Chapter 18
Regional air quality

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18. Regional air quality

This chapter provides an assessment of the existing regional air quality (i.e. air quality for the Sydney region as a whole or the Sydney basin) and the predicted regional air quality impacts resulting from the operation of the Moorebank Intermodal Terminal (IMT) Project (the Project). This chapter summarises the detailed regional air quality assessment prepared by Todoroski Air Sciences (refer to Technical Paper 8 – Regional Air Quality Assessment in Volume 6 of this EIS). Local air quality is discussed in Chapter 17 - Local air quality.

The assessment addresses the Commonwealth Department of the Environment (DoE)'s Environmental Impact Statement (EIS) Guidelines and the Secretary for the NSW Department of Planning & Environment (NSW DP&E)'s Environmental Assessment Requirements (NSW SEARs) for the Project listed in Table 18.1.

Table 18.1 Relevant Commonwealth EIS Guidelines and NSW SEARs

Requirement	Where addressed
Commonwealth EIS Guidelines under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	
Analyse and describe the changes to the local and regional air drainage basin as a result of construction and operational phases of the action. The analysis must consider diurnal and seasonal variations in air pollution levels and the influence of short term weather phenomena. The analysis must provide results for the following: hydrocarbons, suspended particulate matter, carbon monoxide, oxides of nitrogen, sulphur (sulphur) dioxide, ozone, reactive organic compounds, lead and air toxics.	Local air quality impacts are assessed in Chapter 17 – Local air quality. This chapter covers regional air quality impacts only, with a focus on pollutants resulting from the operation of heavy vehicles and freight rail locomotives.
NSW SEARs under the NSW Environmental Planning and Assessment Act 1979 (EP&A Act)	
A quantitative assessment of worst case predicted emission of air pollutants, including an assessment of potential air pollution sources (including identifying locomotive standards), dust deposition, total suspended particulates, PM_{10} $PM_{2.5}$ and atmospheric pollutants of concern for local and regional air quality;	Section 18.3 of this chapter Technical Paper 8 – Regional Air Quality Assessment in Volume 6 (Todoroski Air Sciences 2014) Chapter 4 – Planning and statutory requirements Chapter 5 – Stakeholder and community consultation Chapter 7 – Project description

18.1 Assessment approach

The regional air quality assessment (Technical Paper 8 – Regional Air Quality Assessment in Volume 6) considers the regional air quality impacts that are likely to result from the construction and operation of the Project. A high level qualitative discussion of construction impacts has also been included (see section 18.3.1).

For the purposes of the assessment, 'regional air quality' is defined as air quality for the Sydney region as a whole or the Sydney basin. The extent of this region is shown in Figure 6.2 in Technical Paper 8 (which identifies the extent of the model boundary) and Table 7.3 in Technical Paper 8, which lists the local government areas covered by the assessment.

The assessment focused on the operational scenario of the Project at Full Build in 2030, as this was considered likely to result in the most significant change to existing regional air conditions (i.e. it represents the worst case scenario in terms of regional air impacts). The focus of this assessment was to quantify the likely effects on air quality that would result from the expected change in the distribution of heavy truck and rail traffic throughout the Sydney region, associated with the Project operation. The regional air quality impacts of the construction phases of the Project (including Early Works) have not been assessed given that construction activities are unlikely to generate air quality impacts that would be significant at a regional level. The potential air quality impacts for the construction phases have however been examined in the local air quality impact assessment in Chapter 17 – Local air quality.

Vehicle emissions include a number of pollutants that are known to be potentially harmful to human health; therefore, these emissions were considered to be the key pollutants of concern for the regional air quality assessment of the Project. The main pollutants of concern at a regional level are carbon monoxide (CO), nitrogen oxides (NO_X), various volatile organic compounds (VOCs) and particulate matter (PM_{10} – diameter of less than 10 µm and $PM_{2.5}$ – particle diameter of less than 2.5 µm).

Only container transport within the Sydney region was considered. This included container freight destined for locations beyond the Sydney region; however, the study only considered emissions associated with transport of these containers to the edge of the Sydney Basin. In addition, the Sydney regional airshed is particularly sensitive to air quality impacts, due to the relatively high concentrations of key pollutants when compared with the non-urban airshed beyond the Sydney basin. The assessment was carried out using data at the local government area (LGA) scale and by suburb, using the methodology outlined below:

- The likely destinations of containers transported from Port Botany and the Project were determined using the Strategic Transport Modelling Report (Parsons Brinckerhoff 2012a); this was undertaken for both 'with the Project' and 'without the Project' scenarios where relevant.

- The likely total distance travelled by diesel powered heavy vehicles associated with container transport was determined for both scenarios (with and without the Project). The distance, known as vehicle kilometres travelled (VKT), was then used to calculate the potential traffic emissions (CO, NO_X, VOCs and PM) using the methodology presented in the NSW Environment Protection Authority (EPA 2012) document, Air Emissions Inventory for the Greater Metropolitan Region in New South Wales 2008 Calendar Year On-Road Mobile Emissions (2008 inventory). The 2008 inventory provides a detailed estimate of the sources of emissions in the Sydney basin, and also the methodology for estimating these emissions. A similar process was applied to calculate the likely emissions from locomotives serving the Project site.

- These emissions were then compared with the total emissions in the individual local areas and the regional airshed to see what effect the Project would have on regional air quality. Applicable air quality criteria are as per the local air quality assessment in Chapter 17 – Local air quality (refer section 17.1.1).

- A qualitative assessment of the change in traffic numbers, and a quantitative assessment of regional air quality (using air dispersion modelling) were conducted, using a combination of the CALPUFF Gaussian dispersion modelling system and TAPM (The Air Pollution Model). TAPM was used to generate an upper air data file for use in CALMET, a three dimensional meteorological model. CALMET considers the surface terrain, meteorological data and TAPM upper air data to develop a three dimensionally varying wind field for the Sydney basin for each hour of a full year. The CALPUFF modelling was then used to introduce the traffic and rail pollutant emissions into the CALMET wind field in order to model how these emissions disperse throughout the Sydney region modelling domain. This was done for the worst case 2030 scenario (i.e. the Project at Full Build).

No regional air quality assessment of ozone emissions was undertaken as the Project would result in only a small differential between the emissions that would occur with or without the Project. The change would be too small to be modelled in regard to ozone chemistry (i.e. there is no model which is sensitive enough to be capable of modelling any discernible effect arising from changes that may occur from the Project).

18.1.1 Cumulative assessment

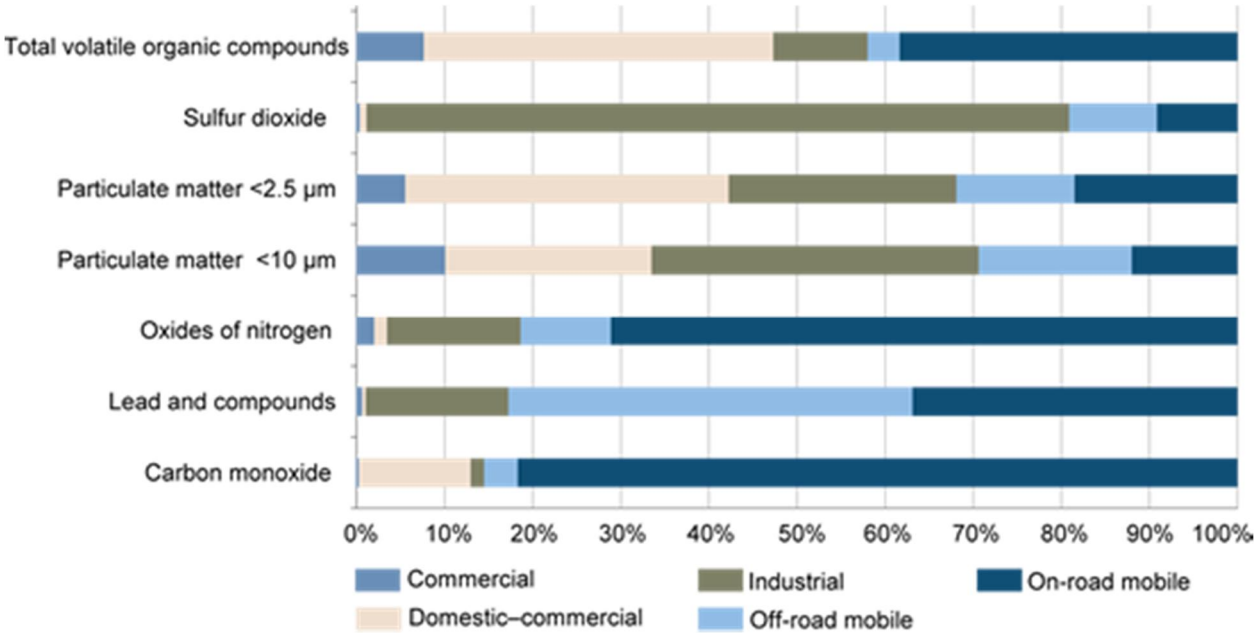
In accordance with the NSW SEARs, this EIS includes a cumulative assessment of the regional air quality impacts of the Project in combination with development on the Sydney Intermodal Terminal Alliance (SIMTA) site and other planned developments within the surrounding region. The findings of the cumulative assessment are provided in Chapter 27 – Cumulative impacts.

18.2 Existing environment

Regional air quality in the Sydney basin is primarily influenced by emissions from major industries, commercial operations, motor vehicles and domestic activities such as wood heaters. The most recent Australia State of the Environment Report (SoE report) (SEWPaC 2011) outlines the measured air pollutant levels and trends in pollutant levels that occur in NSW and in the Sydney region.

The SoE report notes that national ambient air quality standards are rarely exceeded for extended periods in the Sydney region, and exceedances are normally associated with particular events such as bushfires and dust storms.

Motor vehicles are one of the most significant sources of air pollutants in Sydney, accounting for around 80% of CO emissions, 70% of NO_X emissions and almost 40% of total VOC emissions. Figure 18.1 below, from the SoE report, shows the proportion of total estimated emissions from a range of sources within the Sydney region.

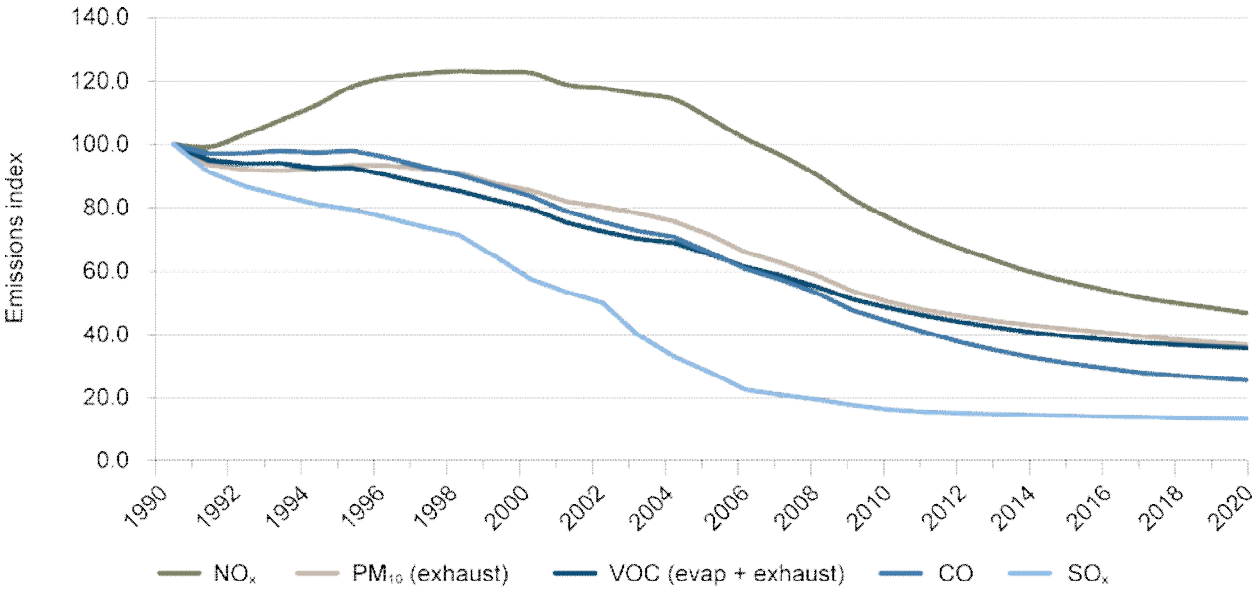


Source: Australian State of the Environment Report 2011 (SEWPaC 2011)

Figure 18.1 Sydney's total estimated annual emissions by source type

Australia is heavily reliant on motor vehicle transport, with total passenger kilometres travelled almost doubling over the past 40 years. Given that the size of the Australian motor vehicle fleet has continued to increase, it is likely that this trend will continue in the foreseeable future. As well as increasing motor vehicle registrations in recent years (averaging 2.9% annually between 2005 and 2010), VKT per vehicle has also increased by a total of 6.8% between 2003 and 2007.

To manage this trend, emissions limits and standards have previously been introduced. Revised limits are scheduled to be introduced by the Commonwealth Department of Infrastructure and Regional Development in the coming years, including Euro 5 and Euro 6 emission standards for light vehicles. As a result of anticipated tighter emission controls and the implementation of technological improvements, reductions in motor vehicle emissions are expected, as shown in Figure 18.2 (Australian metropolitan areas).



CO = carbon monoxide; NO_x = nitrogen oxides; PM_{10} = particulate matter smaller than 10 micrometres; SO_x = sulfur oxides; VOC (evap + exhaust) = volatile organic compounds from evaporative and exhaust emissions

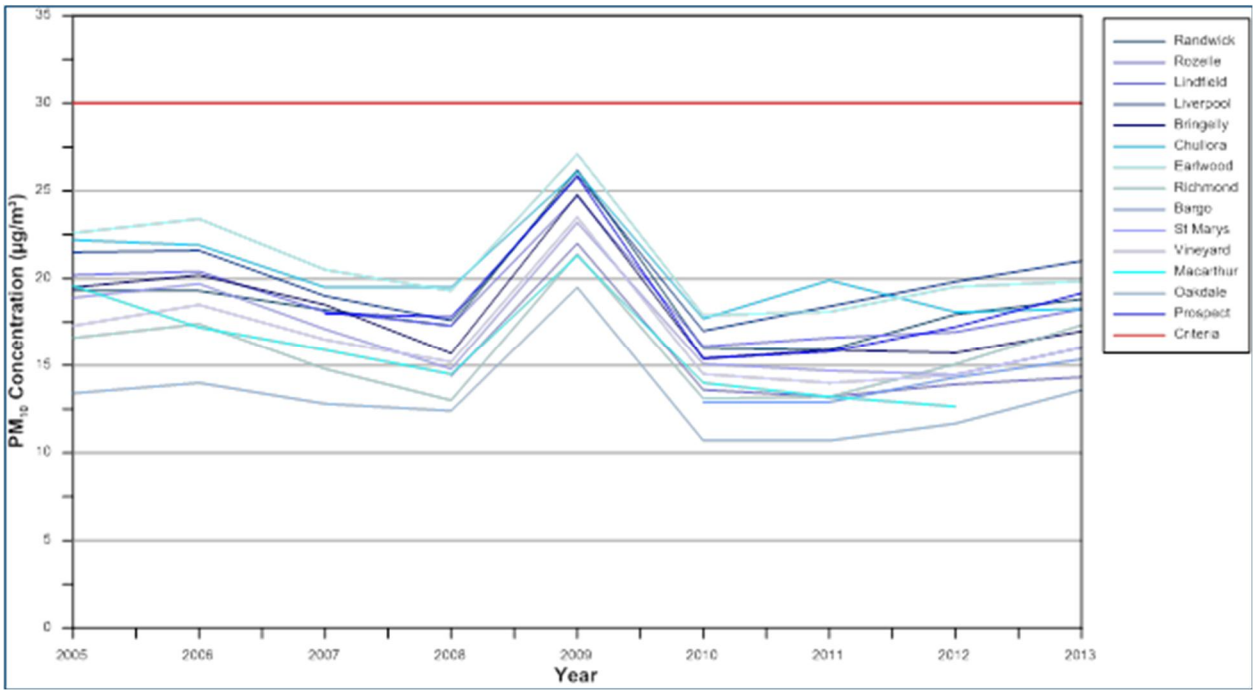
Source: Bureau of Infrastructure, Transport and Regional Economics;[180] D Cosgrove, Principal Research Scientist, Bureau of Infrastructure, Transport and Regional Economics, pers. comm., May 2011

Source: Figure 4.4, Technical Paper 8 – Regional Air Quality Assessment (Volume 6)

Figure 18.2 Base case projected motor vehicle emission trends for Australian metropolitan areas

As part of the NSW Government's air quality management plan, ambient monitoring is conducted by the NSW Environmental Protection Agency (EPA). This monitoring data is posted on the EPA website, and is also used in the SoE Report.

Figure 18.3 presents a summary of the measured annual average PM_{10} levels between 2005 and 2013 from the NSW EPA monitoring stations. The figure shows that there has been a general reduction in annual average PM_{10} concentrations, although increases were observed at all locations during 2009 when widespread regional dust storms occurred. The figure also shows that annual average PM_{10} levels were below criteria at all monitoring sites. Additionally, a common trend in PM_{10} concentrations is observed across the monitoring stations in the region, as shown in Figure 18.3. This demonstrates that the current air quality monitoring locations capture the air quality trends affecting the majority of the population within the Sydney basin and are suitable for National Environmental Protection Measure (NEPM) compliance monitoring.



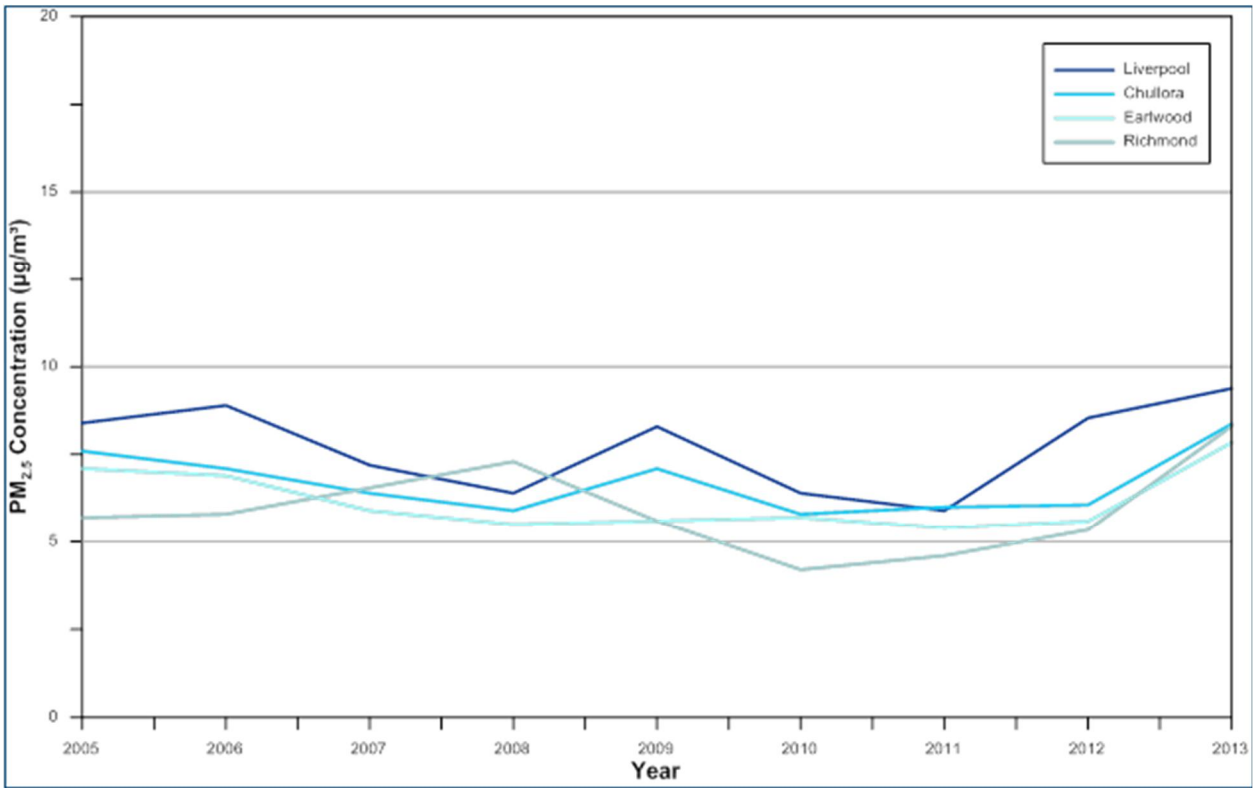
Source: Figure 4.7, Technical Paper 8 – Regional Air Quality Assessment (Volume 6)

Notes: µg/m^3 = micrograms per cubic metre; PM_{10} – Particulate matter ≤ 10 µm in aerodynamic diameter

Figure 18.3 Annual average PM_{10} concentrations at NSW EPA monitoring sites

Figure 18.4 shows a summary of the annual average $PM_{2.5}$ levels between 2005 and 2013 from the NSW EPA monitoring stations.

Figure 18.4 shows that the annual average $PM_{2.5}$ levels follow a similar trend to the annual average PM_{10} levels, with a gradual reduction over time. There are presently no criteria for $PM_{2.5}$ in NSW; however, there is a NEPM advisory reporting standard of 8 micrograms per cubic metre (µg/m^3) annual average. This advisory reporting standard level was exceeded in 2006, 2009, 2012 and 2013, as shown in the figure. These exceedances are likely to coincide with releases of PM into the atmosphere from dust storms, controlled burns and bushfires in these years. Chapter 17 – Local air quality presents further discussion of these events.

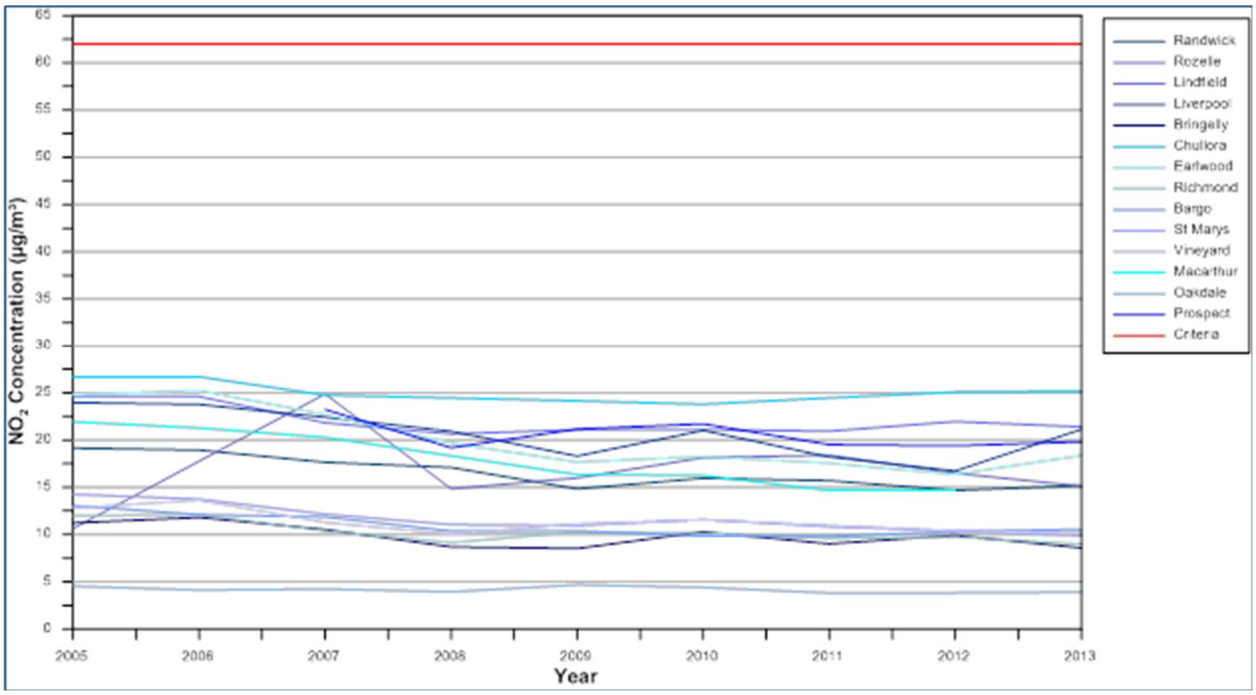


Source: Figure 4-8, Technical Paper 8 – Regional Air Quality Assessment (Volume 6)

Notes: $\mu g/m^3$ = micrograms per cubic metre; $PM_{2.5}$ – Particulate matter ≤ 2.5 µm in aerodynamic diameter. There are presently no criteria for PM2.5 in NSW.

Figure 18.4 Annual average $PM_{2.5}$ concentrations at NSW EPA monitoring sites

A summary of the annual average nitrogen dioxide (NO_2) levels between 2005 and 2013 from the NSW EPA monitoring stations is presented in Figure 18.5. The figure shows a falling trend in NO_X levels, and that measured levels were below criteria at all monitoring sites.



Source: Figure 4-9, Technical Paper 8 – Regional Air Quality Assessment (Volume 6), based on NSW OEH monitoring data

Notes: µg/m^3 = micrograms per cubic metre; NO_2 – nitrogen dioxide

Figure 18.5 Annual average NO_2 concentrations at NSW EPA monitoring sites

18.3 Impact assessment

The regional air quality assessment conducted for the Project assessed the potential implications for air quality in the Sydney metropolitan region associated with the Project at Full Build in 2030. The operation of the Project would involve a change in the truck and diesel locomotive movement intensity along the surrounding major road and rail corridors, in particular those between the Project site at Moorebank and Port Botany. Complex regional-scale dispersion modelling was conducted for 2030 with and without the Project to identify any changes in regional air quality. The modelling results highlighted that despite the small changes in emissions along the regional transportation corridors, only a negligible change in regional air quality would be experienced due to the operation of the Project.

18.3.1 Construction impacts on regional air quality

As noted in section 8.1, the air quality impacts during construction are not likely to be significant at a regional level and therefore have not been assessed in this chapter. Emissions generated during the construction phase of the Project (including from construction traffic) have been assessed in Technical Paper 7 – Local Air Quality Impact Assessment in Volume 6, and are discussed in Chapter 17 – Local air quality, with predicted air pollution concentrations shown to reduce with distance from the Project site.

Early Works

The Early Works phase would involve various activities related to site establishment and building demolition, which would include activities with the potential to generate air emissions, in particular dust. However, the dust generating activities would be localised in nature and would be confined to the 6-month construction period. Air emissions generated from the Early Works activities are unlikely to be significant at a regional level, given the nature of the activities and assuming that appropriate operational and physical mitigation measures would be utilised. In light of this, Early Works activities have not been assessed further in this regional air quality assessment.

Construction phases

Similarly to Early Works, the construction phases of the Project would be temporary in nature and are not likely to result in impacts that would have a significant effect at the regional level.

In addition to onsite operations, the construction phase of the Project would involve the arrival and departure from the Project site of trucks associated with the delivery and removal of material. The number of vehicle movements associated with the construction phase of the Project is substantially lower than that associated with the operational phase. During the peak construction phase of the Project (Phases A and B), it is expected that there would be up to 1,940 truck movements a day, while during the full operation of the Project (in 2030) it is expected that there would be 8,088 truck movements a day (refer to Table 8.2 of Technical Paper 7 – Local Air Quality Impact Assessment in Volume 6). While the origin and final destination of vehicle movements during the construction phase is unknown, the majority of these trips are more likely to be local in nature and would not have a discernible impact on regional transportation routes. These movements would also only be temporary. Additionally, there are no train movements assumed to be associated with the construction phase of the Project.

Given that the number of construction vehicles moving into, out of and around the site would be significantly lower than the number of operational vehicles, and that impacts associated with the construction phase of the Project would be temporary and confined to the local scale, regional air quality impacts from construction would be insignificant. Regional dispersion modelling for the construction phase has therefore not been undertaken.

18.3.2 Operational impacts (and benefits) on regional air quality

Dispersion modelling results

To fully assess the Project's overall impact on regional air emissions, the effects of vehicle and rail activities associated with the Project were considered both separately and in combination. All key components of the Project were considered in the dispersion modelling for the Full Build (2030) operational scenario, by comparing the three modelled cases described below.

- heavy vehicle traffic emissions only, in the Full Build scenario (without locomotive emissions) ('with the Project');
- emissions from heavy vehicle traffic within the Sydney region in 2030, should the Project not proceed ('without the Project'); and
- heavy vehicle traffic and locomotive emissions, in the Full Build scenario.

The three cases allow an assessment to be made of the individual contributions of vehicle and rail, and of their combined effect. A summary of the dispersion modelling results, comparing the heavy vehicle emissions in the Sydney region with and without the Project in 2030, is shown in Table 18.2.

Table 18.2 presents a breakdown of the major air pollutants as well as a summary of the existing (2012) regional air quality emissions in Sydney. The net reductions in emission concentrations as a result of the Project's reduction in heavy VKT are also presented, as percentages of the existing 2012 emissions.

The table reveals that the Project would have a small effect in reducing emissions from heavy diesel vehicles across the Sydney basin. The largest effect of the Project, when comparing heavy vehicles only, is a predicted 0.67% reduction in NO_X emissions, as shown in Table 18.2. This reduction is a direct result of the anticipated reduction in heavy vehicle VKT when the Project is in full operation.

Table 18.2 Summary of results –traffic emissions (road only)

Substance	Sydney region (EPA 2012) (tonnes/year)			Project (2030) (tonnes/year)		Change due to Project (% increase)		
	Total Sydney	Motor vehicles	Heavy vehicle	With Project HV	Without Project HV	Total Sydney	Motor vehicles	Heavy Vehicles
Carbon monoxide (CO)	246,692	123,712	4,081	335.1	346.5	0.00%	-0.01%	-0.28%
Oxides of nitrogen (NO_X)	74,722	45,392	14,423	2837.7	2934.6	-0.13%	-0.21%	-0.67%
Particulate matter (PM_{10})	20,443	2,110	592	42.2	43.7	-0.01%	-0.07%	-0.24%
Particulate matter ($PM_{2.5}$)	11,728	1,553	574	41.0	42.4	-0.01%	-0.09%	-0.24%
Total VOCs	131,356	23,512	866	34.9	36.1	0.00%	-0.01%	-0.14%
1,3 Butadiene		142	3.49	0.1	0.1		0.00%	-0.14%
Acetaldehyde		101	33	1.3	1.4		-0.05%	-0.14%
Benzene		624	9.23	0.4	0.4		0.00%	-0.14%
Formaldehyde		266	85.3	3.4	3.6		-0.04%	-0.14%
Isomers of xylene		979	3.32	0.1	0.1		0.00%	-0.14%
Lead and compounds		2.82	0.106	0.01	0.01		-0.01%	-0.24%
Toluene		1,315	4.06	0.2	0.2		0.00%	-0.14%
TSP		2,737	598	42.7	44.1		-0.05%	-0.24%
PAH			23.3	2.9	3.0			-0.42%

Source: Technical Paper 8 – Regional Air Quality Assessment (Volume 6)

Notes: HV = heavy vehicles; PAH = Polycyclic aromatic hydrocarbon

As the Project would also result in additional rail transport, emissions from both heavy vehicles and rail locomotives need to be considered.

A summary showing the predicted change in regional air emissions for the Sydney basin as a result of the Project (road and rail combined), is presented in Table 18.3. The table shows a comparison between the total emissions predicted for the Sydney basin in accordance with the EPA (2012), the predicted emissions from the operation of the Project under the Full Build 2030 scenario, and the percentage change in regional air emissions as a result of the Project.

Table 18.3 Summary of results – total emissions (road and rail)

Substance	Sydney region (EPA 2012) (tonnes/year)			Project (2031) (tonnes/year)		Change due to Project (% increase)		
	Total Sydney	Motor vehicles and locomotives	HV and locomotives	With Project (HV + loco)	Without Project HV	Total Sydney	Motor vehicles and locomotives	HV and locomotives
Carbon monoxide (CO)	246,692	123,728	4,097	351.3	346.5	0.00%	0.00%	0.12%
Oxides of nitrogen (NO_X)	74,722	45,465	14,496	2,911.5	2934.6	-0.03%	-0.05%	-0.16%
Particulate matter (PM_{10})	20,443	2,112	594	44.0	43.7	0.00%	0.01%	0.05%
Particulate matter ($PM_{2.5}$)	11,728	1,555	576	42.7	42.4	0.00%	0.02%	0.06%
Total VOCs	131,356	23,515	869	37.6	36.1	0.00%	0.01%	0.17%
1,3 Butadiene		142	3	0.1	0.1		0.01%	0.24%
Acetaldehyde		101	33	1.3	1.4		-0.05%	-0.15%
Benzene		624	9	0.4	0.4		0.00%	0.07%
Formaldehyde		266	85	3.5	3.6		-0.03%	-0.10%
Isomers of xylene		979	3	0.1	0.1		0.00%	0.38%
Lead and compounds		3	0	0	0.01		0.01%	0.14%
Toluene		1,315	4	0.2	0.2		0.00%	0.21%
TSP		2,737	600	44.5	44.1		0.01%	0.06%
PAH			23	2.9	3.0			-0.43%

Source: Technical Paper 8 – Regional Air Quality Assessment (Volume 6)

Notes: HV = heavy vehicles; PAH = Polycyclic aromatic hydrocarbon; loco = locomotives

Table 18.3 indicates that the Project would not have a discernible effect on total emissions or regional air quality in Sydney. The largest regional calculated change is a reduction of 0.03% in total NO_X emissions from all sources in the region (the regional change is shown in the 'Total Sydney' column in Table 18.3). The change in emissions is attributed to freight rail locomotives replacing heavy vehicles.

Table 18.3 also shows the specific impact of the Project on the motor vehicle and locomotive fraction of total emissions, and also the specific impact on heavy vehicles and locomotive emissions. As the Project emissions are produced primarily by heavy vehicles and locomotives, the Project's impact on this sub-component (heavy vehicles and locomotives) of the total regional emissions is most notable in Table 18.3.

Overall, the results show that the Project would have only a very small effect (increase or decrease) in terms of total emissions in Sydney, and in terms of total emissions from either heavy vehicles or locomotives alone. The total emissions in the Sydney region include emissions from electricity generation, solid fuel burning, industrial processes and a number of other sources, so the extent to which the Project would have an impact at a regional scale is minor.

To assess the effect on air quality from the predicted changes in pollutant emissions, the dispersion of emissions in the Sydney region airshed was modelled. Air quality impacts that may result across various locations within the regional Sydney area were assessed by comparing the predicted air dispersion modelling results with and without the Project at the various NSW OEH monitoring station locations. The locations represent the typical population exposure to air pollutants in the Sydney region. This has also allowed for direct comparison with the actual measured levels at these locations. The results of the Project dispersion modelling for each OEH monitoring location in 2031 have been presented alongside the 2011 measured data in Table 18.4. Table 18.4 also includes a summary of the future increase in concentration for both the 2031 'with the Project' and 'without the Project' scenarios for each location and concentration. The relevant criteria for the modelled pollutants are listed in the first column of the table.

Table 18.4 Modelling predictions at NSW OEH monitoring sites

Measured 2011 levels and additional future impact due to the Project														
	Bargo	Bringelly	Chullora	Earlwood	Lindfield	Liverpool	Macarthur	Oakdale	Prospect	Randwick	Richmond	Rozelle	St Marys	Vineyard
Max NO_2 1-hr average ($\mu g/m^3$) Criterion of 246 $\mu g/m^3$	Measured													
	86.5	54.5	95.9	86.5	75.2	86.5	84.6	50.8	73.3	99.6	54.5	94	67.7	69.6
	Additional impact, in 2031, without the Project													
	0.01	0.13	0.26	0.15	0.22	0.26	0.23	0.02	0.29	0.18	0.08	0.27	0.13	0.12
	Additional impact, in 2031, with the Project													
	0.01	0.14	0.27	0.17	0.21	0.37	0.23	0.02	0.27	0.17	0.08	0.27	0.12	0.13
	Change due to the Project (%)													
	0.00	0.02	0.00	0.03	-0.01	0.13	0.00	0.00	-0.02	-0.01	0.00	0.00	0.00	0.01
NO_2 annual average ($\mu g/m^3$) Criterion of 62 $\mu g/m^3$	Measured													
	8.7	9	24.5	17.4	18.4	18.2	14.6	3.4	19.5	14	9.6	20.9	10.8	11
	Additional impact, in 2031, without the Project													
	0.00	0.03	0.10	0.05	0.06	0.09	0.07	0.00	0.11	0.02	0.01	0.07	0.03	0.03
	Additional impact, in 2031, with the Project													
	0.00	0.01	0.05	0.02	0.02	0.05	0.03	0.00	0.04	0.01	0.01	0.03	0.01	0.01
	Change due to the Project (%)													
	-0.01	-0.16	-0.21	-0.14	-0.21	-0.22	-0.28	-0.06	-0.33	-0.09	-0.08	-0.20	-0.19	-0.19
Max PM_{10} 24-hr average ($\mu g/m^3$) Criterion of 50 mg/m^3	Measured													
	89.7	86	65.2	124.9	35.7	68.8	38.1	54.7	41.5	40.1	46.2	39.4	73.9	32.7
	Additional impact, in 2031, without the Project													
	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	Additional impact, in 2031, with the Project													
	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	Change due to the Project (%)													
	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Measured 2011 levels and additional future impact due to the Project														
	Bargo	Bringelly	Chullora	Earlwood	Lindfield	Liverpool	Macarthur	Oakdale	Prospect	Randwick	Richmond	Rozelle	St Marys	Vineyard
PM_{10} annual average ($\mu g/m^3$) Criterion of 30 $\mu g/m^3$	Measured													
	12.9	15.9	19.8	18	13.3	18.1	13.2	10.7	15.8	16	13.2	16.6	14.7	14
	Additional impact, in 2031, without the Project													
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Additional impact, in 2031, with the Project													
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Change due to the Project (%)													
	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Max CO 1-hr average (mg/m^3) Criterion of 30 mg/m^3	Measured													
	ND	ND	1.73	ND	ND	2.76	1.27	ND	1.96	ND	ND	1.61	ND	ND
	Additional impact, in 2031, without the Project													
	0.01	0.08	0.16	0.09	0.13	0.15	0.14	0.01	0.17	0.1	0.05	0.16	0.07	0.07
	Additional impact, in 2031, with the Project													
	0.01	0.08	0.19	0.13	0.13	0.35	0.14	0.01	0.16	0.15	0.05	0.18	0.07	0.08
	Change due to the Project (%)													
	-	-	1.90	-	-	7.21	0.55	-	-0.52	-	-	1.25	-	-

Source: Technical Paper 8 – Regional Air Quality Assessment (Volume 6)

Notes: $\mu g/m^3$ = micrograms per cubic metre; mg/m_3 = milligrams per cubic metre; NO_2 = nitrogen dioxide; CO = carbon monoxide; PM_{10} = Particulate matter $\leq$ 10 µm in aerodynamic diameter

Figures showing the spatial distribution of any change in air quality are presented in Technical Paper 8 – Regional Air Quality Assessment in Volume 6 (section 7.2.2). As would be expected, these figures show that the largest effects occur alongside road and rail corridors, and the effect reduces rapidly with increasing distance from the corridor.

The results from Table 18.4 demonstrate that, overall, the Project would not have any discernible impact on air pollution concentrations at any of the monitoring locations within the Sydney basin. All predicted levels are well within the applicable criteria.

The Project is predicted to slightly increase some concentrations of air pollutants in the region, along roads near Moorebank and the western part of the rail corridor from Port Botany to Moorebank, as these are the primary routes for IMT transport. This slight increase is shown in Table 18.4, which indicates that areas close to the Project and Port Botany transport corridor, such as Liverpool, would generally experience a slight increase in pollutant concentrations with the addition of the Project in 2030. The Project is also predicted to reduce emissions on the eastern part of the Port Botany to Moorebank rail corridor and to decrease traffic emissions along the M5, M4 and M2 Motorways, due to the anticipated shift in transport from road to rail.

The regional air quality assessment found that, as a whole, the Project would have a negligible effect on air emissions across the Sydney basin when it reaches full operation in 2030. Therefore, it can be concluded that the predicted impacts of the Project on regional air quality in Sydney are insignificant.

The change in emissions due to the Project arises from a reduction in VKT travelled by heavy diesel trucks on Sydney roads (refer Chapter 11 – Traffic, transport and access), and an increase of approximately 20 trains a day travelling between Port Botany and Moorebank as a result of the IMEX operation.

The effect on air quality due to the Project arises from a reduction in emissions from heavy diesel vehicles in most LGAs and an increase in locomotive emissions between Port Botany and Moorebank. There is also an increase in emissions from heavy diesel vehicles in the general area of the Project.

However, the notable finding of the assessment is that the change in emissions due to the Project on a regional level is likely to be small and is unlikely to be discernible relative to pollutant levels within the Sydney basin that would occur with or without the Project.

18.3.3 Consideration of cumulative assessment

A cumulative assessment of the Project and a potential warehousing development on the Sydney Intermodal Terminal Alliance (SIMTA) site has been undertaken for traffic, noise and local air quality. The primary purpose of the assessment was to identify impacts on the local community, and to this end the local air quality cumulative assessment (refer to Chapter 27 – Cumulative impacts) is considered to be a more appropriate approach to cumulative impact assessment.

At the regional scale, there are a number of other developments that could equally contribute to the regional airshed, and it is not feasible to model all of these. Based on regional air quality modelling, the overall impact of the Project on the regional airshed was found to be negligible.

18.3.4 Management and mitigation

Based on the regional air quality assessment included in Volume 6 of this EIS and summarised in this chapter, no substantial regional air quality impacts are predicted to result from the operation of the Project. Therefore, no specific management or mitigation measures for regional air quality are proposed in this EIS.

Potential local air quality impacts that may result from the construction and operation of the Project have been discussed in Chapter 17 – Local air quality. Chapter 17 also includes a range of management and mitigation measures that are designed to address the local air quality impacts discussed in that chapter.

The results show that the largest effects of the Project would be localised to the vicinity of the Project, and hence the local air quality impact assessment at Chapter 17 should be referred to for a detailed assessment of potential impacts at sensitive receptor locations.

18.4 Summary of key findings

Regional air quality in the Sydney basin is primarily influenced by emissions from major industries, commercial operations, motor vehicles and domestic activities such as wood heaters. The SoE report (SEWPaC 2011) notes that national ambient air quality standards are rarely exceeded for extended periods in the Sydney region, and exceedances are normally associated with particular events such as bushfires and dust storms.

Motor vehicles are one of the most significant sources of air pollutants in Sydney, accounting for around 80% of CO emissions, 70% of NOX emissions and almost 40% of total VOC emissions. The Regional Air Quality Assessment has found that the impacts of the Project on regional air quality in the Sydney basin would be insignificant. The largest calculated effect is predicted to be a 0.03% reduction in NOx in the Sydney airshed which would arise from the reduction in heavy vehicle VKT. No net change was predicted for other pollutant emissions that are quantified for the whole of Sydney region.

A summary of the annual average nitrogen dioxide (NO_2) levels between 2005 and 2013 from the NSW EPA monitoring stations is presented in Figure 18.5. The figure shows a falling trend in NO_X levels, and that measured levels were below criteria at all monitoring sites.

All predictions are well within the applicable air quality criteria for the modelled pollutants.

The Project is predicted to slightly increase some concentrations of air pollutants along roads near Moorebank and the western part of the rail corridor from Port Botany to Moorebank. Also, the Project is predicted to slightly reduce emissions on the eastern part of the Port Botany to Moorebank rail corridor and to decrease traffic emissions along the M5, M4 and M2 motorways, due to the anticipated shift in transport from road to rail. However, the change in emissions on a regional level is likely to be small, and unlikely to be discernible relative to pollutant levels that would occur with or without the Project.

As there are no substantial regional impacts predicted to result from the operation of the Project, no specific management or mitigation measures are proposed.

Table 18.5 summaries the regional air quality impacts for the Project at Full Build for each rail access option. There is no discernible difference in impact or benefit between the options.

Table 18.5 Summary of regional air quality impacts at Full Build

Impact	IMT layout and associated rail access connection option		
	Northern	Central	Southern
Increase in pollutant concentrations that can be quantified at a regional level for the Sydney basin	-	-	-
Slight reduction in NO_x air pollution levels for the Sydney basin (positive outcome)	•	•	•
Slight increase of some concentrations of air pollutants in the region, along roads near Moorebank and the western part of the rail corridor from Port Botany to Moorebank	•	•	•

Key: • = impact, - = no impact

The regional air quality assessment focused on the Project's operational Full Build scenario as this phase would result in the most significant change to existing regional conditions. Early works and construction impacts are unlikely to generate air quality impacts that would be significant at a regional level and, therefore, these were examined in the local air quality assessment (refer Chapter 17 – Local air quality).