- Evaluating opportunities to recycle and / or recover materials for reuse
- Processing of materials scheduled for reuse
- Removing and disposing of waste materials assessed as being unsuitable for recycling / reuse to
  the landfill, or to another suitably licensed landfill facility in accordance with EPA requirements
- Stabilisation of a cliff face landslip.

The activities do not involve any excavation of the land and / or landfilled waste and involve dealing
with the stockpiles of materials stored across the premises.

Where asbestos waste is identified within the stockpiled materials, Roads and Maritime’s contractors
manage and remove the materials in accordance with the Work Health and Safety Act 2011, an
Asbestos Management Plan and an Asbestos Removal Control Plan.

Since this acquisition, in order to meet the requirements of the existing trade waste agreement with
Sydney Water, temporary upgrade works have commenced on the existing leachate treatment plant.

Current and past land uses have resulted in contamination at the site. In the past, the Alexandria
Landfill:

- Was a brickworks quarry between 1908 and 1962
- Was a solid waste landfill owned and operated by the City of Sydney Council from 1988 to 2002
- Continued to operate as a solid waste landfill and resource recovery facility run by Dial a Dump
  Industries from 2002 until acquisition by the NSW Government in December 2014
- A Phase 2 ESA was completed for the Alexandria Landfill in 2015 (AECOM, 2015e) which
  included soil, groundwater, leachate and ground gas sampling and analysis.
The Phase 2 ESA identified the following:

- The main contaminants of concern included lead, polycyclic aromatic hydrocarbons (PAH), total recoverable hydrocarbons (TRH), dioxins and asbestos. Contamination was mainly confined to the fill and appeared to be randomly distributed both laterally and throughout the full depth of the landfill.

- The analytical results indicated that natural soils may contain potential acid sulfate soils.

- Landfill gases including methane, hydrogen sulphide and carbon dioxide were detected within the subsurface monitoring wells at concentrations that could potentially pose a risk to surrounding receptors. Landfill gases could migrate through preferential pathways such as unconsolidated sediments, bedrock fractures and underground service trenches into surrounding land.

- Groundwater and leachate monitoring detected elevated concentrations of ammonia, heavy metals, TRH and phenols, which appeared mainly confined to the leachate, due to an inward hydraulic gradient into the landfill from leachate extraction.

- The base of the landfill is not lined and, as such, fractures and joints within the underling Ashfield Shale formation may provide migration pathways for leachate to enter the aquifer within the Ashfield Shale aquifer. If an inward gradient is not maintained by leachate extraction, the leachate could also migrate into the Botany Sands Aquifer.

Leachate generated from the infiltration of groundwater and surface water into the Alexandria Landfill is currently pumped out of the main leachate extraction riser. The extracted leachate is initially treated at a leachate treatment plant before being discharged to sewer under a trade waste agreement with Sydney Water. To protect surrounding groundwater and the Alexandra Canal from leachate, the leachate management system is required to operate continuously to keep the leachate level within the shale pit (i.e. intercept groundwater and reduce the volume of leachate being generated due to groundwater inflow). Details of the groundwater assessment and mitigation measures to be implemented are discussed in Chapter 19 (Groundwater).

The current landfill gas mitigation measure is limited to a small (~50 m) cut off trench located at the northwest boundary of the site and the existing temporary landfill cap. Further ground gas measures would be implemented in accordance with the Landfill Closure Management Plan (refer Section 17.3.4).

**5/5A Canal Road**

The land at 5/5A Canal Road, St Peters is located on the southern boundary of the Alexandria Landfill. The land was formerly used as a metal smelter, waste recycle facility and has since been filled with uncontrolled fill. A Phase 2 ESA was completed (AECOM, 2015d) which included soil, groundwater and ground gas sampling and analysis. The fill was found to be contaminated with heavy metals, asbestos, PAHs, PCBs, TRH and dioxins.

Asbestos was identified and is likely to be randomly present throughout the fill and potentially concentrated in pockets of fill with high proportions of demolition waste. The management and removal of asbestos as part of the project is discussed in Chapter 24 (Resource use and waste minimisation).

**Alexandra Canal**

As identified in the NSW EPA contaminated sites register, Alexandra Canal has been declared a remediation site due to the contamination of bed sediments resulting from a history of industrial activities in the local area. Primary contaminants of concern that have previously been identified in the Alexandra Canal sediments include organochlorine pesticides (chlordane, total DDT and dieldrin), PCBs and metals.

Due to the type and levels of these contaminants, the NSW EPA has determined that the bed sediments have the potential to present a significant risk of harm to human health and the environment if disturbed. The NSW EPA consequently issued Sydney Water (the landowner) with a Remediation Order under the CLM Act to facilitate the prevention of sediment disturbance.
Other lands

Other potentially contaminated land within and in the vicinity of the St Peters interchange and local road upgrades area includes commercial and industrial land uses, such as filled quarries, metal smelter sites, manufacturing sites and fuel storage sites. The industrial nature of the area as well as widespread uncontrolled filling has resulted in the potential for a range of contaminants to be present.

The M5 Factual Contamination Assessment (AECOM, 2015g) was completed within parts of the St Peters interchange and local road upgrade area, and provides an indication of the potential contamination. Specific findings included the presence of petroleum hydrocarbon soil and potential groundwater contamination at a borehole completed at 34 Burrows Road, St Peters (Lot 13 DP 32332) and asbestos containing materials in boreholes completed in Sydney Park near Campbell Road and Barwon Park Road.

The Phase 1 ESA identified a number of properties, including (and in association with) areas of contamination concern (Table 17-5 and Figure 17-5), where additional intrusive investigations were recommended. These properties are discussed in greater detail in the Technical working paper: Contamination (Appendix O).
Figure 17-5 Potential contamination at St Peters interchange and local road upgrades
17.3 Assessment of potential impacts

The project has the potential to generate contamination during construction and operation, including the potential to disturb existing contaminated lands at each of the surface works locations.

17.3.1 Potential to generate contamination

Various activities undertaken at and around the surface disturbance areas would have the potential to generate contamination including:

- Earthworks
- Demolition of buildings containing hazardous materials
- Vehicle, plant and/or equipment maintenance
- Accidents, spills of fuels, oils and chemicals during construction or operation.

The potential to cause contamination through earthworks, demolition of hazardous building materials and maintenance activities would be mitigated through further investigations of identified areas of contamination concern, and the implementation of appropriate environmental management measures (refer Section 17.4).

The potential for contamination to occur as a result of accidents or spills of fuels, oils and chemicals during construction and operation of the project is considered to be low, providing the environmental management measures presented in Section 17.4 are implemented.

Chapter 26 (Hazard and risk) presents further details on the management of dangerous goods and hazardous substances during construction, operation and transportation.

17.3.2 Potential to disturb contamination and associated risk

The risk of disturbing or encountering contaminated material during construction of the project varies across the project corridor. The risk for localised areas of soil, fill and groundwater contamination to be encountered at locations associated with historically contaminating land uses has been incorporated into the contamination risk assessment.

The contamination risk assessment (without the implementation of appropriate controls or remediation) was undertaken to understand the potential risk of identified areas of contamination concern. The risk assessment was qualitatively undertaken by assessing identified areas of contamination concern based on the likelihood of:

- Encountering soil or groundwater contamination
- The exposure pathway for human or ecological receptors.

Table 17-6 highlights the findings of the contamination risk assessment. Table 20 in the Technical working paper: Contamination (Appendix O) provides further details of the preliminary risk evaluation.

The potential for acid sulfate soils to be present is further discussed in Chapter 16 (Soil and water quality) and discussion of asbestos management is presented in Chapter 24 (Resource use and waste minimisation).
<table>
<thead>
<tr>
<th>Area of contamination concern</th>
<th>Project area</th>
<th>Preliminary risk evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>M5 Linear Park</td>
<td>Project area 1, 2 and 3</td>
<td>High</td>
</tr>
<tr>
<td>27-31 Garema Circuit, Kingsgrove</td>
<td>Project area 1</td>
<td>Medium</td>
</tr>
<tr>
<td>30A and 32 Commercial Road, Kingsgrove</td>
<td>Project area 1</td>
<td>Medium</td>
</tr>
<tr>
<td>Former ammunition storage</td>
<td>Project area 3</td>
<td>Medium</td>
</tr>
<tr>
<td>Vacant Roads and Maritime owned site, west of Bexley Road (part of M5 Linear Park)</td>
<td>Project area 3</td>
<td>Low</td>
</tr>
<tr>
<td>Kingsgrove Avenue Reserve</td>
<td>Project area 3</td>
<td>Low</td>
</tr>
<tr>
<td>19 Marsh Street, Amcliffe</td>
<td>Project area 4</td>
<td>Medium</td>
</tr>
<tr>
<td>Alexandria Landfill</td>
<td>Project area 5</td>
<td>High</td>
</tr>
<tr>
<td>Sydney Park</td>
<td>Project area 5</td>
<td>High</td>
</tr>
<tr>
<td>Camdenville Park</td>
<td>Project area 5</td>
<td>High</td>
</tr>
<tr>
<td>3-7 Unwin’s Bridge Road</td>
<td>Project area 5</td>
<td>High</td>
</tr>
<tr>
<td>5/5A Canal Road, St Peters (Phase 2 ESA completed)</td>
<td>Project area 5</td>
<td>High</td>
</tr>
<tr>
<td>34 Burrows Road, St Peters</td>
<td>Project area 5</td>
<td>High</td>
</tr>
<tr>
<td>Dial a Dump Industries, 1 Holland Street, St Peters</td>
<td>Project area 5</td>
<td>High</td>
</tr>
<tr>
<td>Burrows Industrial Estate, 1-3 Burrows Road, St Peters</td>
<td>Project area 5</td>
<td>High</td>
</tr>
<tr>
<td>Pioneer Plating Works, 25-29 Ricketty Street, Mascot (listed under CLM Act section 60)</td>
<td>Project area 5</td>
<td>High</td>
</tr>
<tr>
<td>Dynamo Workshop, 318 Princes Highway, St Peters</td>
<td>Project area 5</td>
<td>High</td>
</tr>
<tr>
<td>City of Sydney, Material Recycling Depot 19-25 Burrows Road, St Peters (listed under POEO Act)</td>
<td>Project area 5</td>
<td>High</td>
</tr>
<tr>
<td>Greyhound Bus Depot (also former metal smelter), 34 Burrows Road, St Peters</td>
<td>Project area 5</td>
<td>High</td>
</tr>
<tr>
<td>Shipping Container Logistics, 12-18 Burrows Road, St Peters</td>
<td>Project area 5</td>
<td>High</td>
</tr>
<tr>
<td>Car rental outlet, 532-536 Gardeners Road, Mascot</td>
<td>Project area 5</td>
<td>High</td>
</tr>
<tr>
<td>SIMS Metal and Taxi Depot, 33 Burrows Road, St Peters</td>
<td>Project area 5</td>
<td>High</td>
</tr>
<tr>
<td>Good River Properties Pty Ltd, 33 Burrows Road, St Peters (listed under POEO Act)</td>
<td>Project area 5</td>
<td>High</td>
</tr>
</tbody>
</table>
## Area of contamination concern

<table>
<thead>
<tr>
<th>Area of contamination concern</th>
<th>Project area</th>
<th>Preliminary risk evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITA Alexandria Pty Ltd, 33 Burrows Road, St Peters (listed under POEO Act)</td>
<td>Project area 5</td>
<td>High</td>
</tr>
<tr>
<td>Former Drum Reconditioning Facility, 53 Barwon Park Road, St Peters (listed under CLM Act section 58)</td>
<td>Project area 5</td>
<td>Medium</td>
</tr>
<tr>
<td>Australian Refined Alloys, 202-212 Euston Rd, Alexandria (listed under CLM Act section 60 and on National Pollutant Inventory register)</td>
<td>Project area 5</td>
<td>Medium</td>
</tr>
<tr>
<td>Visy Paper Pty Ltd and SPRC Pty Ltd, 6-10 Burrows Road South, St Peters (listed under POEO Act)</td>
<td>Project area 5</td>
<td>Low</td>
</tr>
<tr>
<td>Alexandra Canal (listed under section 58 of the CLM Act)</td>
<td>Project area 5</td>
<td>Low</td>
</tr>
<tr>
<td>Cooks River Rail Terminal, 20 Canal Road, St Peters (listed under CLM Act section 60)</td>
<td>Project area 5</td>
<td>Low</td>
</tr>
<tr>
<td>Uncontrolled filling for land reclamation and levelling</td>
<td>Project area 5</td>
<td>Medium</td>
</tr>
<tr>
<td>Acid sulfate soils</td>
<td>Project area 5</td>
<td>High</td>
</tr>
</tbody>
</table>

Potentially contaminated sites identified in Table 17-6 would be subject to further investigation, remediation and / or management in accordance with the measures described in Section 17.3.3 and those outlined in Section 17.4. These measures would be implemented so that all land used as part of the project is suitable for the proposed land use (ie the development of road infrastructure).

### Exposure Pathways

Where construction works would come into contact with contaminated materials, the potential exists for the health of onsite and offsite receivers to be impacted. However, for this potential impact to be realised, a pathway must exist between the contamination source and a sensitive receiver. This is commonly referred to as a source-pathway-receiver link.

Source-pathway-receiver links have the potential to occur when contaminated materials are first released and then transported (eg through mediums such as water and air) to a potential receiver (such as a person, fauna or flora species or an ecosystem), who then has the ability to intake those contaminated materials.

A specific example relevant to the construction of the project would be the potential for asbestos to be disturbed, causing asbestos particles to become airborne and thereby transported to a sensitive receiver (such as an onsite worker, or offsite member of the public). If those asbestos particles are in a form which can be chemically taken in by the receiver (eg friable asbestos), that receiver may be impacted by coming into contact with that substance. Other pathways by which contaminated materials may be transported to human or environmental receivers include vapour, leachate, or groundwater migration offsite.
However, the construction of the project would be undertaken in accordance with the requirements of the CLM Act, as well as the Work Health and Safety Regulation 2011, which sets out the requirements for preventing workers and nearby members of the public becoming exposed to airborne contaminants and hazardous materials in general. By following the requirements set out in the Work Health and Safety Regulation 2011, such as using appropriately licensed sub-contractors and ensuring persons are not exposed to contaminated materials above and beyond the relevant exposure standards, the construction of the project would effectively break any potential for source-pathway-receiver linkages to be completed, and for any adverse health impacts to result.

**Potential disturbance of contaminated bed sediments in the Alexandra Canal**

New stormwater infrastructure would be constructed near and upstream of Ricketty Creek Bridge, which is located more than two kilometres from the junction of the Alexandra Canal with the Cooks River.

During periods of high stormwater runoff, sediments within the canal, particularly in proximity to stormwater outlets, may be temporarily mobilised. This has the potential to cause localised erosion and scour in the vicinity of the stormwater discharge point(s) which may mobilise contaminated sediments already present in the canal.

However, it is considered unlikely that sediments mobilised as a result of the impact of the new infrastructure would extend a significant distance from the stormwater discharge point. Details of previous investigations indicating that sediments would not be mobilised a significant distance are provided in the Technical working paper: Contamination (Appendix O). These investigations suggest that sediment mobilisation is likely to be localised and would be unlikely to result in an increased risk to human health or the environment.

As such, the risk of mobilised sediment migrating to the Cooks River as a result of discharge from stormwater infrastructure constructed for the purposes of the project is considered to be low. In addition, mitigation measures (that would be detailed in the construction environmental management plan) would be installed at the point of discharge to further minimise the potential for sediment disturbance caused by the construction and operation of a new stormwater system. The construction and operation of the additional discharge points would not conflict with the existing Remediation Order.

**Interception of contaminated water from the Botany Sand Beds aquifer**

The Botany Sand Beds aquifer is a shallow, unconfined aquifer with a high hydraulic conductivity. In many areas it has been contaminated by industrial activities, most notably in the southern portion of the aquifer near the Botany Industrial Park where groundwater use has been embargoed due to contamination. Further details regarding the botany sand beds aquifer is discussed in Chapter 19 (Groundwater). The proposed treatment of intercepted contaminated groundwater would be managed through a water treatment plan, a wetland system and a polishing tertiary treatment system. Details of this process are provided in Chapter 16 (Soils and water quality).

17.3.3 Site assessment and remediation

Both the Alexandria Landfill (including Bradshaw Mountain) and 5/5A Canal Road sites would be managed under the NSW site auditor scheme provided in the CLM Act. Additional areas of contamination concern (Table 17-5) may be managed under the NSW site auditor scheme as a result of additional intrusive investigations.

The NSW site auditor scheme is in place to increase the certainty that contaminated sites are assessed and/or remediated to an appropriate level. The scheme is administered by the NSW EPA under the CLM Act, including the relevant guidelines published under section 105 of the CLM Act.

NSW accredited auditors are engaged to undertake an independent review of a consultants work, thereby providing an increased certainty to planning authorities about the suitability of a site for a proposed use or the extent and nature of contamination.
An accredited site auditor has been engaged by Roads and Maritime, and a further site auditor would be engaged by the contractor to certify different stages of the management of these sites under the CLM Act. Initial site assessments have been completed for the Alexandria Landfill and the 5/5A Canal Road sites, and a Landfill Closure Management Plan (LCMP) has been prepared for the Alexandria Landfill. The LCMP would be finalised prior to closure and remediation works commencing at the Alexandria Landfill (refer Section 17.3.4).

The accredited site auditor engaged by Roads and Maritime would continue to act as an independent reviewer of further investigations undertaken at these sites under the CLM Act.

To ensure they are suitable for use as part of the project, both the Alexandria Landfill and 5/5A Canal Road sites would ultimately be subject to the following process under the CLM Act:

- Remediation of both sites would take place in accordance with separate Remedial Action Plans. Both Remedial Action Plans would first be certified by the accredited site auditor engaged by the proponent, and would also be approved by the NSW EPA.
- After remediation works are complete, the Site Auditor engaged by the contractor would prepare a Site Audit Report and a Site Audit Statement for each site. The purpose of these Site Audit Reports and Site Audit Statements would be to demonstrate how, and confirm that, each site is suitable for its intended use in the operation of the project.

Areas of land identified in this chapter and Technical working paper: Contamination (Appendix O) as being of potential contamination concern would be further investigated to assess whether the land is suitable for the proposed land use.

If the land is assessed as not suitable, based on the findings, recommendations would be made to undertake one or all of the following:

- Undertake further investigations
- Development of a remedial action plan to make the site suitable for the proposed land use
- Notify the site to the NSW EPA in accordance with section 60 of the CLM Act if required
- Development and implementation of a site management plan to manage risks to future land uses.

17.3.4 Landfill rehabilitation and management

A Phase 2 ESA was prepared for the former Alexandria Landfill (AECOM, 2015e), with works including intrusive site investigations, comprising the drilling of 93 boreholes, 12 groundwater monitoring wells and 13 landfill gas monitoring wells. The Phase 2 ESA found that the Alexandria Landfill site at the time of the Phase 2 ESA investigations did not meet the proposed land use criteria of motorway interchange and open space parkland; however, the site could be made suitable if appropriate remediation and management actions were adopted and implemented. It was recommended that further delineation and monitoring of landfill gases was required and that a Remedial Action Plan and Landfill Closure Plan be prepared for the site.

The LCMP prepared for the former Alexandria Landfill site (Appendix F) provides a landfill closure, environmental management and monitoring framework that would be implemented both during and post landfill closure. The LCMP outlines the key landfill closure activities and documents the proposed final landform, capping system, leachate and gas management approach and monitoring protocols to be adopted for the landfill closure process.

The LCMP has been developed in accordance with the requirements of the POEO Act and in consultation with the NSW EPA and the Site Auditor accredited under the CLM Act. Construction and operation of the project would be carried out in accordance with the LCMP once finalised.
The key components of the landfill closure works would include:

- Final landfill cap
- Landfill gas management
- Leachate management
- Groundwater cut-off wall (discussed in Chapter 19 Groundwater)
- Landfill monitoring and management requirements.

**Landfill cap design**

The purpose of the landfill cap is to form a barrier between contaminated material (landfill wastes) and the ground surface in order to limit the potential migration of contaminants. In particular, the landfill cap would:

- Restrict surface water infiltration which would reduce the ability of the landfill to generate leachate
- Reduce the release of landfill gases to the atmosphere; and would also mitigate the release of landfill gases into the atmosphere
- Provide a physical barrier between the landfill waste and potential future site users.

The landfill cap design in the LCMP was developed following discussions with NSW EPA and in consideration of the following guidance documents:

- POEO Act 1997. No 156, Section 76. Post-closure requirements for waste facilities or other licensed premises
- Existing Environment Protection Licences (EPLs) and trade waste agreement:
  - EPL 4627: Waste disposal by application to land. The licence allows for acceptance of: general solid waste (non-putrescible) (application to land); waste tyres (application to land); asbestos waste (application to land); and any waste below the licensing thresholds in Schedule 1 of the POEO Act
  - EPL 12594: Recovery of general waste and waste storage (other types of waste)
  - Sydney Water (Trade Waste Agreement No. 29304) for the discharge of treated leachate to a sewer discharge point in Albert Street. The existing trade waste agreement would be maintained, and maximum discharge limits may be altered in consultation with Sydney Water to levels appropriate to the amount of treated leachate requiring disposal.

The landfill capping system for the landfill is described in the LCMP (*Appendix F*) and would comprise the following major components:

- A re-vegetation layer with localised thickening to accommodate taller vegetation (if required)
- A subsoil drainage layer
- A low permeability material layer comprising compacted clay and, in some areas, a geosynthetic clay liner
- A compacted earth cover (seal bearing layer)
- A gas collection system located within the waste material substrate.
The capping system will vary across the landfill to suit topography. An indicative cross section of the layers within the capping system is provided in Figure 17-6.

The proposed final landform would include areas of batter, which would be cut into landfilled waste and capped. These areas require a modified capping layer, to suit the slope of the batter. The final landfill cap design would be determined during detailed design in line with NSW EPA and the NSW EPA accredited site auditor’s requirements.

A construction quality assurance report would be submitted to the NSW EPA, containing the as-constructed final landfill cap details and addressing the construction quality assurance requirements specified in NSW EPA (2015). For further detail refer to the LCMP in Appendix F.

Landfill gas management

Landfill gas issues have previously been identified at the Alexandria Landfill as described in Section 17.2.4. The landfill gas management system to be introduced as part of the project would manage gas emissions and odours identified in the subsurface. The proposed landfill gas management system is described in the LCMP in Appendix F and would comprise:

- A subsurface gas drainage system comprising collection pipes and gas vents
- Vertical active gas extraction wells across the landfill, with flow lines and header lines feeding a gas flare
- A network of subsurface landfill gas monitoring wells to monitor the effectiveness of the mitigation systems.

Details of the landfill gases identified at the Alexandria Landfill are provided in the Technical working paper: Contamination (Appendix O) and LCMP (Appendix F).

Leachate management

Leachate is generated by the infiltration of water from rainfall and groundwater flow into landfill waste. The management of leachate would be required during the construction of the St Peters interchange to maintain:

- Leachate levels below the level licensed in the Environmental Protection Licences
- Groundwater levels below the finished road level and foundations
- Radial groundwater inflow into the landfill to prevent leachate from migrating from the site and contaminating surrounding groundwater.

In addition, the New M5 westbound ramps and portal, as well as the cut and cover road infrastructure would be below the natural groundwater level. Consequently, a groundwater management system would be installed. Continual leachate pumping and construction of a cut-off wall would maintain groundwater and leachate levels below the St Peters interchange infrastructure design levels.

The existing leachate treatment plant is being upgraded to treat a minimum of 100 kilolitres per day of raw leachate from the site as part of effluent improvement program (upgrades have commenced under existing consents). A new leachate treatment plant (included as part of this project) would replace the upgraded existing treatment plant (with an approximate maximum leachate treatment capacity of 200 kilolitres per day). The existing upgraded leachate treatment plant would continue to operate until the new leachate treatment plant is commissioned.
The key components of the leachate management system include:

- The existing leachate collection system would be upgraded and maintained in the short term
- A new leachate collection system would be provided to collect leachate under the capping layer
- Collected leachate would be pumped to a new leachate treatment plant through a rising main
- Treated leachate would be discharged into the local sewer system under a Sydney Water trade waste agreement
- Stormwater runoff would be collected through a pipe and pit stormwater system into the stormwater pump station, before being pumped to the surface through a rising main and conveyed to a water quality control basin. After treatment, stormwater would be discharged to Alexandra Canal.

*Landfill monitoring and management requirements*

Landfill monitoring and management requirements would be followed in accordance with the existing Environment Protection Licences and trade waste agreement requirements and is outlined in the LCMP (*Appendix F*).
17.4 Environmental management measures

Mitigation and management measures provided in Table 17-7 would be implemented during construction and operation of the project to reduce or eliminate the risks posed by contamination. These measures are expected to make the land to be used as part of the project suitable for the proposed end use.

Potentially contaminated sites identified in Section 17.2 would be subject to further investigation, remediation and/or management. Monitoring programs for the Alexandria Landfill and other sites identified through further investigations would confirm the effectiveness of the proposed mitigation and management measures.

<table>
<thead>
<tr>
<th>Impact</th>
<th>No.</th>
<th>Environmental management measure</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landfill closure</td>
<td>CM01</td>
<td>The closure and ongoing management of the Alexandria Landfill would be undertaken in line with the LCMP (see Section 17.3.4 and Section 5.9.1) and remedial action plan. This includes a landfill closure, environmental management and monitoring framework.</td>
<td>Pre-construction and construction</td>
</tr>
</tbody>
</table>
| Landfill closure                      | CM02 | A site specific management plan would be prepared for the Alexandria Landfill to manage the excavation of parts of the landfill during construction. The management plans, amongst other requirements would detail mitigation measures to:  
• Contain and treat landfill gas emissions from excavations  
• Treat offensive odours produced by leachate and landfill gas  
• Contain, extract and treat leachate within excavations  
• Protect workers and off-site receptors from exposure to potential biological, chemical and physical hazards encountered during the exhumation of landfill waste.  
• Manage asbestos contaminated wastes | Pre-construction |
<p>| Disturbance and mobilisation of contaminated material | CM03 | Potentially contaminated areas directly affected by the project would be investigated and managed in accordance with the requirements of guidance endorsed under section 105 of the CLM Act. This includes further investigations in areas of potential contamination identified in the construction footprint. | Pre-construction |
| General                               | CM04 | An unexpected finds and hazardous materials procedure would be implemented to manage any potentially contaminated materials that may be encountered during site preparation and/or construction works. | Pre-construction |</p>
<table>
<thead>
<tr>
<th>Impact</th>
<th>No.</th>
<th>Environmental management measure</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>CM05</td>
<td>Waste management plans, as part of the Construction Environmental Management Plan, would include procedures for handling and storing potentially contaminated spoil and undertaking waste assessment and classification for off-site disposal to appropriately licenced waste facilities. See Chapter 24 (Resource use and waste minimisation) for more information.</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Asbestos</td>
<td>CM06</td>
<td>Site specific asbestos management plans would be developed where relevant. Refer to Chapter 24 (Resource use and waste minimisation) for further information on asbestos management.</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Hazardous materials</td>
<td>CM07</td>
<td>A hazardous materials assessment would be carried out prior to and during the demolition of buildings. Demolition works would be undertaken in accordance with the relevant Australian Standards and relevant NSW WorkCover Codes of Practice, including the Work Health and Safety Regulation 2011.</td>
<td>Pre-construction, construction</td>
</tr>
<tr>
<td>Dangerous goods</td>
<td>CM08</td>
<td>A dangerous goods search of the WorkCover NSW records for licenced dangerous good would be undertaken prior to construction.</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Explosive ordnance</td>
<td>CM09</td>
<td>An explosive ordnance due diligence assessment would be completed at the identified former ammunition site (Project area 3), located between Flatrock Road, Bexley Road and Wolli Creek.</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>General</td>
<td>CM10</td>
<td>In the event of encountering unexpected finds of contamination (i.e. the observation of offensive odours, soil discoloration, buried waste or potential asbestos containing materials) during construction, work in the area would cease until an appropriately qualified environmental consultant can advise on the need for further assessment, remediation or other action, as deemed appropriate. Further assessment and management of contamination, if required, would be undertaken in accordance with section 105 of the CLM Act.</td>
<td>Construction</td>
</tr>
<tr>
<td>Contamination</td>
<td>CM11</td>
<td>Appropriate mitigation measures to minimise sediment mobilisation as a result of construction activities at the location of the new stormwater infrastructure at Alexandra Canal would be detailed in the Construction Environmental Management Plan in accordance with the requirements of the Remediation Order in consultation with NSW EPA and Sydney Water.</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>Contamination</td>
<td>CM12</td>
<td>Appropriate mitigation measures including stockpiling and management of potentially contaminated material would be undertaken at construction compounds to prevent movement of material into receiving waters.</td>
<td>Construction</td>
</tr>
<tr>
<td>Impact</td>
<td>No.</td>
<td>Environmental management measure</td>
<td>Timing</td>
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</tr>
<tr>
<td>General</td>
<td>CM13</td>
<td>Plant, equipment and supplies would be managed to prevent spills and leaks. See Chapter 26 (Hazard and risk) for more information.</td>
<td>Construction</td>
</tr>
<tr>
<td>General</td>
<td>CM14</td>
<td>Tunnel washing water and waste would be appropriately contained, treated and disposed of. Refer to Chapter 24 (Resource use and waste minimisation) for more information.</td>
<td>Construction</td>
</tr>
<tr>
<td>Contamination</td>
<td>CM15</td>
<td>Further in situ testing of soils in areas of known potential contamination to determine waste classification.</td>
<td>Construction</td>
</tr>
<tr>
<td>Operation</td>
<td>OpCM1</td>
<td>The ongoing management of the Alexandria Landfill will be undertaken in line with the LCMP (see Section 17.3.4 and Section 5.9.1)</td>
<td>Pre-construction, construction and post construction</td>
</tr>
<tr>
<td>Contamination</td>
<td>OpCM2</td>
<td>Procedures to address spills, leaks and tunnel washing would be developed and implemented during operation of the project</td>
<td>Operation</td>
</tr>
<tr>
<td>Scour protection</td>
<td>OpCM3</td>
<td>Measures to minimise sediment mobilisation during operation would be incorporated into the design of stormwater outlets at the location of the new stormwater infrastructure at Alexandra Canal. The design of the outlets, including discharge velocities and scour protection measures, would be confirmed during detailed design and supported by appropriate drainage modelling. The detailed design of the outlets would be provided to Sydney Water and NSW EPA for approval in accordance with the requirements of the Remediation Order.</td>
<td>Detailed design</td>
</tr>
</tbody>
</table>