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Sydney Metro – Western Sydney Airport

Chapter 22
Air quality

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22 Air quality

This chapter provides an assessment of potential air quality impacts during construction and operation of the project, and identifies mitigation measures to manage identified impacts.

22.1 Overview

Air quality during construction of the project would be adequately managed in accordance with standard mitigation measures. Temporary dust generating activities would include earthworks and construction activities and stockpiling activities carried out at the permanent spoil placement area. 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.

During operation, the project is anticipated to benefit regional air quality by delivering an attractive alternative mode of transport, which could result in a mode shift from road to rail. This has the potential to reduce air pollution emissions associated with road transport and associated congestion, when compared to the emissions that would otherwise occur if the project was not delivered.

22.2 Legislative and policy context

22.2.1 Off-airport

The air quality assessment has considered the relevant requirements for the off-airport environment following legislation and guidelines:

- *Protection of the Environment Operations Act 1997* (NSW)
- Protection of the Environment Operations (Clean Air) Regulation 2010 (NSW)
- *Guidance on the assessment of dust from demolition and construction* (UK Institute of Air Quality Management (IAQM) 2014)
- *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2016)
- *National Environment Protection (Ambient Air Quality) Measure* (National Environment Protection Council, 1998).

22.2.2 On-airport

In addition to the legislation and guidelines identified in Section 22.2.1 where applicable, the air quality assessment has considered the relevant requirements for the on-airport environment which includes:

- *Airports Act 1996* (Cth)
- *Western Sydney Airport - Airport Plan* (Department of Infrastructure and Regional Development, 2016a)
- Airports (Environment Protection) Regulations 1997 (Cth) (Airports Regulations).

22.3 Assessment approach

22.3.1 Off-airport

Construction

The construction air quality assessment involved the application of a semi-quantitative risk-based approach to the assessment of potential temporary construction impacts related to dust generation following the guidance developed by the UK Institute of Air Quality Management (IAQM, 2014). This methodology has been commonly used to assess air quality impacts for the construction of infrastructure projects in NSW and was referenced as the appropriate guideline in the assessment methodology of the Scoping Report.

The assessment also includes a qualitative discussion on the potential temporary construction air quality impacts from vehicle emissions.

The assessment methodology considers three separate potential air quality impacts:

- annoyance due to dust soiling e.g. dust covering items or objects such as cars and houses
- the risk of health effects due to an increase in exposure to particulate emissions (PM_{10})
- harm to ecological receptors.

The assessment identified any receptors close enough to warrant further assessment. An assessment is required where there is a human receptor within:

- 350 metres of the construction footprint; or
- 50 metres of the route used by construction vehicles on public roads and up to 500 metres of a construction vehicle access point to a highway.

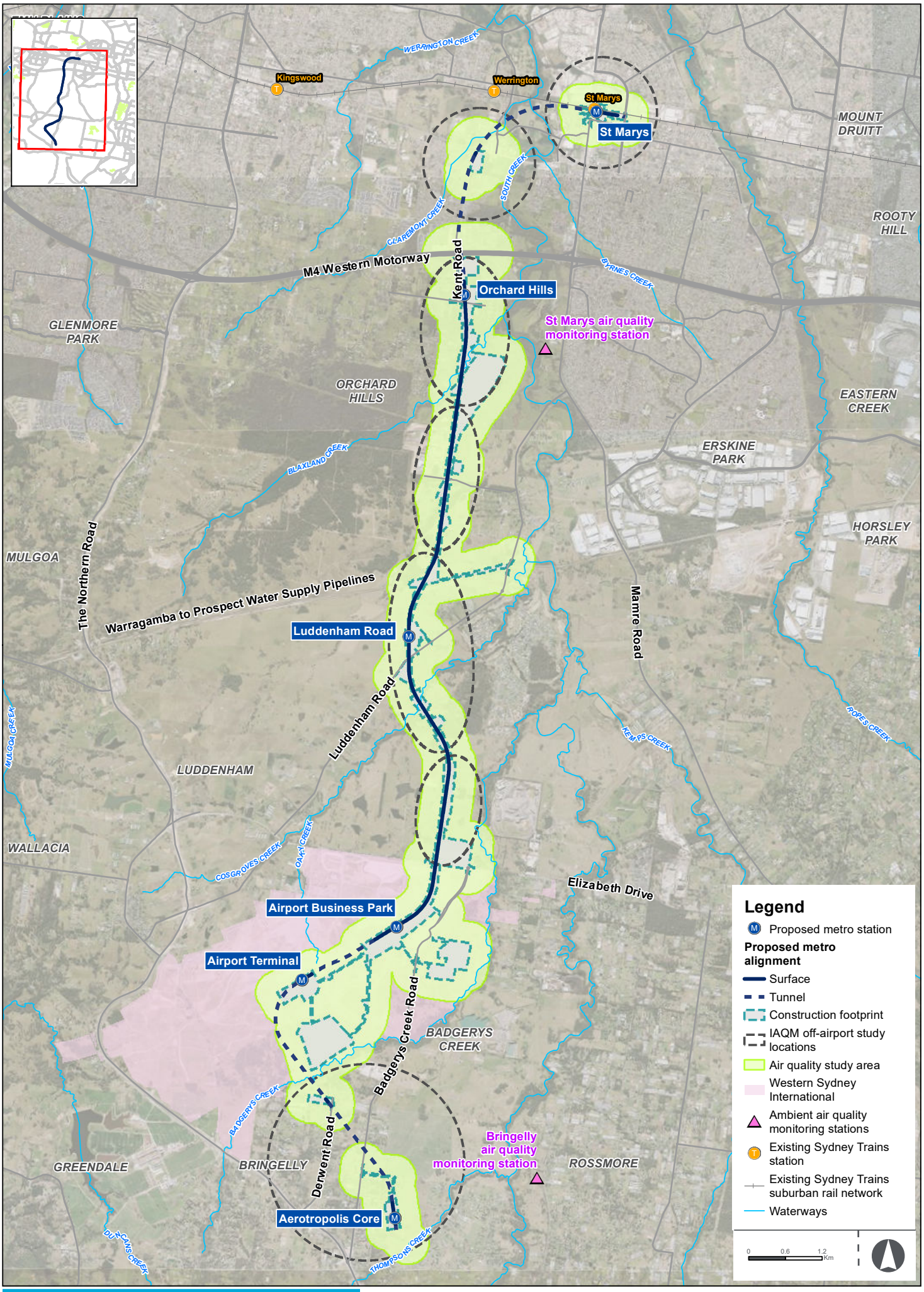
This determined the study area for the construction air quality assessment.

The risk of air quality impacts associated with different construction activities including demolition, earthworks and construction is assessed. The risk of dust impacts is assessed without mitigation. Based on a revised assessment with standard mitigation measures the residual risks of air quality impacts are identified. The category of risk is shaded in accordance with the relevant risk table in the IAQM assessment methodologies (IAQM, 2014).

Study area

The study area has been divided into six assessment locations within the off-airport environment to capture the key construction activities that would be carried out for the project as shown in Figure 22-1:

- St Marys Station - representative of a medium density urban residential and commercial area
- Claremont Meadows services facility - representative of a medium density urban residential area
- Orchard Hills Station - representative of a low density semi-rural residential area
- Off-airport construction corridor - representative of a variety of rural residential and agricultural land uses. The corridor extends from Orchard Hills to Western Sydney International
- Luddenham Road Station - representative of an undeveloped, agricultural land use area
- Bringelly services facility and Aerotropolis Core Station - representative of a rural residential area.



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Air quality study area, assessment locations and monitoring stations

Figure 22-1

Indicative only, subject to design development

In addition to the main project alignment contained in the six assessment locations detailed above, construction power supply routes for the project would be required at the following locations:

- Claremont Meadows construction power route - located between the existing Claremont Meadows substation to the Orchard Hills construction site
- Kemps Creek construction power route - located between the existing Kemps Creek substation and Western Sydney International.

A permanent power supply route for operation of the project would be required between the existing Mamre Zone substation at Erskine Park and the stabling and maintenance facility at Orchard Hills.

Given the short-term transient nature of construction works for these power supplies, a study area of 50 metres from the indicative alignment of these power supply routes has been considered for these locations in this assessment. The assessment is based on a worst-case scenario of the construction works being carried out in a medium density urban residential area.

Operation

Operational impacts have been assessed qualitatively as these are likely to be minor given the metro trains are powered by electricity (see Section 22.6 for further detail).

The qualitative assessment involves a discussion of the potential sources of air pollution during operation of the project, the potential proximity of sensitive receptors and the potential impacts the emissions may have on the environment.

22.3.2 On-airport

The requirements for the assessment of on-airport air quality impacts are generally consistent with the requirements for the assessment of off-airport impacts. Therefore, the assessment approach for potential on-airport air quality impacts is the same as the approach described in Section 22.3.1. The on-airport land within the study area is considered as one assessment location.

The Airports Regulations provides accepted limits of air quality emissions at Commonwealth airports. The limits relate primarily to air quality emissions associated with operational activities rather than dust generated during construction.

22.4 Existing environment

The existing air quality environment is described below, based on existing publicly available information. Ambient air quality monitoring stations in proximity to the study area include one station at St Marys (around 700 metres east of the study area) and one station at Bringelly (around two kilometres east of the study area) as shown on Figure 22-1. The monitoring stations are maintained by NSW Department of Planning, Industry and Environment (DPIE).

22.4.1 Off-airport

Meteorology

Seasonal wind patterns observed at St Marys show a predominant north-south directional pattern for all seasons with slightly higher levels of winds from the east during summer compared to the other seasons. Seasonal wind patterns for Bringelly show predominantly south-southwest winds for autumn and winter, increased levels of wind from the east during spring and predominant stronger easterly winds during summer.

Both areas experience a high proportion of calm winds (winds that are less than 0.5 metres per second) which represent around 25 per cent of winds over a typical annual time frame. The high proportion of calm winds suggests the potential for significant periods throughout the year where the ability of local winds to disperse particulates and other air pollutants is poor.

An analysis of the intraday wind patterns was undertaken by examining the wind roses for the 2014-2019 data for the time periods of 9am to 3pm, midnight to 7am, and 7am to 5pm (typical workday).

The analysis showed the following:

- both St Marys and Bringelly meteorology data showed very high percentages of calm wind speed at night with calm percentages of approximately 45 per cent for both stations. This was very high compared to the daytime percentages which showed calm winds at St Marys and Bringelly of 14 and 12 per cent respectively
- night-time wind direction was predominantly from a south to south-westerly direction, which is consistent with the expected wind direction at night due to the topography sloping down toward the north in the area
- winter and autumn patterns were broadly similar to the patterns observed during summer and spring with northerly, south-westerly and easterly winds dominating the wind patterns
- 9am and 3pm wind roses showed a similar pattern to the overall night-time and day-time calm percentages with approximately 20 per cent calm winds at 9am and very low calm wind percentages (less than five per cent) observed at 3pm.

Terrain

The project is situated within the Sydney basin approximately nine kilometres east of the Blue Mountains. The terrain is generally flat with minor topographical undulation along the length of the project alignment. Although the local relief surrounding the project area is minor and is not expected to influence the broad scale meteorology in the region, there are localised topographical effects that may influence low wind speed conditions. There is a decrease in elevation as the alignment moves north toward St Marys. This topographical feature has the potential to affect the area under low wind speed conditions with cool air following the low-lying topography toward the north.

Particulate matter

Annual air quality data for the period 2014-2019 (Office of Environment and Heritage, 2014-2019) indicates that annual average PM_{10} concentration around St Marys and Bringelly ranges between 15.1 and 21.2 micrograms per cubic metre (see Table 22-1 and Table 22-2). There are a number of recorded exceedances of the 50 micrograms per cubic metre maximum 24-hour concentration criterion, however the exceedances are generally due to exceptional events related to bushfires, hazard reduction burns and dust storms.

Annual air quality data for the period 2016-2019 (Office of Environment and Heritage, 2016-2019) indicates that annual average $PM_{2.5}$ concentration around St Marys and Bringelly is around 8 micrograms per cubic metre (see Table 22-3 and Table 22-4). There are a number of recorded $PM_{2.5}$ exceedances of the 25 micrograms per cubic metre maximum 24-hour concentration criterion. As with PM_{10} concentrations however, the $PM_{2.5}$ exceedances were generally due to exceptional events related to bushfires, hazard reduction burns and dust storms.

Particulate data from 2019 is heavily skewed by the bushfires that occurred across NSW in November and December 2019. Data from 2019 does not represent normal long-term air quality conditions in the Sydney basin.

Table 22-1 St Marys monitoring location ambient PM_{10} concentrations (2014-2019)

Statistic	24-hour average PM_{10} concentration - µg/m^3						
	Criteria	2014	2015	2016	2017	2018	2019
Maximum 24-hour concentration	50	45.0	53.0	100.2	49.8	100.5	159.8
24-hour exceedance count	-	0	1	3	0	2	26
Statistic	**Annual average PM_{10} concentration - µg/m^3**						
	Criteria	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Annual average	25	16.7	15.1	16.0	16.2	19.3	24.7

Table 22-2 Bringelly monitoring location ambient PM_{10} concentrations (2014-2019)

Statistic	24-hour average PM_{10} concentration - µg/m^3						
	Criteria	2014	2015	2016	2017	2018	2019
Maximum 24-hour concentration	50	42.6	57.0	61.6	83.7	92.9	134.0
24-hour exceedance count	-	0	1	3	6	8	24
Statistic	**Annual average PM_{10} concentration - µg/m^3**						
	Criteria	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Annual average	25	16.6	15.8	17.0	19.8	21.2	23.6

Table 22-3 St Marys monitoring location ambient $PM_{2.5}$ concentrations (2016-2019)

Statistic	24-hour average $PM_{2.5}$ concentration - µg/m^3				
	Criteria	2016	2017	2018	2019
Maximum 24-hour concentration	25	93.2	38.2	80.5	88.3
24-hour exceedance count	-	5	3	2	21
Statistic	**Annual average PM_{10} concentration - µg/m^3**				
	Criteria	**2016**	**2017**	**2018**	**2019**
Annual average	8	7.8	8	7.8	9.8

Table 22-4 Bringelly monitoring location ambient $PM_{2.5}$ concentrations (2016-2019)

Statistic	24-hour average $PM_{2.5}$ concentration - µg/m^3				
	Criteria	2016	2017	2018	2019
Maximum 24-hour concentration	25	21.6	52.5	55.6	178.0
24-hour exceedance count	-	0	2	4	27
Statistic	**Annual average PM_{10} concentration - µg/m^3**				
	Criteria	**2016**	**2017**	**2018**	**2019**
Annual average	8	7.6	7.5	8.0	11.3

Existing and future air pollution sources

Existing air pollution sources within and surrounding the study area include:

- emissions from vehicles using the surrounding road network including the M4 Western Motorway, Elizabeth Drive, The Northern Road and Great Western Highway and diesel freight on the T1 Western Line
- various small scale agricultural activities.

There are a number of ongoing and planned large scale construction projects within and surrounding the study area which would also be sources of air pollution and may overlap with the construction of the project. These projects include:

- St Marys Intermodal
- Western Sydney International Stage 1
- The Northern Road
- future M12 Motorway.

Cumulative air quality impacts associated with the projects listed above are assessed in Chapter 24 (Cumulative impacts).

22.4.2 On-airport

There is no publicly available information from ambient air quality monitoring stations located within the on-airport environment. Given the proximity of the on-airport location to the Bringelly DPIE monitoring station, the existing on-airport air quality is expected to be generally consistent with the existing environment described for the off-airport environment in Section 22.4.1.

Ongoing earthworks for the Western Sydney International Stage 1 project would influence the local air quality environment. The *Western Sydney Airport - Environmental Impact Statement* (Department of Infrastructure and Regional Development, 2016b) identified that during earthworks, predicted dust impacts would be at or below the project air quality assessment criteria.

In relation to the future ambient air quality environment relevant to the project, the operation of Western Sydney International will significantly influence the on-airport air quality environment.

22.5 Potential air quality impacts – construction

22.5.1 Off-airport

Construction activities associated with the project with the potential to temporarily generate dust include:

- demolition of existing structures
- earthworks
- construction
- track-out.

Track-out refers to the transportation of dust and dirt from heavy vehicle movements from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network.

The assessment of potential air quality impacts to ecological receptors are considered as part of the biodiversity assessment in Chapter 11 (Biodiversity).

St Marys construction site

At St Marys there would be large scale demolition, earthworks, construction and track-out activities associated with supporting tunnelling activities and the construction of the station. The magnitude of the unmitigated emissions from all activities is therefore considered to be large.

There are over 100 high sensitivity residential and commercial receivers within 20 metres of the construction footprint at this location. As such the sensitivity to dust soiling and human health effects is considered to be high.

The results of the assessment are summarised in Table 22-5. There is generally a potential high risk of dust soiling and human health impacts associated with unmitigated dust impacts for St Marys. The risk would be temporary during the construction period and would be reduced given the application of standard mitigation measures identified in Appendix F (Construction Environmental Management Framework) as well as those measures outlined in Section 22.5.2.

Table 22-5 Summary of dust risk assessment at St Marys

Activity	Dust emission magnitude	Sensitivity of area		Risk of unmitigated dust impacts		Risk of mitigated dust impacts	
		Dust soiling	Human health	Dust soiling	Human health	Dust soiling	Human health
Demolition	Large	High	High	High	High	Low	Low
Earthworks	Large	High	High	High	High	Low	Low
Construction	Large	High	High	High	High	Low	Low
Track-out	Large	High	High	High	High	Low	Low

Claremont Meadows services facility construction site

Construction activities around the Claremont Meadows services facility would involve earthworks and track-out for the excavation of the shaft for the Claremont Meadows services facility which is considered to generate a medium potential for dust emissions. Demolition would be limited to the removal and relocation of existing utilities (if required) and construction would be limited to civil works for the Claremont Meadows services facility which are primarily situated underground. The potential for dust emissions for these activities is therefore considered to be low.

There are more than 100 high sensitivity residential receivers within 20 metres of the construction footprint at this location. As such the sensitivity to dust soiling and human health effects is considered to be high.

The results of the assessment are summarised in Table 22-6. There is a low to medium risk of dust soiling and human health impacts associated with unmitigated dust impacts for the Great Western Highway to M4 Western Motorway area. The risk would be temporary during the construction period and would be reduced given the application of standard mitigation measures identified in Appendix F (Construction Environmental Management Framework) as well as those measures outlined in 22.7.1.

Table 22-6 Summary of dust risk assessment at Claremont Meadows

Activity	Dust emission magnitude	Sensitivity of area		Risk of unmitigated dust impacts		Risk of mitigated dust impacts	
		Dust soiling	Human health	Dust soiling	Human health	Dust soiling	Human health
Demolition	Small	High	High	Medium	Medium	Low	Low
Earthworks	Medium	High	High	Medium	Medium	Low	Low
Construction	Small	High	High	Low	Low	Negligible	Negligible
Track-out	Medium	High	High	Medium	Medium	Low	Low

Orchard Hills construction site

Construction activities at Orchard Hills would include large scale earthworks and track-out associated with tunnel spoil excavation and the construction of the in-cutting section of the alignment with a large potential for dust emissions. Activities would also include the construction of large-scale civil structures for the station and tunnel portal with a large potential for dust emissions. Demolition would be limited to removal of existing residential buildings and would have a small potential for dust emissions.

There are more than 10 high sensitivity residential receivers within 20 metres of the construction footprint at this location. As such the sensitivity to dust soiling and human health effects is considered to be high.

The results of the assessment are summarised in Table 22-7. There is a potential medium to high risk of dust soiling and human health impacts associated with unmitigated dust impacts for Orchard Hills. The risk would be temporary during the construction period and would be reduced given the application of standard mitigation measures identified in Appendix F (Construction Environmental Management Framework) as well as those measures outlined in Section 22.7.1.

Table 22-7 Summary of dust risk assessment at Orchard Hills

Activity	Dust emission magnitude	Sensitivity of area		Risk of unmitigated dust impacts		Risk of mitigated dust impacts	
		Dust soiling	Human health	Dust soiling	Human health	Dust soiling	Human health
Demolition	Small	High	High	Medium	Medium	Low	Low
Earthworks	Large	High	High	High	High	Low	Low
Construction	Large	High	High	High	High	Low	Low
Track-out	Large	High	High	High	High	Low	Low

Off-airport construction corridor

The magnitude of the unmitigated emissions from demolition, earthworks, construction and track-out is considered to be large due to the widespread extent of dust producing activities throughout the corridor. This rating represents the worst case rating for all demolition, earthworks, construction and track-out activities across the entire project footprint. This is a conservative approach which can be refined based on the individual locations described below.

There is a large number of high sensitivity residential and commercial receivers in close proximity to the off-airport construction corridor within the study area, including more than 100 receivers within 20 metres of the construction footprint. As such the sensitivity to dust soiling and human health effects is considered to be high.

The results of the assessment are summarised in Table 22-8. There is a potential high risk of dust soiling and human health impacts associated with unmitigated dust impacts from the off-airport construction corridor. The risk would be temporary during the construction period and would be reduced given the application of standard mitigation measures identified in Appendix F (Construction Environmental Management Framework) as well as those measures outlined in Section 22.7.1.

Table 22-8 Summary of dust risk assessment at off-airport construction corridor

Activity	Dust emission magnitude	Sensitivity of area		Risk of unmitigated dust impacts		Risk of mitigated dust impacts	
		Dust soiling	Human health	Dust soiling	Human health	Dust soiling	Human health
Demolition	Large	High	High	High	High	Low	Low
Earthworks	Large	High	High	High	High	Low	Low
Construction	Large	High	High	High	High	Low	Low
Track-out	Large	High	High	High	High	Low	Low

Luddenham Road construction site

Construction activities at Luddenham Road would include earthworks to support construction activities and limited demolition activities which would both have a small potential for dust emissions. Major construction activities would be carried out for the construction of the viaduct and Luddenham Road Station which would have a large potential for dust emissions. Track-out associated with earthworks and the delivery of materials to support construction would have a medium potential for dust emissions.

There are less than 10 high sensitivity residential receivers within 100 metres of the construction footprint at this location and therefore the sensitivity to dust soiling and human health effects is considered to be low. This area of the corridor is largely developed with agricultural areas dominating the landscape.

The results of the assessment are summarised in Table 22-9. There is a negligible to low risk of dust soiling and human health impacts associated with unmitigated dust impacts for Luddenham Road. The risk would be temporary during the construction period and would be reduced given the application of standard mitigation measures identified in Appendix F (Construction Environmental Management Framework) as well as those measures outlined in Section 22.7.1.

Table 22-9 Summary of dust risk assessment at Luddenham Road

Activity	Dust emission magnitude	Sensitivity of area		Risk of unmitigated dust impacts		Risk of mitigated dust impacts	
		Dust soiling	Human health	Dust soiling	Human health	Dust soiling	Human health
Demolition	Small	Low	Low	Negligible	Negligible	Negligible	Negligible
Earthworks	Small	Low	Low	Negligible	Negligible	Negligible	Negligible
Construction	Large	Low	Low	Low	Low	Negligible	Negligible
Track-out	Medium	Low	Low	Low	Low	Negligible	Negligible

Bringelly services facility and Aerotropolis Core construction sites

Construction activities at Bringelly would include earthworks to support construction activities at the Bringelly services facility and the Aerotropolis Core. There would be limited earthworks associated with the tunnelling between Western Sydney International and Aerotropolis Core Station as the tunnel spoil is expected to be extracted within the Western Sydney International site. Construction and track-out activities would have a large potential for dust emissions. There would be limited demolition of residential buildings which would have a small potential for dust emissions.

There are more than 10 high sensitivity receptors within 20 metres of the construction footprint and therefore the sensitivity to dust soiling and human health effects is considered to be medium.

The results of the assessment are summarised in Table 22-10. There is a low to medium risk of dust soiling and human health impacts associated with unmitigated dust impacts for Bringelly. The risk would be temporary during the construction period and would be reduced given the application of standard mitigation measures identified in Appendix F (Construction Environmental Management Framework) as well as those measures outlined in Section 22.7.1.

Table 22-10 Summary of dust risk assessment at Bringelly and Aerotropolis Core

Activity	Dust emission magnitude	Sensitivity of area		Risk of unmitigated dust impacts		Risk of mitigated dust impacts	
		Dust soiling	Human health	Dust soiling	Human health	Dust soiling	Human health
Demolition	Small	Medium	Medium	Low	Low	Negligible	Negligible
Earthworks	Medium	Medium	Medium	Medium	Medium	Low	Low
Construction	Large	Medium	Medium	Medium	Medium	Low	Low
Track-out	Large	Medium	Medium	Medium	Medium	Low	Low

Power supply routes

Construction activities for three power routes would include earthworks for trenching, and underboring. Construction activities would be limited to cable installation and demolition would be limited to the relocation or protection of existing utilities if required. Track-out would be associated with earthworks and the delivery of materials. Each activity is considered to have a small potential for dust generation.

For the areas where the power supply routes are located in medium density urban residential areas, there are more than 10 but less than 100 high sensitivity receptors within 50 metres of the construction footprint and therefore the sensitivity to dust soiling and human health effects is considered to be medium.

The results of the assessment are summarised in Table 22-10. There is a low risk of dust soiling and human health impacts associated with unmitigated dust impacts for the power supply routes. These potential impacts would be temporary and are expected to occur for only a limited period during the construction period. The risk would be temporary during the construction period and would be reduced given the application of standard mitigation measures identified in Appendix F (Construction Environmental Management Framework) as well as those measures outlined in Section 22.7.1.

Table 22-11 Summary of dust risk assessment for power supply routes

Activity	Dust emission magnitude	Sensitivity of area		Risk of unmitigated dust impacts		Risk of mitigated dust impacts	
		Dust soiling	Human health	Dust soiling	Human health	Dust soiling	Human health
Demolition	Small	Medium	Medium	Low	Low	Negligible	Negligible
Earthworks	Small	Medium	Medium	Low	Low	Negligible	Negligible
Construction	Small	Medium	Medium	Low	Low	Negligible	Negligible
Track-out	Small	Medium	Medium	Negligible	Low	Negligible	Negligible

Vehicle and plant emissions

Potential emissions other than dust that would be generated during construction include emissions from the combustion of diesel fuel by heavy vehicles, mobile construction equipment and stationary equipment such as diesel generators. Potential emissions are expected to depend on the nature of the emissions source (that is, the size of the equipment, usage rates, duration of operation). Pollutants emitted by construction vehicles include carbon monoxide (CO), particulate matter (PM_{10} and $PM_{2.5}$), nitrous oxides (NO_2), sulphur dioxide (SO_2), volatile organic compounds (VOCs), and polycyclic aromatic hydrocarbons (PAHs).

Given anticipated construction plant and vehicle numbers and the commonly applied mitigation measures expected to be applied (such as minimising equipment idling), potential temporary adverse air quality impacts from the operation of construction equipment are not anticipated.

22.5.2 On-airport

There would be substantial earthworks and construction activities carried out within the on-airport environment associated with the tunnel and viaduct segment precast facility and the construction of the Western Sydney International tunnel portal, Airport Business Park Station and Airport Terminal Station. Stockpiling activities would also be carried out at the permanent spoil placement area. The potential for temporary dust emissions from earthworks, construction and track-out is therefore considered to be high. Demolition activities have been carried out as part of the Western Sydney International Stage 1 project and no further demolition is required as part of the project.

There are no sensitive receptors within the on-airport environment and limited sensitive receptors within the study area outside the on-airport environment that would be potentially affected by on-airport construction activities. The sensitivity of the affected environment to potential dust soiling and human health effects (as a result of on-airport works) is therefore considered to be low.

The results of the assessment are summarised in Table 22-12. There is generally a negligible to low risk of unmitigated dust impacts for the on-airport environment. The risk would be temporary during the construction period and would be reduced given the application of the mitigation measures outlined in Section 22.7.1.

Table 22-12 Summary of dust risk assessment for on-airport environment

Activity	Dust emission magnitude	Sensitivity of area			Risk of unmitigated dust impacts		Risk of mitigated dust impacts	
		Dust soiling	Human health	Ecological	Dust soiling	Human health	Dust soiling	Human health
Demolition	Small[1]	Low[1]	Low[1]	Low	Negligible	Negligible	Negligible	Negligible
Earthworks	Large	Low	Low	Low	Low	Low	Negligible	Negligible
Construction	Large	Low	Low	Low	Low	Low	Negligible	Negligible
Track-out	Large	Low	Low	Low	Low	Low	Negligible	Negligible

Note 1: Although no demolition is occurring and there are no receptors within Western Sydney International, 'Small' and 'Low' are the lowest categories available for demolition and dust sensitivity using the IAQM assessment methodologies.

Vehicle and plant emissions

Potential temporary air quality impacts associated with vehicle and plant emissions would be consistent with the impacts described in Section 22.5.1 for the off-airport environment.

22.6 Potential air quality impacts – operation

22.6.1 Off-airport

The project would be powered by electricity and therefore local emissions generated during operation are expected to be minimal.

The operation of metro trains would generate minor quantities of particulate matter (PM_{10}), carbon monoxide, volatile organic compounds and oxides of nitrogen mainly due to the wear of the train brake pads, vaporisation of metals due to sparking, and wear of steel due to friction between wheels and rail. These emissions would represent very low concentrations, and potential impacts at nearby sensitive receivers during operation would be negligible.

The tunnel ventilation system is described in Section 7.5.3 of Chapter 7 (Project description – operation). In addition to mechanical ventilation, air would be pushed through the tunnels via the piston effect of the trains moving through the tunnels. As described above, pollutant concentrations would be negligible, and emissions are anticipated to quickly disperse into the ambient environment from tunnel and station ventilation points.

The project would generate commuter traffic (bus and private car) to metro stations. This would result in a negligible increase in associated vehicle emissions due to the relatively low number of trips generated relative to (future) background traffic movements.

Overall, the project is anticipated to benefit regional air quality by delivering an attractive alternative mode of transport, which could result in a mode shift from road to rail. This has the potential to reduce potential air pollution emissions associated with road transport and associated congestion, when compared to the emissions that would otherwise occur if the project was not delivered.

It is proposed that operational emissions would be 100 percent offset under the Sustainability Plan for the project.

22.6.2 On-airport

Potential air quality impacts during operation would be consistent with those described in Section 22.6.1 for the off-airport environment. As described above, pollutant concentrations would be negligible and emissions are anticipated to quickly disperse into the ambient environment from tunnel and station ventilation points. Potential impacts at nearby sensitive receptors during operation would be negligible and within the limits identified in the Airports Regulations.

22.7 Proposed management and mitigation measures

Environmental management for the project would be undertaken through an environmental management approach as detailed in Chapter 25 (Environmental management and mitigation). The construction and operational environmental management frameworks are discussed in Section 25.2 and 25.3 respectively.

22.7.1 Mitigation measures

The Construction Environmental Management Framework (CEMF) describes the approach to environmental management, monitoring and reporting during construction. Specifically, it lists the requirements to be addressed in developing the Construction Environmental Management Plans (CEMP), sub-plans, and other supporting documentation for specific environmental aspects.

The Air Quality CEMP for the on-airport works would be developed in consultation with Western Sydney Airport and would be consistent with the existing *Western Sydney Airport Air Quality Construction Environmental Management Plan* (Western Sydney Airport, 2019c).

Mitigation measures that would be implemented under the provisions of the Construction Environmental Management Framework to address potential air quality impacts are listed in Table 22-13.

Table 22-13 Air quality mitigation measures

Ref	Mitigation measures	Applicable location(s)
Construction		
AQ1	The Air Quality Management Plan for the project would incorporate 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 odour monitoring would be conducted during excavation to verify that no offensive odours are being generated	All
AQ2	Where acoustic sheds are proposed these would be designed and managed to prevent/minimise the escape of dust emissions	All
AQ3	Air quality monitoring, consistent with the Western Sydney Airport, Air Quality Construction Environmental Management Plan would be carried out during construction to ensure that works meet the requirements under Schedule 1 of the Airports (Environment Protection) Regulations 1997	On-airport

22.7.2 Consideration of the interaction between measures

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

- Chapter 11 (Biodiversity), specifically measures which address dust impacts
- Chapter 16 (Soils and contamination), specifically measures which address the management of contaminated soils and groundwater during construction, including vapours and gas
- Chapter 23 (Hazard and risk), specifically measures which address appropriate handling and management of hazardous materials or asbestos.