# Chapter 19

## Air quality

# 19 Air quality

This chapter provides an assessment of the potential impact on air quality as a result of this proposal and identifies mitigation measures to minimise these impacts.

## 19.1 Overview

Air quality during the proposal would be managed in accordance with standard mitigation measures. This would include best-practice dust management measures, such as watering of haul roads and exposed areas, adjusting and coordinating activities, and stockpiling measures.

Temporary dust generating activities would include dust generated from clearing and demolition, excavation, materials handling, stockpiling and compaction activities, as well as from wind erosion of stored materials and exposed surfaces. This could result in potential impacts at surrounding human and ecological sensitive receivers.

Temporary emissions from combustion of diesel fuel by heavy vehicles, mobile construction equipment and stationary equipment such as diesel generators are not expected to result in adverse impacts on the surrounding environment.

## 19.2 Legislative and policy context

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

The air quality assessment has considered the relevant requirements for the following legislation and guidelines:

- *Protection of the Environment Operations Act 1997* (NSW)
- *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (Approved Methods) (Environment Protection Authority (EPA), 2016)
- The Protection of the Environment Operations (Clean Air) Regulation 2010
- National Environment Protection (Ambient Air Quality) Measure 2016.

## 19.3 Assessment methodology

### 19.3.1 General methodology

The general methodology applied to assess potential air quality impacts for the proposal was designed to address the primary risks to air quality, and involved:

- Identifying the key air quality risks from the proposal
- Establishing prevailing climate conditions in the vicinity of the proposal using publicly available data from nearby long-term stations operated by the Bureau of Meteorology
- Determining local meteorological patterns and trends using publicly available data from nearby Department of Planning, Industry and Environment meteorological monitoring stations
- Establishing ambient air quality conditions using publicly available data from nearby Department of Planning, Industry and Environment air quality monitoring stations
- A desktop review of Commonwealth Department of the Environment and Energy National Pollutant Inventory database (http://www.npi.gov.au/npi-data/search-npi-data) to identify any projects or facilities that may be contributing to local air quality conditions
- Identifying air quality sensitive receivers with the potential to be adversely affected by the proposal
- Describing the methods used to evaluate the potential changes in air quality
- Assessing potential air quality impacts during construction of the proposal
- Identifying mitigation measures to address or manage potential air quality impacts.

### 19.3.2 Identification of key air quality risks

During the proposal, the primary air quality risk would be dust generated from construction clearing and demolition, excavation, materials handling, stockpiling and compaction activities, as well as from wind erosion of stored materials and exposed surfaces resulting in impacts at surrounding sensitive receivers. The term dust refers to particulate matter and most commonly, is referred to as total suspended particles (TSP), deposited dust, particulate matter with equivalent aerodynamic diameter of 10 microns or less ($PM_{10}$), and finer particulate matter with equivalent aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$). When not properly managed, elevated airborne dust levels have the potential to cause adverse health or nuisance impacts. These types of impacts can include:

- Respiratory-related health issues
- Nuisance impacts including dust soiling (i.e. the unwanted settling of dust of property surfaces)
- Reduced visibility and irritation of the eyes.

High dust levels can also cause physical and chemical impacts to vegetation (Farmer 1993). Impacts on vegetation can include physically smothering the leaves, physically blocking the stomata (Farmer 1993; Doley 2006) and an increase in leaf temperature (Doley 2006).

Exhaust emission from the combustion of fossil fuels in construction plant and equipment represent another air quality risk during construction. Key pollutants associated with these emissions include:

- Fine particulate matter (i.e. $PM_{10}$ and $PM_{2.5}$)
- Oxides of nitrogen ($NO_x$) including nitrogen dioxide ($NO_2$)
- Carbon monoxide (CO)
- Sulfur dioxide ($SO_2$)
- Carbon dioxide ($CO_2$)
- Volatile organic compounds (VOCs) such as benzene.

Finally, odours and airborne hazardous materials arising from uncovered contaminated soils represent another air quality related risk.

### 19.3.3 Methodology for assessing dust impacts

Consistent with other recent large-scale Australian transport infrastructure projects and *Sydney Metro West Environmental Impact Statement – Westmead to The Bays and Sydney CBD* (Sydney Metro, 2020a), the potential for dust related impacts of the proposal was evaluated using the risk-based assessment approach developed by the UK Institute of Air Quality Management presented in *Guidance on the assessment of dust from demolition and construction Version 1.1* (UK Institute of Air Quality Management, 2014). The UK Institute of Air Quality Management assessment approach considers the potential for dust-related air quality impacts to cause:

- Annoyance due to dust soiling, e.g. dust covering items or objects such as cars and houses
- Human health impacts such as respiratory and visual impacts as identified above
- Physical and chemical impacts to ecological receivers.

The UK IAQM assessment approach is an evaluation of the risk of dust impacts from the proposal, which involves:

- Estimating the magnitude (i.e. large, medium or small) of potential dust emissions associated with each of the relevant construction activities, including:
  - Demolition (with reference to the volume and height of buildings to be demolished, and the materials with which they are built)
  - Earthwork (with reference to the area of earthwork, soil type, the number of heavy vehicles, and the total amount of materials to be moved)
  - Construction of acoustic sheds and other temporary buildings and structures (with reference to size of buildings being constructed, and whether construction activities include on-site concrete batching or sandblasting)
  - 'Track-out' or transport related handling of construction materials on-site (with reference to the number of heavy vehicles per day and the extent of unsealed roads)

- Classifying the sensitivity of the surrounding human and ecological environment, taking into account the proximity and density of human receivers within 350 metres of each construction site, within 50 metres of haulage routes, as well as within 500 metres of site vehicle access points and sensitive ecological receivers within 50 metres. The sensitivity of the surrounding receiver area is identified for both:
  - Nuisance impacts (such as dust soiling), which is based on the number of sensitive receivers in close proximity to the site
  - Human health impacts, including eye irritation, which has a lower threshold for significance in terms of the number of sensitive receivers and their proximity to the site.

The risk of impacts at these receivers was evaluated by estimating the unmitigated magnitude (i.e. large, medium or small) of potential dust emissions from demolition, earthwork, construction and track-out (i.e. transport loading/unloading and haulage) activities and combining this with the sensitivity of the identified surrounding human and ecological receivers, to provide a risk rating. This risk rating is used to determine what mitigation and management measures are required (in-line with the guidance presented in the UK Institute of Air Quality Management methodology) to effectively manage these risks.

### 19.3.4 Methodology for assessing other air quality-related impacts

Other air quality-related risks for the proposal identified above (including impacts from pollutants associated with the combustion of fossil fuels in construction plant and equipment and odours and hazardous substances from within removed structures and excavated materials) were assessed qualitatively, with measures developed in Section 19.8.2.

## 19.4 Existing environment

### 19.4.1 Climate and meteorology

Climate and meteorological conditions are important for determining the direction and rate at which air pollution will disperse. Impacts due to dust generation is the main air quality risk during construction, and long-term climate data is useful for identifying periods throughout the year when conditions conducive to dust generation are most likely (such as warm and/or dry periods).

Long-term temperature and rainfall data from the Commonwealth Bureau of Meteorology's Sydney Observatory Hill (Station no. 066062) which operated from 1859 to August 2020 were reviewed to understand prevailing climate conditions and patterns. This data shows the study area of the proposal experiences warm and wet summers, with mean daily maximum temperatures of around 26 degrees Celsius. The driest period of the year was identified as being between August and December, when the average monthly rainfall ranges between 68.1 and 83.8 millimetres; below the monthly average of 101 millimetres. This period of low rainfall and/or higher temperature conditions creates the greatest potential for dust generation.

Meteorological records from the automatic weather stations operated by the Department of Planning, Industry and Environment at Rozelle and Randwick were reviewed to determine the prevailing local wind conditions around the proposal. This was carried out to identify the receivers with the highest potential to be affected by winds blowing in the direction from the proposal. Winds blowing from the south were recorded most often at the Department of Planning, Industry and Environment Rozelle station which is located near the Bays tunnel launch and support site and the Pyrmont Station construction sites. These data indicate that receivers located to the north of the Bays tunnel launch and support site and the Pyrmont Station construction sites have the highest potential to experience winds blowing from these sites.

At the Department of Planning, Industry and Environment Randwick station, which is located to the south of the Sydney CBD, winds blowing from the west and east-northeast were most common. This station provides an indication of prevailing meteorological conditions at the Hunter Street (Sydney CBD) Station construction sites. Based on the meteorological trends from the Randwick station described above, receivers to the east and west-southwest of the Hunter Street (Sydney CBD) Station construction sites have the highest risk of experiencing winds blowing from these sites.

### 19.4.2 Background air quality

Air quality data sourced from Department of Planning, Industry and Environment monitoring stations at Rozelle, Randwick and Cook and Phillip Sydney CBD for the last five calendar years (2016 to 2020) are summarised in Table 19-1. For the Cook and Phillip Sydney CBD station, data are only presented for 2020 with this station commencing monitoring in September 2019. The data shows that existing concentrations of air pollutants were generally below the air quality impact assessment criteria during the 2016 to 2020 reporting periods for carbon monoxide, nitrogen dioxide and sulfur dioxide. However, exceedances frequently occurred for the:

- $PM_{10}$ 24-hour impact assessment criterion of 50 micrograms per cubic metre
- $PM_{2.5}$ 24-hour and annual impact assessment criteria of 25 and eight micrograms per cubic metre respectively.

These exceedances are likely due to increased particle levels from widespread drought conditions (particularly in 2017 and 2018), hazard reduction burning, and an unprecedented bushfire season in late 2019 and early 2020.

Background annually averaged $PM_{10}$ levels for the IAQM dust impact assessment method were determined using the data listed in Table 19-1. A value of 18 micrograms per cubic metre was applied for The Bays tunnel launch and support site and the Pyrmont Station construction sites. This was the rounded average of the results measured at the Department of Planning, Industry and Environment's Rozelle station in 2016 and 2017, noting no data was available for 2018 and the annual averages in 2019 and 2020 were affected by the Australian bushfires and therefore were excluded.

An annually averaged $PM_{10}$ concentration of 19 micrograms per cubic metre was applied at the Hunter Street Station (Sydney CBD) construction sites. This was the rounded average value of the results measured at the Department of Planning, Industry and Environment's Randwick station in 2016, 2017 and 2018, noting that the annual averages in 2019 and 2020 were affected by the Australian bushfires and therefore were excluded.

Table 19-1 Background air quality monitoring information (2016 to 2020)

| Pollutant | Averaging period | Air quality impact assessment criteria | Rozelle | | | | | Randwick | | | | | Cook and Phillip Sydney CBD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2016 | 2017 | 2018 | 2019 | 2020 | 2016 | 2017 | 2018 | 2019 | 2020 | 2020 |
| **$PM_{10}$ ($\mu g/m^3$)** | Max 24-hour | 50 | **59** | **54** | **88** | **143** | **114** | 44 | **56** | **96** | **128** | **137** | **131** |
| | 95th percentile 24-hour | - | 20 | 31 | 31 | 49 | 34 | 32 | 32 | 36 | 52 | 37 | 30 |
| | Annual | 30 | 17 | 18 | - | 23 | 18 | 18 | 19 | 21 | 24 | 20 | 16 |
| **$PM_{10}$ ($\mu g/m^3$)** | Max 24-hour | 25 | **49** | **36** | 19 | **102** | **87** | - | - | **31** | **95** | **115** | **113** |
| | 95th percentile 24-hour | - | 14 | 13 | 14 | 28 | 18 | - | - | 14 | 27 | 16 | 17 |
| | Annual | 8 | 7.4 | 7.2 | - | **10.3** | 7.5 | - | - | 7.6 | **10.8** | 7.6 | 7.8 |
| **Carbon monoxide ($mg/m^3$)** | Max 1-hour | 30 | 2 | 1 | 1 | 6.5 | 4.1 | - | - | - | - | - | 4.4 |
| **Nitrogen dioxide ($\mu g/m^3$)** | Max 1-hour | 246 | 94 | 115 | 107 | 185 | 88 | 89 | 77 | 75 | 105 | 76 | 94 |
| | Annual | 62 | 21 | 21 | 21 | 21 | 16 | 15 | 13 | 13 | 14 | 10 | 27 |
| **Sulfur dioxide ($\mu g/m^3$)** | Max 1-hour | 570 | 52 | 63 | 79 | 91 | 46 | 89 | 76 | 55 | 83 | 40 | 54 |
| | Annual | 60 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

*Note: Exceedances of the relevant air quality impact assessment criteria are shown in bold; '-' indicates that the data are either not available or not measured*

### 19.4.3 Local emission sources

Air quality in Sydney is influenced by a variety of different anthropogenic and natural sources. The EPA (2012) has investigated the relative contribution levels of relevant pollutants in the Sydney region from different anthropogenic sources, including:

- Domestic activities (such as wood-fired home heaters and lawn mowing) which are major contributors to the total emissions of $PM_{10}$, $PM_{2.5}$, carbon monoxide and volatile organic compounds
- Road traffic and off-road mobile equipment (such as construction plant and boats) which are major contributors to the total emissions of carbon monoxide and nitrogen dioxide, while making a smaller but still significant contribution to total emissions of $PM_{10}$, $PM_{2.5}$ and volatile organic compounds
- Industrial and commercial activities which are major contributors to the total emissions of $PM_{10}$, while making a smaller but still significant contribution to total emissions of $PM_{2.5}$, nitrogen dioxide, and volatile organic compounds.

In recent years intense drought conditions and bushfires have also contributed to elevated pollutant concentrations, and in particular, particulate matter levels.

A search of the Commonwealth Department of the Environment and Energy National Pollutant Inventory (for 2019/20) and a desktop review of land uses within five kilometres of this proposal identified several nearby anthropogenic sources which are likely to influence local air quality. These sources include:

- Mineral, metal and chemical wholesaling at Gore Bay Terminal, Greenwich
- Beverage manufacturing at Camperdown
- Asphalt manufacturing and fabricated metal product manufacturing at Alexandria
- Educational research-related activities at the University of NSW, Kensington
- Laundry and dry-cleaning service at Rosebery.

A detailed description of the existing land use patterns and sensitive receivers surrounding the proposal is provided in Chapter 7 (Noise and vibration), Chapter 10 (Property and land use) and Chapter 13 (Social impacts).

## 19.5 Avoidance and minimisation of impacts

The design development of this proposal has aimed to avoid or minimise potential air quality impacts. Specifically, the design includes:

- Conducting most spoil handling activities within enclosed structures. This includes establishing acoustic sheds at The Bays tunnel support and launch site, over each of the Pyrmont Station construction sites and using the existing acoustic shed at the existing Sydney Metro City & Southwest tunnelling support site at 33 Bligh Street (which becomes part of the Hunter Street eastern construction site in this proposal). These sheds are expected to capture dust generated from construction activities at these sites, limiting the extent of emissions to air at both locations
- Wherever possible, using spoil haulage routes that avoid local roads and restrict construction traffic movements to main and industrial roads.

## 19.6 Potential impacts

### 19.6.1 Potential tunnelling impacts

Air quality impacts from tunnelling would be contained underground. As such, no potential direct air quality impacts from tunnelling between The Bays and the Sydney CBD are expected.

### 19.6.2 Potential power supply route impacts

Power supply routes would generally be constructed within existing road reserves, and power connection cabling would generally be installed using open trenching approaches. At major infrastructure or other major physical constraints, under boring approaches would be utilised to install the connections. Air quality mitigation measures detailed in Section 19.8.2 would be applied as required to manage potential dust generated during power supply work. Dust generated from the excavation, handling, placement and compaction of soils and from exposed surfaces and stockpiled materials would be the key air quality risk associated with this work. The footprint of the active work area and linear nature of the activity is such that potential impacts would be limited and temporary in nature.

### 19.6.3 The Bays tunnel launch and support site

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

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

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

The Bays tunnel launch and support site in this proposal would be located within a part of The Bays Station construction site. The impacts of the proposed use of The Bays tunnel launch and support site are assessed below. There would be minimal surface ground disturbance associated with this work.

#### Dust

Sensitive receivers within the study area around The Bays tunnel launch and support site include:

- Residential receivers to the north at Mansfield Street (about 80 metres away), and to the west off Quirk Street, Hornsey Street and Lilyfield Road (more than 150 metres away)
- Users of several parks (the closest on Robert Street about 100 metres to the north-east), as well as several educational facilities (more than 300 metres from the site), and places of worship, including C3 Church (immediately north of the site)
- Ecologically sensitive receivers associated with White Bay, located immediately adjacent to the site.

Using guidance from the UK IAQM methodology, the unmitigated risk ratings were determined as presented below in Table 19-2. The potential dust impact would be temporary in nature and would be substantially reduced with the implementation of standard mitigation measures identified in Section 19.8.2. While about 306,000 cubic metres of spoil is anticipated to be removed, stored and transported from The Bays tunnel launch and support site, some of the activities would be carried out within an enclosed acoustic shed and the receiver sensitivity is comparatively lower due to the distance and density of sensitive receivers. The Bays tunnel launch and support site would not exceed an overall risk rating of 'medium' (unmitigated) for human receivers. Risk assessment for sensitive ecological receivers has also been carried out as Sydney Harbour catchment is mapped as Key Fish Habitat (refer to Chapter 15 (Soils and surface water quality)).

Table 19-2 Unmitigated risk ratings, The Bays tunnel launch and support site

| Construction activity | Magnitude of potential emissions | Potential unmitigated impacts | | |
|---|---|---|---|---|
| | | Nuisance | Human health | Ecological |
| **Demolition** | None | No risk | No risk | No risk |
| **Earthwork** | Large | Medium risk | Low risk | High risk |
| **Construction** | Small | Negligible risk | Negligible risk | Low risk |
| **Track-out** | Large | Low risk | Low risk | High risk |

As shown in Table 19-2 the highest unmitigated dust risk rating determined for the construction activities at The Bays tunnel launch and support site was 'high'. This was determined for ecological impacts from earthwork (i.e. spoil storage, handling and management), given the proximity of the site to White Bay (part of Sydney Harbour) and the quantity of materials to be managed and transported from the site. An unmitigated risk rating of 'high' was also determined for track-out (i.e. haulage activities) based on the quantity of soils to be managed and transported from the site. Measures to mitigate or otherwise effectively manage these risks are presented in Section 19.8.2.

#### Other emissions to air

Exhaust emissions from construction plant and equipment and odours and airborne hazardous materials arising from uncovered contaminated soils also represent potential air quality risks during construction. Considering the intensity of activities, and given that the background concentrations of CO, $SO_2$ and $NO_2$ are well below the relevant Environment Protection Authority impact assessment criteria (refer to Table 19-1), exhaust emissions from construction plant and equipment at The Bays tunnel launch and support site are not expected to represent substantial risk.

The potential risk associated with possible odours, vapours and airborne hazardous materials arising from uncovered contaminated soils is expected to be limited noting there would be minimal ground surface disturbance activities within The Bays tunnel launch and support site. However, there is also the potential for these risks to be encountered in tunnelled materials extracted at the site. As such, potential odours, vapours and airborne hazardous materials represent a risk at The Bays tunnel launch and support site, with measures to address this risk included in Section 19.8.2.

### 19.6.4 Pyrmont Station construction sites

#### Dust

Sensitive receivers within the study area around the Pyrmont Station construction sites include:

- Residential receivers to the north and west of the western construction site along Paternoster Row, Pyrmont Street and Harris Street as close as 20 metres away
- Medium density residential receivers within 20 metres to the south and west of the eastern construction site along Pyrmont Bridge Road and Edwards Street
- Jones Street Pocket Park and Carmichael Park recreational areas located about 300 metres to the northwest of the western construction site
- Elizabeth Healey Reserve located across Pyrmont Bridge Road and directly south of the western construction site
- St Bede Catholic Church and Harbour City Harvest Church both within 500 metres
- Pyrmont Bay Park located about 200 metres to the north of the eastern construction site and Paradise Reserve 150 meters to the west of the western construction area
- Ecologically sensitive areas of Blackwattle Bay and Darling Harbour both located within 500 metres of the Pyrmont Station construction sites.

Earthwork activities at the Pyrmont Station construction sites would be completed within fully enclosed acoustic sheds. The unmitigated risk ratings listed in Table 19-3 for the enclosed construction sites were determined using the UK IAQM approach outlined above in Section 19.3.3. Potential dust impacts would be temporary in nature and would be substantially reduced with the implementation of standard mitigation measures identified in Section 19.8.2.

Table 19-3 Unmitigated risk ratings, Pyrmont Station construction sites

| Construction activity | Magnitude of potential emissions | Potential unmitigated impacts | | |
|---|---|---|---|---|
| | | Nuisance | Human health | Ecological |
| **Demolition** | Medium | Medium risk | Medium risk | No risk |
| **Earthwork** | Small | Low risk | Low risk | No risk |
| **Construction** | Small | Low risk | Low risk | No risk |
| **Track-out** | Large | High risk | High risk | No risk |

As indicated in Table 19-3, the highest unmitigated dust risk rating determined for the construction activities at the Pyrmont Station construction sites was 'high'. This was determined in relation to dust soiling and human health impacts track-out activities, given that 280,780 cubic metres of materials to be managed and transported from the sites, and proximity of nearby sensitive receivers to the construction footprints. Measures to mitigate or otherwise effectively manage these risks are presented below in Section 19.8.2.

#### Other emissions to air

Emissions from construction plant and equipment at the Pyrmont Station construction sites are not expected to result in exceedances of relevant Environment Protection Authority impact assessment criteria. This is due to the intensity of activities, and given the background concentrations of CO, $SO_2$ and $NO_2$ are well below the relevant Environment Protection Authority impact assessment criteria (refer to Table 19-1).

Chapter 16 (Contamination) describes nearby sites as having potential contamination (heavy metals, hydrocarbons (TRH, BTEX, PAH), VOC and PFAS in groundwater). It notes the eastern construction site would be located in an area of potentially saline and acid sulfate soils. Therefore, there is the potential for odours, vapours and airborne hazardous materials arising from uncovered contaminated soils (if encountered) at the Pyrmont Station construction sites, with measures to address this risk included in Section 19.8.2.

### 19.6.5 Hunter Street Station (Sydney CBD) construction sites

#### Dust

Sensitive receivers within the study area around the Hunter Street Station (Sydney CBD) construction sites include:

- Workers within mixed use commercial buildings and residents of residential buildings in all directions
- Customers at 12 hotels within about 500 metres
- Attendees at educational facilities, including the National Catholic Education Commission, Sydney School for Self-Knowledge, Blue Mountains International Hotel Management School, University of Wollongong City Campus (located on Macquarie Place in Circular Quay) and Conservatorium High School and childcare facilities, including Barangaroo Montessori Academy and Only About Children Barangaroo South Campus (both located on Sussex Street)
- Customers at a number of cafes and restaurants fronting Hunter Street, George Street and surrounding lanes and streets, in close proximity to both construction sites
- Attendees at places of worship including Scots Presbyterian Church, Church Hill Anglican, Saint Patrick's Catholic Church, Saint Stephen's Uniting Church, Saint James Church, Anglican Church of Australia and Marist Chapel
- Key civic and recreational areas including Wynyard Park, Lang Park, Macquarie Place Park, The Domain – Phillip Precinct and the Sydney Royal Botanical Gardens
- Ecologically sensitive area of Sydney Cove located about 500 metres to the north of the construction sites.

Unmitigated risk ratings for the Hunter Street Station (Sydney CBD) construction sites were determined using guidance from the UK IAQM methodology, and are presented below in Table 19-4. Potential dust impacts would be temporary in nature and would be substantially reduced with the implementation of standard mitigation measures identified in Section 19.8.2. Earthwork activities at the Hunter Street Station (Sydney CBD) eastern construction site would be partially completed within a fully enclosed acoustic shed.

Several buildings and structures would be demolished and removed from the construction sites which could cause dust emissions. Around 519,300 cubic metres of excavated spoil is also expected to be stored, managed and transported from the sites.

Table 19-4 Unmitigated risk ratings, Hunter Street Station (Sydney CBD) construction sites

| Construction activity | Magnitude of potential emissions | Potential unmitigated impacts | | |
|---|---|---|---|---|
| | | Nuisance | Human health | Ecological |
| **Demolition** | Medium | Medium risk | Medium risk | Negligible risk |
| **Earthwork** | Large | High risk | High risk | Negligible risk |
| **Construction** | Small | Low risk | Low risk | Negligible risk |
| **Track-out** | Large | High risk | High risk | Negligible risk |

As shown in Table 19-4, the highest unmitigated dust risk rating determined for the construction activities at the Hunter Street Station (Sydney CBD) construction sites was 'high'. This was determined in relation to dust soiling and human health impacts for earthwork and track-out activities, noting the following:

- The proximity and density of nearby sensitive receiver
- The number of buildings and structures to be removed
- The quantity of material to be removed and transported from the sites as described above
- That only the eastern construction site would be covered by an acoustic shed.

Measures to mitigate or otherwise effectively manage these risks are included below in Section 19.8.2.

#### Other emissions to air

Emissions from construction plant and equipment at the Hunter Street Station (Sydney CBD) construction sites are not expected to result in exceedances of relevant Environment Protection Authority impact assessment criteria. This is due to the intensity of activities, and low background concentrations of CO, $SO_2$ and $NO_2$ with respect to the relevant Environment Protection Authority impact assessment criteria (refer to Table 19-1).

Chapter 16 (Contamination) notes there is a site around 300 metres to the west of the Hunter Street Station (Sydney CBD) western construction site with potential soil and groundwater contamination. It is not expected that these contaminated soils would be disturbed during construction. Should contaminated groundwater be exposed at the site, there is the potential for odours, vapours and airborne hazardous materials. Measures to address these risks are listed below in Section 19.8.2.

## 19.7 Cumulative impacts

The adoption of mitigation and management measures set out in Section 19.8.2 are expected to result in the adequate management of dust and other air-borne emissions for the proposal. Potential cumulative air quality impacts would be temporary and managed through consultation with the relevant stakeholders and coordinating construction programs with other nearby projects. Cumulative air quality impacts may result at all construction sites associated with the proposal from increased dust generation and emissions if other major projects nearby to the proposal are being constructed concurrently. Potential cumulative air quality impacts would be highest at the following construction sites as a result of the number, proximity and/or scale of other nearby major projects:

- The Bays tunnel launch and support site, as a result of nearby projects including:
  - Major civil construction work for Sydney Metro West between Westmead and The Bays
  - The WestConnex M4-M5 Link
  - Western Harbour Tunnel and Warringah Freeway upgrade
- Pyrmont Station construction sites, as a result of nearby projects including:
  - The New Sydney Fish Market
  - Cockle Bay Wharf mixed use development.

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

## 19.8 Mitigation and management measures

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

The environmental management approach for the project is detailed in Chapter 23 (Synthesis of the Environmental Impact Statement). Under these broad frameworks and as outlined within the Concept assessment, a series of performance outcomes have been developed to define the minimum environmental standards that would be achieved during construction of the proposal (refer to Section 19.8.1), and mitigation measures that would be implemented during construction to manage potential identified impacts (refer to Section 19.8.2).

### 19.8.1 Performance outcomes

Construction performance outcomes were developed for the proposal as part of the Concept assessment. Performance outcomes for the proposal identify measurable, performance-based standards for environmental management. The identified performance outcome in relation to air quality for construction of the proposal is to minimise air quality impacts during construction.

Chapter 23 (Synthesis of the Environmental Impact Statement) describes how the proposal addresses this performance outcome. The proposal has committed to implementing best practice dust and odour management measures.

### 19.8.2 Mitigation measures

Specific mitigation measures that would be implemented to address potential air quality impacts are listed in Table 19-5.

Table 19-5 Summary of potential air quality impacts and management measures

| Reference | Impact | Mitigation measure | Applicable location(s) |
|---|---|---|---|
| **AQ1** | Dust impacts during all construction phases | The following best-practice dust management measures would be implemented during all construction work:<br>• Regularly wet-down exposed and disturbed areas including stockpiles, especially during dry weather<br>• Adjust the intensity of activities based on measured and observed dust levels and weather forecasts<br>• Minimise the amount of materials stockpiled and position stockpiles away from surrounding receivers<br>• Regularly water haul roads and exposed areas and ensure that all loads are covered<br>• Regularly inspect and as necessary, remove any loose materials tracked along haulage routes<br>• Regularly inspect dust emissions and apply additional controls as required<br>• Implement all relevant measures listed in the UK IAQM corresponding to the highest level of risk determined around each construction site.<br>At locations where there is an acoustic shed established, dust filtering systems will be installed on the acoustic shed exhaust. | All |
| **AQ2** | Exhaust emissions from the combustion of fossil fuels during construction | • Maintaining plant and equipment in a proper and efficient manner<br>• Conducting visual inspections of emissions from plant as part of pre-acceptance checks<br>• Switching off plant and equipment when not in-use<br>• Avoiding diesel or petrol-powered generator use wherever possible with mains electricity or battery powered equipment used wherever practicable | All |
| **AQ3** | Odour emissions during construction | The following best-practice odour management measures would be implemented during relevant construction work:<br>• The extent of opened and disturbed contaminated soil at any given time would be minimised<br>• Temporary coverings or odour supressing agents would be applied to excavated areas where appropriate<br>• Regular monitoring would be conducted during excavation to verify that no offensive odours are being detected beyond the site boundary. | All |

### 19.8.3 Interactions between mitigation measures

Mitigation measures in other chapters that are relevant to the management of air quality impacts include:

- Chapter 15 (Soils and surface water quality) – Specifically measures which address the management of saline and acid sulfate soils
- Chapter 16 (Contamination) – Specifically measures which address the management of contaminated soils and groundwater during construction, which would include the assessment and management of vapours and gas
- Chapter 20 (Spoil, waste management and resource use) – Specifically measures which address appropriate handling and management of hazardous materials or asbestos.

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

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