23 Air quality – Stage 1

23 Air quality – Stage 1

This chapter assesses the potential impacts of Stage 1 on air quality and identifies mitigation measures to address these impacts.

23.1 Secretary's Environmental Assessment Requirements

The Secretary's Environmental Assessment Requirements relevant to air quality, and reference to where they are addressed in the Environmental Impact Statement are provided in Table 23-1.

Table 23-1: Secretary's Environmental Assessment Requirements – Air quality Stage 1

Reference	Secretary's Environmental Assessment Requirements	Where addressed
13. Other Issues		
13.1	Air quality, greenhouse gas and energy, climate change adaptation, waste management and resource use, hazard and risk assessments should be undertaken in accordance with the commitments in Section 9 of the Scoping Report.	This chapter Chapter 24 (Spoil, waste management and resource use) Chapter 25 (Hazards) Chapter 26 (Sustainability and climate change) Refer to Table 2 of Appendix A for Scoping Report requirements

23.2 Legislative and policy context

23.2.1 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* provides the statutory framework for managing pollution in NSW. It includes procedures to regulate the potential for pollution, including the issue of environment protection licences for activities identified in Schedule 1 of the Act. Air quality requirements (including criteria) are typically included in environment protection licences. An environment protection licence(s) would be obtained as necessary for Stage 1.

The Protection of the Environment Operations (Clean Air) Regulation 2010 regulates emissions from motor vehicles, fuels, and industry. The Regulation does not apply to railway vehicles or special purpose motor vehicles such as construction vehicles (e.g. earthworks vehicles, mobile cranes and lifting equipment). As such, while Stage 1 would be constructed so that it complies with the Clean Air Regulation, the provisions of the Clean Air Regulation would have no direct application.

Air quality impact assessment is guided by the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (Environment Protection Authority, 2016). The Approved Methods generally apply to stationary sources of air pollution, but include air quality impact assessment criteria that are used for the qualitative assessment described in this chapter.

23.2.2 National Environment Protection (Ambient Air Quality) Measure

The National Environment Protection (Ambient Air Quality) Measure sets national air quality standards for particulate matter with an aerodynamic diameter of less than 10 microns (PM_{10}), and for particulate matter with an aerodynamic diameter of less than 2.5 microns ($PM_{2.5}$). The relevant standards under the National Environment Protection (Ambient Air Quality) Measure are reproduced in the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (Environment Protection Authority, 2016).

23.3 Assessment approach

23.3.1 General methodology

The general methodology applied to assess potential air quality impacts during Stage 1 was designed to address the primary risks to air quality, and involved:

- Identifying the key air quality related risks from Stage 1
- Establishing prevailing climate and meteorological conditions around Stage 1 using publicly available data from the Bureau of Meteorology monitoring station at Parramatta North
- Establishing prevailing ambient air quality conditions around Stage 1 using publicly available data from Department of Planning, Industry and Environment air quality monitoring stations at Prospect, Parramatta North, Rozelle and Randwick (the closest monitoring stations to Stage 1)
- A desktop review of Commonwealth Department of the Environment and Energy National Pollutant Inventory 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 Stage 1
- Assessing potential air quality impacts during construction of Stage 1
- Identifying mitigation measures to address or manage potential air quality impacts.

23.3.2 Methodology for assessing dust impacts

Consistent with other recent large-scale Australian transport infrastructure projects, the potential for dust related impacts during Stage 1 was evaluated using the risk-based assessment approach developed by the UK Institute of Air Quality Management (UK IAQM). The UK IAQM assessment approach is an evaluation of the risk of dust impacts during Stage 1 construction, which involves:

- Estimating the magnitude (i.e. large, medium or small) of potential dust emissions associated with each of the relevant Stage 1 construction activities, including:
  - Demolition (with reference to the volume and height of buildings to be demolished, and the materials with which they are built)
  - Earthworks (with reference to the area of earthworks, 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 Stage 1 construction site, 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 area around a construction site is assessed as having a high sensitivity to nuisance impacts under the IAQM where more than 10 sensitive receivers are located within 20 metres of the construction site, or where more than 100 sensitive receivers are located within 50 metres of the construction site. The surrounding area is assessed as having a lower sensitivity to nuisance impacts where there are fewer sensitive receivers in close proximity to the construction site, or where surrounding receivers are of a less sensitive nature. Receivers that have a higher sensitivity to nuisance impacts include residential properties, museums and other culturally important collections, medium and long-term car parks, and car show rooms.

Receivers that have a higher sensitivity to human health impacts are locations where members of the public are exposed over longer periods of time, and include residential properties, hospitals, schools and residential care homes. For human health impacts, the sensitivity of the surrounding receiver area also depends on the degree that sensitive receivers are currently subjected to elevated dust concentrations in addition to the number of receivers in proximity to the construction site. A background PM_{10} level of 22 micrograms per cubic metre was applied for construction sites closest to Parramatta North, whereas a background PM_{10} level of 18 micrograms per cubic metre was applied at construction sites closer to the Rozelle air quality monitoring station. The higher background concentration for construction sites closest to Parramatta North indicates a higher level of sensitivity of the surrounding receiver areas to human health impacts. The calculation of background levels of PM_{10} are discussed in Section 23.4.3.

The UK IAQM method results in a risk rating for each type of construction activity without mitigation. The risk ratings for each of the four construction activities are based on different combinations of magnitude and sensitivity, to reflect the potential impacts associated with the different types of construction activity. In particular, receivers are considered to be more sensitive to demolition activities, which can lead to higher risk rating levels for the demolition phase of works compared to other construction activities. This risk rating is then used to determine what mitigation and management measures are required to effectively manage these risks.

23.4 Existing environment

23.4.1 Climate and meteorology

Meteorological conditions are important for determining the direction and rate at which air pollution would disperse. 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 records from the Bureau of Meteorology monitoring station at Parramatta North (the nearest weather station with long-term records) were reviewed to understand meteorological conditions most common during peak day time construction periods.

The data indicates the Sydney metropolitan area experiences warm, wet summers, with average maximum temperatures of around 28 degrees Celsius. Months through winter are the coldest with average mean daily maximum temperatures of around 18 degrees Celsius. Months through winter were also measured to be the driest, with the lowest average monthly rainfall recorded in July (45 millimetres).

Conditions most likely to be associated with dust generation were measured in spring, with above average temperature conditions and average or below average rainfall.

23.4.2 Ambient air quality

Ambient air quality throughout the Sydney Basin is influenced by a number of factors, including topography, prevailing meteorological conditions (such as wind and temperature, which vary seasonally) and local and regional air pollution sources (such as motor vehicles, industrial facilities and bushfires). Consequently, regional air quality can be highly variable and impacted by events occurring a significant distance away.

The NSW Office of Environment and Heritage uses a standardised measurement known as the air quality index to characterise air quality and the acceptability of air quality at a location and compare it in relative terms with other locations throughout NSW. Average daily air quality index values for the four monitored locations between 2014 and 2018 were:

- Prospect – ranging from 48 to 55
- Parramatta North – 56 (only measured in 2018)
- Rozelle – ranging from 42 to 47
- Randwick – ranging from 43 to 49.

These values correspond with an air quality index outcome of 'good', indicating that air quality around Parramatta and Central Sydney is generally of an acceptable quality. Worse air quality index values can occur as a result of a combination of natural and human phenomena including dust storms and bushfires. The recent bushfire events in 2019/2020 resulted in the air quality index exceeding 200 (being the hazardous level), indicating the effect that bushfires can have on air quality.

23.4.3 Background air quality

Air quality data sourced from monitoring stations at Prospect, Parramatta North, Rozelle and Randwick are summarised in Table 23-2, which also provides the air quality impact assessment criterion for each pollutant specified in the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (Environment Protection Authority, 2016). The data shows the existing concentrations of air pollutants were generally below the applicable air quality impact assessment criteria during the 2014 to 2018 reporting periods for sulfur dioxide, nitrogen dioxide and carbon monoxide. The exception is that on occasional days the 24-hour average concentration levels of:

- PM_{10} exceeded the 24-hour impact assessment criterion of 50 micrograms per cubic metre
- $PM_{2.5}$ exceeded the 24-hour impact assessment criterion of 25 micrograms per cubic metre.

These occurrences are generally the result of natural events including dust storms, bushfires and sea spray arising from on-shore winds. Annually averaged PM_{10} concentrations generally complied with the 25 micrograms per cubic metre criterion, whereas annually averaged $PM_{2.5}$ concentrations exceeded the eight micrograms per cubic metre criterion at the Prospect and Parramatta North monitoring stations.

To calculate background PM_{10} levels for the IAQM dust impact assessment, the PM_{10} concentration has been averaged across the years that the data is available at a specific monitoring location.

Table 23-2: Background air quality data

Pollutant	Averaging period	Air quality impact assessment criteria	Prospect					Parramatta North					Rozelle					Randwick				
			2014	2015	2016	2017	2018	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
PM_{10} (µg/m³)	Maximum 24-hour	50	44	**69**	**110**	**61**	**113**	-	-	-	-	**107**	44	**60**	**59**	**54**	**88**	46	**77**	44	**56**	**96**
	95th percentile 24-hour	50	30	30	34	32	37	-	-	-	-	39	30	29	20	31	31	32	32	32	32	36
	Annual	25	18	18	19	19	22	-	-	-	-	22	18	17	17	18	-	18	19	18	19	21
$PM_{2.5}$ (µg/m³)	Maximum 24-hour	25	-	**30**	**85**	**30**	**48**	-	-	-	-	**42**	-	-	**49**	**36**	19	-	-	-	-	**31**
	95th percentile 24-hour	25	-	16	18	15	16	-	-	-	-	17	-	-	14	13	14	-	-	-	-	14
	Annual	8	-	**8.2**	**8.7**	7.7	**8.5**	-	-	-	-	**9.2**	-	-	7.4	7.2	-	-	-	-	-	7.6
Carbon monoxide (mg/m³)	Maximum 1-hour	30	2	2	2	2	2	-	-	-	-	2	2	2	2	1	1	-	-	-	-	-
Nitrogen dioxide (µg/m³)	Maximum 1-hour	246	88	100	100	113	96	-	-	-	-	120	103	113	94	115	107	88	81	89	77	75
	Annual	62	19	18	19	19	17	-	-	-	-	-	21	17	21	21	21	11	15	15	13	13
Sulfur dioxide (µg/m³)	Maximum 1-hour	570	50	71	55	60	66	-	-	-	-	55	-	73	52	63	79	68	81	89	76	55
	Annual	60	3	3	3	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.

23.4.4 Local emissions sources

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

- Domestic activities (such as wood-fired home heaters and lawn mowing) 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) 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 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.

A search of the Commonwealth Department of the Environment and Energy National Pollutant Inventory (for 2015) and a desktop review of land uses surrounding Stage 1 identified several air pollution sources close to Stage 1 which are likely to influence local air quality. These sources include industrial facilities within several industrial areas:

- Petroleum and hydrocarbon distribution facilities at Rosehill/Camellia, Silverwater and Homebush West
- Waste treatment facilities at Camellia, Silverwater, Clyde and Homebush Bay
- Manufacturing of construction materials at Rosehill and Camellia
- Food and beverage manufacturing at Lidcombe, Northmead, Camellia, Ermington and Camperdown
- Other manufacturing or processing facilities at Rydalmere, Silverwater and Enfield
- Railway maintenance activities at Auburn.

23.4.5 Sensitive receivers

Stage 1 would traverse a well-established urban environment that contains a wide range of sensitive receivers including residential properties, community facilities (such as schools, childcare centres, places of worship and medical facilities), recreational areas and commercial and retail premises. A number of these receivers are located immediately adjacent to Stage 1 construction sites.

A detailed description of the existing land use patterns and sensitive receivers surrounding Stage 1 is provided in Chapter 11 (Noise and vibration – Stage 1), Chapter 14 (Property and land use – Stage 1) and Chapter 17 (Social impacts – Stage 1), and summarised for each construction site in Section 23.6.1.

23.5 Avoidance and minimisation of impacts

The design development of Stage 1 has aimed to avoid or minimise potential air quality impacts. This included:

- Most spoil handling activities would be carried out within enclosed structures
- Positioning the Westmead metro station construction site south of the existing rail corridor to minimise construction air quality impacts to sensitive medical receivers around Westmead Hospital
- Locating the stabling and maintenance facility at Clyde within an industrial area to minimise potential construction air quality impacts on sensitive receivers
- Retrieval of tunnel boring machines at Sydney Olympic Park to minimise air quality impacts to residential areas relative to alternative options considered.

23.6 Potential impacts

23.6.1 Dust

Potential dust emissions would be temporary in nature and comparable to other similar infrastructure projects. Best-practice management measures (as identified in Section 23.7) would be implemented during all construction works to adequately manage potential dust impacts. This would include regularly wetting down exposed and disturbed area and adjusting construction activities based on observed dust levels and weather forecasts.

Construction activities would involve clearing and demolition, excavation, materials handling, stockpiling and compaction activities. Dust potentially generated from these activities is expected to be the main potential air quality impact during Stage 1.

Dust is a general term used to describe particulate matter in the form of total suspended particulates or particulate matter with a specified aerodynamic diameter (PM_{10} and $PM_{2.5}$), or particulate matter that has deposited onto surfaces over prescribed periods of time. When not properly managed, elevated airborne dust levels have the potential to cause health or nuisance impacts.

The volume of dust potentially generated during a typical work day would vary depending on the types of activities occurring at each construction site, the prevailing weather conditions (for example, dry windy conditions increase the potential for wind erosion) and the controls that are implemented to reduce these emissions.

The risk assessment for each Stage 1 construction site is provided below for each of the two types of potential impacts (nuisance impacts and human health impacts). The sensitivity of the receiver area to these two types of potential impacts has been determined in accordance with the methodology explained in Section 23.3.2 Methodology for assessing dust impacts. Where sensitive ecological receivers are identified within the 50 metre UK IAQM trigger distance of a construction site, the risk assessment includes an assessment on these ecological receivers.

Proposed measures to mitigate potential air quality impacts are discussed in Section 23.7.

Westmead metro station construction site

Potential sensitive receivers nearest to the Westmead metro station construction site include:

- Residential receivers located immediately to the west, south and east of the construction site
- Westmead Public School located less than 50 metres from the construction site, with the University of Western Sydney campus and Marist High School located about 70 metres and 210 metres respectively to the north-west of the construction site
- Patients and staff of medical facilities located about 130 metres to the north of the construction site, on the northern side of the existing rail corridor
- Ecological receivers within Parramatta Park, located about 350 metres to the east of the Westmead metro station construction site.

The risk assessment for unmitigated dust impacts is provided in Table 23-3. Potential dust impact would be temporary in nature and would be substantially reduced with the implementation of standard mitigation measures identified in Section 23.7. Westmead metro station construction site was given a 'high risk' rating (unmitigated) for earthworks for human health impacts due to the scale of earthworks and the close proximity of Westmead Public School and a large number of sensitive residential receivers to the construction site. Due to the distance of the construction site to Parramatta Park, potential ecological impacts are negligible and have not been assessed further.

Table 23-3: Risk of potential unmitigated dust impacts – Westmead metro station construction site

Construction activity	Magnitude of potential emissions	Potential nuisance impacts (high sensitivity)	Potential human health impacts (high sensitivity)
Demolition	Small	Medium risk	Medium risk
Earthworks	Large	High risk	High risk
Construction	Small	Low risk	Low risk
Track-out	Large	High risk	Medium risk

Parramatta metro station construction site

Potential sensitive receivers nearest to the Parramatta metro station construction site include:

- Educational facilities including the University of New England, University of Western Sydney, Richmond School of Business, and Lead College within 50 metres of the construction site, and Arthur Phillip High School and the Sydney Graduate School of Management over 100 metres to the east
- Civic places such as Centenary Square, Parramatta Town Hall and the future Parramatta Square, opposite the site, south of Macquarie Street
- Leigh Memorial Church and St John's Anglican Church which adjoins Parramatta Square
- Residents in the closest residential apartment building about 200 metres to the west at 31-39 Macquarie Street
- Ecological receivers associated with Parramatta River, located about 300 metres to the north of the construction site.

The risk assessment for unmitigated dust impacts is provided in Table 23-4. Potential dust impact would be temporary in nature and would be substantially reduced with the implementation of standard mitigation measures identified in Section 23.7. The Parramatta metro station construction site was assessed as having the highest risk of all construction sites, with an overall 'high risk' rating (unmitigated) in three of the four activities assessed for nuisance impacts and a 'high risk' rating (unmitigated) for human health impacts from demolition activities. These ratings are a result of the scale of the buildings to be demolished, the amount of excavation required and a large number of nearby receivers. While there are only a small number of residential receivers nearby, the construction site is surrounded by densely occupied commercial offices, restaurants and shops, as well as culturally significant buildings such as the Parramatta Town Hall. The density of receivers means that the receiver area is particularly sensitive to potential nuisance impacts from dust. Due to the distance of the construction site to the Parramatta River, potential ecological impacts are negligible and have not been assessed further.

Table 23-4: Risk of potential unmitigated dust impacts – Parramatta metro station construction site

Construction activity	Magnitude of potential emissions	Potential nuisance impacts (high sensitivity)	Potential human health impacts (medium sensitivity)
Demolition	Large	High risk	High risk
Earthworks	Large	High risk	Medium risk
Construction	Small	Low risk	Low risk
Track-out	Large	High risk	Medium risk

Clyde stabling and maintenance facility

Potential sensitive receivers nearest to the Clyde stabling and maintenance facility construction site include:

- Residential receivers in Rosehill about 50 metres to the west of the construction site, separated by James Ruse Drive a major arterial road
- Attendees at a Fun2Learn Early Learning Centre (within the Rosehill residential area) about 100 metres to the west of the construction site, separated by James Ruse Drive, a major arterial road
- Attendees at Rosehill Gardens racecourse immediately adjacent to the northern boundary of the construction site. This also includes horses stabled at the racecourse
- Duck Creek, the nearest ecological receiver, located adjacent to the site.

The risk assessment for unmitigated dust impacts is provided in Table 23-5. Potential dust impact would be temporary in nature and would be substantially reduced with the implementation of standard mitigation measures identified in Section 23.7. The Clyde stabling and maintenance facility construction site was identified as having a large scale of potential emissions for all Stage 1 construction activities, as it would include major earthworks and excavation for the dive structure within the construction site. The ratings for demolition for both potential nuisance impacts and potential human health impacts are a result of the large number of buildings to be demolished. Risk assessment for sensitive ecological receivers has also been carried out due to the close proximity of Duck Creek.

Table 23-5: Risk of potential unmitigated dust impacts – Clyde stabling and maintenance facility construction site

Construction activity	Magnitude of potential emissions	Potential nuisance impacts (high sensitivity)	Potential human health impacts (medium sensitivity)	Potential ecological impacts (medium sensitivity)
Demolition	Large	High risk	High risk	High risk
Earthworks	Large	High risk	Medium risk	Medium risk
Construction	Large	High risk	Medium risk	Medium risk
Track-out	Large	High risk	Medium risk	Medium risk

Silverwater services facility construction site

Potential sensitive receivers nearest to the Silverwater services facility construction site include:

- Employees at commercial or industrial premises in all directions from the site
- Residential receivers about 200 metres to the south of the construction site, along Carnarvon Street.

There are no nearby ecologically sensitive areas.

The risk assessment for unmitigated dust impacts is provided in Table 23-6. Potential dust impact would be temporary in nature and would be substantially reduced with the implementation of standard mitigation measures identified in Section 23.7. The Silverwater services facility construction site was assessed as a relatively low risk rating due to the surrounding receivers being of a commercial and industrial nature, and low-rise in intensity, as well as the significantly smaller site extent and smaller scale of activities associated with the construction of services facilities compared to a station excavation.

Table 23-6: Risk of potential unmitigated dust impacts – Silverwater services facility construction site

Construction activity	Magnitude of potential emissions	Potential nuisance impacts (medium sensitivity)	Potential human health impacts (low sensitivity)
Demolition	Small	Low risk	Negligible risk
Earthworks	Medium	Medium risk	Low risk
Construction	Small	Low risk	Negligible risk
Track-out	Large	Medium risk	Low risk

Sydney Olympic Park metro station construction site

Potential sensitive receivers nearest to the Sydney Olympic Park metro station construction site include:

- Residential receivers in medium and high-density residential dwellings about 200 metres to the east
- Educational buildings including the Kirana College and the New South Wales Institute of Sport less than 50 metres to the south
- Attendees at several open-air sporting venues that may be sensitive to dust impacts
- Customers at three hotels within 100 metres of the construction site
- Ecologically sensitive receivers associated with Lake Belvedere, Bicentennial Park and Powells Creek are about 350 metres to the east.

The risk assessment for unmitigated dust impacts is provided in Table 23-7. Potential dust impact would be temporary in nature and would be substantially reduced with the implementation of standard mitigation measures identified in Section 23.7. While the immediately surrounding area is mainly commercial, a number of large buildings require demolition leading to a 'high risk' rating (unmitigated) during demolition. Similarly, the mixed-use nature of Sydney Olympic Park and large extent of excavation would result in a 'medium risk' rating (unmitigated) during earthworks activities. Due to the distance of the construction site to sensitive ecological receivers, potential ecological impacts are negligible and have not been assessed further.

Table 23-7: Risk of potential unmitigated dust impacts – Sydney Olympic Park metro station construction site

Construction activity	Magnitude of potential emissions	Potential nuisance impacts (medium sensitivity)	Potential human health impacts (medium sensitivity)
Demolition	Large	High risk	High risk
Earthworks	Large	Medium risk	Medium risk
Construction	Small	Low risk	Low risk
Track-out	Large	Medium risk	Medium risk

North Strathfield metro station construction site

Potential sensitive receivers nearest to the North Strathfield metro station construction sites include:

- Residential receivers immediately to the east, south and north of the construction sites
- Schools immediately to the west of the rail corridor, including the McDonald College and Our Lady of the Assumption Catholic Primary School
- Ecologically sensitive receivers associated with Powells Creek, located about 350 metres to the west.

The risk assessment for unmitigated dust impacts is provided in Table 23-8. Potential dust impact would be temporary in nature and would be substantially reduced with the implementation of standard mitigation measures identified in Section 23.7. The large extent of excavation and earthworks combined with the close proximity of sensitive receivers results in North Strathfield metro station construction site being assessed as having a 'high risk' rating (unmitigated) for earthworks and track-out activities. Due to the distance of the construction site to Powells Creek, potential ecological impacts are negligible and have not been assessed further.

Table 23-8: Risk of potential unmitigated dust impacts – North Strathfield metro station construction site

Construction activity	Magnitude of potential emissions	Potential nuisance impacts (high sensitivity)	Potential human health impacts (medium sensitivity)
Demolition	Small	Medium risk	Low risk
Earthworks	Large	High risk	Medium risk
Construction	Small	Low risk	Low risk
Track-out	Large	High risk	Medium risk

Burwood North Station construction site

Potential sensitive receivers nearest to the Burwood North Station construction sites include:

- Residential areas mostly to the north and west of the construction sites
- Schools including MLC Junior School (about 250 metres south-west of the construction site), St Marys Catholic Primary School (about 250 metres west of the construction site)
- Attendees at St Luke's Anglican Church located opposite the northern construction site on Burton Street, and St Marys Catholic Parish Church which is about 300 metres to the west
- Attendees at Concord Oval immediately to the east of Loftus Street, as well as Cintra Park (about 250 metres to the north) and Goddard Park (about 280 metres to the north-west)
- A number of medical facilities along Burwood Road to the south, and Concord Private Hospital on Burwood Road about 300 metres to the north of the construction site.

There are no nearby ecologically sensitive areas.

The risk assessment for unmitigated dust impacts is provided in Table 23-9. Potential dust impact would be temporary in nature and would be substantially reduced with the implementation of standard mitigation measures identified in Section 23.7. The large extent of excavation and earthworks combined with the close proximity of sensitive receivers results in Burwood North Station construction site being assessed as having a 'high risk' rating (unmitigated) for earthworks and track-out activities.

Table 23-9: Risk of potential unmitigated dust impacts – Burwood North Station construction site

Construction activity	Magnitude of potential emissions	Potential nuisance impacts (high sensitivity)	Potential human health impacts (medium sensitivity)
Demolition	Medium	Medium risk	Medium risk
Earthworks	Large	High risk	Medium risk
Construction	Small	Low risk	Low risk
Track-out	Large	High risk	Medium risk

Five Dock Station construction site

Potential sensitive receivers nearest to the Five Dock Station construction sites include:

- Residential receivers at both the eastern and western Five Dock Station construction sites, including nursing homes in surrounding residential areas
- Medical facilities located within the town centre immediately adjacent to both construction sites, as well as in the surrounding residential areas
- Key civic places such as Fred Kelly Place, adjacent to the south of the western construction site
- Customers at a number of cafes and restaurants fronting Great North Road and surrounding lanes and streets, in close proximity to both construction sites
- Attendees at places of worship including St Albans Anglican Church and GGC Life Church, immediately to the north of the western construction site, as well as the Five Dock-Drummoyne Uniting Church off Garfield Street about 100 metres to the south-west
- Five Dock Public School, about 120 metres to the west of the western construction site off West Street
- Five Dock Park located about 250 metres to the east of the eastern construction site.

There are no nearby ecologically sensitive areas.

The risk assessment for unmitigated dust impacts is provided in Table 23-10. Potential dust impact would be temporary in nature and would be substantially reduced with the implementation of standard mitigation measures identified in Section 23.7. The large extent of excavation and earthworks combined with the close proximity of sensitive receivers results in the Five Dock Station construction site being assessed as having a 'high risk' rating (unmitigated) for earthworks and track-out activities.

Table 23-10: Risk of potential unmitigated dust impacts – Five Dock Station construction site

Construction activity	Magnitude of potential emissions	Potential nuisance impacts (high sensitivity)	Potential human health impacts (medium sensitivity)
Demolition	Medium	Medium risk	Medium risk
Earthworks	Large	High risk	Medium risk
Construction	Small	Low risk	Low risk
Track-out	Large	High risk	Medium risk

The Bays Station construction site

Potential sensitive receivers nearest to The Bays Station construction site include:

- Residential receivers to the north at Mansfield Street (about 80 metres away), and to the west of Quirk Street, Hornsey Street and Lilyfield Road (over 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 250 metres from the construction site), and places of worship, including C3 Church (immediately north of the construction site)
- Ecologically sensitive receivers associated with White Bay are located immediately adjacent to the construction site.

The risk assessment for unmitigated dust impacts is provided in Table 23-11. Potential dust impact would be temporary in nature and would be substantially reduced with the implementation of standard mitigation measures identified in Section 23.7. While The Bays Station construction site would include large excavation and earthworks activities, and associated track-out activities, the receiver sensitivity is lower than at other sites due to the distance and density of sensitive receivers. As such, The Bays Station construction site does not exceed an overall risk rating of 'medium' (unmitigated) for any of the Stage 1 activities. Risk assessment for sensitive ecological receivers has also been carried out due to the close proximity of ecological receivers in White Bay.

Table 23-11: Risk of potential unmitigated dust impacts – The Bays Station construction site

Construction activity	Magnitude of potential emissions	Potential nuisance impacts (medium sensitivity)	Potential human health impacts (low sensitivity)	Potential ecological impacts (high sensitivity)
Demolition	Medium	Medium risk	Low risk	Medium risk
Earthworks	Large	Medium risk	Low risk	High risk
Construction	Small	Low risk	Negligible risk	Low risk
Track-out	Large	Medium risk	Low risk	High risk

23.6.2 Other emissions to air

Exhaust emissions generated during construction would be temporary and would not significantly contribute to emissions in the local area, given the high existing levels of vehicle use in urban areas surrounding the construction sites. These emissions would be adequately managed by the implementation of standard construction mitigation measures, described in Section 23.7. No long-term adverse impacts to air quality are anticipated.

The main source of air emissions would be from the combustion of diesel fuel and petrol from heavy vehicles, mobile excavation machinery, and stationary combustion equipment as well as from the handling and/or on-site storage of fuel and other chemicals. The volume of emissions from construction vehicles and machinery would depend on the type of fuel used, the power output and condition of the engine, and duration of use.

The tunnel boring machines and roadheaders used to excavate the tunnels and caverns would use electric power and therefore would not create local exhaust emissions. However, at some of the station construction sites, this equipment may be powered by generators for a short period of time prior to the mains power supply becoming available. This would result in local exhaust emissions.

Exhaust emissions would involve periodic localised emissions of carbon monoxide, particulate matter (PM_{10} and $PM_{2.5}$), oxides of nitrogen (including nitrogen dioxide), sulphur dioxide, volatile organic compounds, and polycyclic aromatic hydrocarbons associated with the combustion of diesel fuel and petrol.

The risk of mobilising airborne hazardous materials, odours or vapours could occur as a result of uncovering contaminated soils or hazardous materials (including asbestos). As identified in Chapter 20 (Contamination – Stage 1) all potential contamination impacts can be managed to acceptable levels with the implementation of appropriate management measures and/or remediation. In addition, the presence of hazardous materials in building stock to be demolished would be determined prior to demolition and managed to meet legislative requirements.

23.6.3 Construction site power supply routes

Air quality mitigation measures detailed in Section 23.7 would be applied as required to manage potential dust generated during power supply works. The main potential air quality risk associated with these works would be dust temporarily generated from the excavation, handling, placement and compaction of soils, and from exposed surfaces and stockpiled materials. The small footprint of the active work area and linear nature of the construction activity means potential impacts would be limited in extent and temporary in nature.

23.6.4 Regional impacts

Stage 1 would not result in any substantial regional air quality impacts as any emissions would be highly dispersed in the local area and would not impact on any areas away from Stage 1.

23.6.5 Cumulative impacts

The adoption of mitigation and management measures set out in Section 23.7 are expected to result in the adequate management of dust and other emissions for Stage 1. 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 from increased dust generation and emissions if other major projects nearby to the Stage 1 sites are being constructed concurrently with Stage 1. The potential for cumulative air quality impacts are highest at the following construction sites as a result of the number, proximity and/or scale of other nearby major projects:

- Parramatta
- Clyde
- Sydney Olympic Park
- The Bays.

23.7 Management and mitigation measures

23.7.1 Approach to management and mitigation

Potential impacts to air quality would be managed in accordance with the Construction Environmental Management Framework, as described in Chapter 27 (Synthesis of the Environmental Impact Statement).

The Construction Environmental Management Framework requires the preparation of an Air Quality Management Plan and includes the following air quality management objectives:

- Minimise gaseous and particulate pollutant emissions from construction activities as far as feasible and reasonable
- Identify and control potential dust and air pollutant sources.

23.7.2 Mitigation measures

The mitigation measures that would be implemented to address potential air quality impacts are described in Table 23-12.

Table 23-12: Mitigation measures – Air quality Stage 1

Reference	Impact/issue	Mitigation measures	Applicable location(s)[1]
AQ1	Dust impacts during all construction phases	The following best-practice dust management measures would be implemented during all construction works: • Regularly wet-down exposed and disturbed areas including stockpiles, especially during dry weather • Adjust the intensity of activities based on measured and observed dust levels and weather forecasts • Minimise the amount of materials stockpiled and position stockpiles away from surrounding receivers • Regularly inspect dust emissions and apply additional controls as required • Implement all relevant measures listed in the UK IAQM corresponding to the highest level of risk determined around each Stage 1 construction site.	All
AQ2	Exhaust emissions from the combustion of fossil fuels during construction	Plant and equipment would be maintained in a proper and efficient manner. Visual inspections of emissions from plant would be carried out as part of pre-acceptance checks.	All
AQ3	Odour emissions during construction	The following best-practice odour management measures would be implemented during relevant construction works: • The extent of opened and disturbed contaminated soil at any given time would be minimised • Temporary coverings or odour supressing agents would be applied to excavated areas where appropriate • Regular monitoring would be conducted during excavation to verify that no offensive odours are being generated.	All

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

23.7.3 Interactions between mitigation measures

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

- Chapter 20 (Contamination – Stage 1), 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 24 (Spoil, waste management and resource use – Stage 1), specifically measures which address appropriate handling and management of hazardous materials or asbestos
- Chapter 27 (Synthesis of the Environmental Impact Statement), specifically measures which address consultation with relevant stakeholders to manage the interface of nearby projects under construction at the same time.

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

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