

JHCPB Joint Venture

Air Quality Management Plan

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Developed By:				
Name: JHCPB Environment and Approvals team			Position: Environment and Approvals Team	
Reviewed By:				
Name		Position		Date Reviewed
Ali Gotch		Planning Approvals Manager		16/12/2020
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Glossary/Abbreviations

Abbreviations	Expanded text
AQMP	Air Quality Management Sub-Plan
AAQNEPM	National Environment Protection Measure for Ambient Air Quality Guidelines
BoM	Australian Government Bureau of Meteorology
CEMP	Construction Environmental Management Plan
CS	Communication Strategy
CO	Carbon monoxide
CoA	Conditions of Approval
DEC	Former Department of Environment and Conservation
DECC	Former NSW Department of Environment and Climate Change
DPIE	NSW Department of Planning, Industry and Environment
ER	Environmental Representative for the CSSI*
EIS	<i>M4-M5 Link Environmental Impact Statement</i> : the Environmental Impact Statement submitted to the Secretary seeking approval to carry out the project described in it and as revised if required by the Secretary under the EP&A Act*.
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence under the POEO Act
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
EWMS	Environmental Work Method Statements
GREP	NSW Government Resource Efficiency Policy
JHCPB	John Holland CPB Contractors Joint Venture
LGA	Local government area
NEPC	National Environment Protection Councils
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
OEH	NSW Office of Environment and Heritage
PIRMP	Pollution Incident Response Management Plan
PM	Particulate matter
PM ₁₀	Particulate matter (10 micrometres or less in diameter)
PM _{2.5}	Particulate matter (2.5 micrometres or less in diameter)
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
POEO Clean Air Regulation	<i>Protection of the Environment Operations (Clean Air) Regulation 2010</i>
REMMs	Revised environmental management measures
Roads and Maritime	NSW Roads and Maritime Services

Abbreviations	Expanded text
SO ₂	Sulfur Dioxide
SPiR, the	The <i>M4-M5 Link Submissions and Preferred Infrastructure Report</i> dated January 2018, submitted to the Secretary under the EP&A Act, comprising a response to written submission made during the public exhibition period of the EIS and changes to the design of the proposal since the publication of the EIS*.
SSWMP	Soil and Surface Water Management Plan
TfNSW	Transport for NSW (formerly Roads and Maritime Services)

*Note: Where these terms are defined in the Infrastructure Approval (SSI 7485) they have been copied verbatim in this table.

1. Introduction

1.1. Context

This Air Quality Management Sub Plan (AQMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the Rozelle Interchange Project (the Project). The Rozelle Interchange Project is Stage 2 of the M4-M5 Link Project.

This Air Quality Management Sub Plan (AQMP or Plan) has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), Project Approvals and all applicable guidance and legislation.

1.2. Background and project description

The M4-M5 Link EIS (AECOM, 2017) assessed the impacts of construction and operation of the Project on air quality. The EIS identified potential impacts on ambient air quality as identified in Section 5.3 of this Plan.

As part of the EIS development, a detailed air quality assessment was prepared to address the Environmental Assessment Requirements issued by the Department of Planning, Industry and Environment (DPIE). The air quality assessment was included in the EIS, within Chapter 9 and the Air Quality Technical Working Paper (Appendix I of the EIS).

The EIS concluded that the design and construction of the Project would be managed to ensure that the identified potential air quality impacts are minimised and / or avoided as far as practical, through the implementation of mitigation and management measures described in this AQMP.

Further background information on air quality aspects of the Project is provided in Section 4 of this Plan.

The Project description is outlined in Section 1.3 of the CEMP.

1.3. Scope of the Sub-Plan

The scope of this Plan is to describe how John Holland CPB Contractors Joint Venture (JHCPB) proposes to manage and protect air quality during construction of the Project. Operational air quality measures do not fall within the scope of this Plan and are therefore not included within the process contained within this Plan.

This Plan includes both pro-active as well as reactive management measures. It also includes mitigation strategies to minimise the impact of dust, offensive odour, and other air pollutants on the surrounding environment, including adjacent properties and sensitive places.

1.4. Environmental management systems overview

The environmental management system overview is described in Section 1.5 of the CEMP.

2. Purpose and objectives

2.1. Purpose

The purpose of this AQMP is to describe how the JHCPB proposes to manage and protect air quality during construction of the Project.

2.2. Objectives

The key objective of the AQMP is to ensure all CoA, REMM and licence/permit requirements relevant to air quality are described, scheduled and assigned responsibility as outlined in:

- The EIS prepared for WestConnex M4-M5 Link
- The SPIR for WestConnex M4-M5 Link
- Conditions of Approval granted to the Project on 17 April 2018, and as subsequently modified
- Roads and Maritime Services (Roads and Maritime) QA specifications G36 Environmental Protection (August 2014) (Roads and Maritime G36 Specifications)
- The Project's Environment Protection Licence (EPL)
- Relevant legislation and other requirements described in Section 3.1 of this Plan.

2.3. Environmental Performance outcome and targets

The desired environmental performance outcome for air quality, as outlined and addressed in the EIS, is to design, construct and operate the Project in a manner that minimises air quality impacts (including nuisance dust and offensive odour) to minimise risks to human health and the environment to the greatest extent practicable.

To achieve this outcome, JHCPB will undertake the outcomes and targets presented in Table 1.

Table 1 Performance outcomes

No.	Performance Outcome	How addressed	Records	Source
1	Effective management of dust, odour and other emissions during construction.	Implement Table 6 mitigation and management measures MMAQ2, MMAQ4 – MMAQ19, MMAQ22	Weekly Environmental Inspection Checklist (internal document) Monitoring registers and records	EIS, Appendix A
2	Ensure compliance with the relevant legislative requirements, CoA and REMM.	Implement the management and mitigation measures identified in Table 6, specifically MMAQ1, MMAQ3-17, MMAQ20-21 and MMAQ25. Undertake training, monitoring and inspections, auditing and recording (refer to Section 7).	Inspection records Monitoring records Audit reports	CoA A1
3	Ensure compliance with the air quality requirements of the EPL.	Implement the management and mitigation measures identified in Table 6, specifically MMAQ18. Undertake training, monitoring and inspections, auditing and recording (refer to Section 7).	Weekly Environmental Inspection Checklist (internal document) Inspection records Monitoring records Audit reports	EPL
4	Ensure training is provided in the form of inductions to relevant Project personnel relating to air quality issues, before they begin work on site.	Implement the measures identified in Section 7.2 of this Plan and Table 6, specifically MMAQ1 and MMAQ23.	Training register	CEMP Section 3.5

No.	Performance Outcome	How addressed	Records	Source
5	Implement reasonably practicable measures to minimise the emission of dust and other air pollutants during construction.	Implement the management and mitigation measures identified in Table 6, specifically MMAQ1-17, MMAQ20-21 and MMAQ24.	Weekly Environmental Inspection Checklist (internal document) Monitoring registers and records	CoA E1

3. Environmental requirements

3.1. Relevant legislation and guidelines

3.1.1. Legislation

Legislation relevant to air quality management for this Project include:

- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *Protection of the Environment Operations Act 1997* (POEO Act)
- *Protection of the Environment Operations (Clean Air) Regulation 2010* (POEO Clean Air Regulation).

Relevant provisions of the above legislation are explained in the legal and compliance tracking register included in Appendix A1 of the CEMP.

3.1.2. Guidelines

The main guidelines, specifications and policy documents relevant to this Plan include:

- National Environment Protection Councils (NEPC) – National Environment Protection Measure (NEPM) for Ambient Air Quality Guidelines (AAQNEPM)
- AS 3580.1.1-2007 Methods of Sampling Analysis of Ambient Air. Part 1.1 Guide to Siting Air Monitoring Equipment
- AS 3580.10.1-2003 Methods of Sampling Analysis of Ambient Air. Determination of Particulate Matter – Deposited Matter - Gravimetric Method
- Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (NSW Environment Protection Authority (EPA) 2016) (EPA Approved Modelling and Assessment Methods)
- Roads and Maritime QA Specification G36 – Environmental Protection (Management System) (August 2014)
- Roads and Maritime QA Specifications G38 – Soil and Water Management (Soil and Surface Water Management Plan)
- Air Quality Monitoring Criteria for Deposited Dust (NSW Department of Environment and Conservation (DEC) Guideline)
- NSW Government Resource Efficiency Policy (Office of Environment and Heritage (OEH) 2014) (GREP)
- EPA Approved Methods (DEC 2007)
- Managing Urban Stormwater: Soils and Construction, Volume 1 (Landcom 2004) and Volume 2 (NSW Department of Environment and Climate Change (DECC) 2008) (the “Blue Book”).

3.2. Air quality criteria

This section specifies the air quality monitoring criteria during the construction of the Project. Other monitoring requirements relevant to management of air quality are outlined in Section 7.3 of this Plan. Table 2 outlines the air quality monitoring criteria for the Project.

Table 2 Air quality monitoring criteria for construction phase of the Project

Item	Frequency	Standards	Reporting	Responsibility
Rainfall monitoring	Daily	Weather station (online weather station BOM)	Monitoring results	Environment and Sustainability Manager

Item	Frequency	Standards	Reporting	Responsibility
Dust deposition monitoring	Throughout construction, in line with the Dust Deposition Monitoring Program	AS/NZS 3580.10.1 2016, Methods for sampling and analysis of ambient air – Determination of particulates – Deposited Matter – Gravimetric method NSW EPA Approved Methods for Modelling and Assessment of Air Pollutants in New South Wales (2016)	Dust Deposition Monitoring Reports	Environment and Sustainability Manager

3.3. Minister's Conditions of Approval

The CoA relevant to this Plan are listed in Table 3 Conditions of Approval relevant to the AQMP below. A cross reference is also included to indicate where the condition is addressed in this Plan or other Project management documents.

Table 3 Conditions of Approval relevant to the AQMP

CoA No.			Document Reference	How addressed
C4	The following CEMP Sub-plans must be prepared in consultation with relevant authorities identified for each CEMP Sub-plan and be consistent with the CEMP referred to in the EIS:		This Plan Section 3.5	This AQMP has been prepared in accordance with this condition and describes how JHCPB propose to manage impacts to air quality during construction of the Project. This Plan was provided to EPA and the following relevant Councils for consultation: <ul style="list-style-type: none">▪ Inner West Council▪ City of Sydney Council
	Required CEMP Sub-plan	Relevant authority(s) and council(s) to be consulted for each CEMP Sub-plan		
	(d) Air Quality	EPA and relevant council(s)		
C5	The CEMP Sub-plans must state how:			
	(a) the environmental performance outcomes identified in the documents listed in Condition A1 as modified by these conditions will be achieved		Section 2.3 Table 2	This Plan was prepared in accordance with the environmental performance outcomes identified in the EIS and SPIR.
	(b) the mitigation measures identified in the documents listed in Condition A1 as modified by these conditions will be implemented		Table 6	The implementation of air quality mitigation and management measures identified in the documents listed in Condition A1 are listed in Table 6.
	(c) the relevant terms of this approval will be complied with, and		Section 3.3	Details regarding how JHCPB propose to comply with the relevant terms of approval are listed in this Table and in Appendix A.
	(d) issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed.		Section 5.3 Table 6	Air quality issues requiring management during construction of the Project have been identified through the documents listed in Condition A1. These issues have been detailed in Section 5.3 of this Plan. Environmental risk analysis will be ongoing and regularly reviewed in accordance with Section 3.9 to Section 3.13 of the CEMP to ensure effective management of impacts to air quality. Mitigation and management measures for these issues are listed in Table 6.

CoA No.		Document Reference	How addressed									
C6	The CEMP Sub-plans must be endorsed by the ER and then submitted to the Secretary for approval no later than one (1) month prior to the commencement of the construction activities to which they apply.	Section 2.2 of the CEMP	This AQMP was endorsed by the ER in a letter dated 12 June 2019. The AQMP will be submitted to DPIE for approval no later than one month prior to the commencement of construction activities.									
C7	Any of the CEMP Sub-plans may be submitted to the Secretary along with, or subsequent to, the submission of the CEMP.	Section 2.2 of the CEMP	This Plan has been submitted for approval to DPIE prior to the final submission of the CEMP for DPE approval.									
C8	Construction must not commence until the CEMP and all CEMP Sub-plans have been approved by the Secretary. The CEMP and CEMP Sub-plans, as approved by the Secretary, including any minor amendments approved by the ER, must be implemented for the duration of construction. Where the CSSI is being staged, construction of that stage is not to commence until the relevant CEMP and CEMP Sub-plans have been endorsed by the ER and approved by the Secretary.	Section 2.2 of the CEMP	Construction will not commence until the CEMP and all CEMP Sub-plans have been approved by DPIE. The CEMP and CEMP Sub-plans will be implemented for the duration of construction.									
C9	<table><tr><td colspan="3">The following Construction Monitoring Programs must be prepared in consultation with the relevant authorities identified for each Construction Monitoring Program to compare actual performance of construction of the CSSI against predicted performance.</td></tr><tr><td></td><td>Required Construction Monitoring Programs</td><td>Relevant authority(s) and council(s) to be consulted for each Construction Monitoring Program</td></tr><tr><td>(e)</td><td>Dust Deposition Monitoring Program</td><td>EPA</td></tr></table>	The following Construction Monitoring Programs must be prepared in consultation with the relevant authorities identified for each Construction Monitoring Program to compare actual performance of construction of the CSSI against predicted performance.				Required Construction Monitoring Programs	Relevant authority(s) and council(s) to be consulted for each Construction Monitoring Program	(e)	Dust Deposition Monitoring Program	EPA	Annexure B, Dust Deposition Monitoring Program Section 2.3 of the DDMP	The Dust Deposition Monitoring Program has been prepared in accordance with this condition and describes how JHCPB propose to monitor dust deposition during construction of the Project. The monitoring program has been provided to EPA for consultation. EPA advised in advance that it was not EPA policy to review management plans. EPA expectations will be specified in the Project's EPL.
The following Construction Monitoring Programs must be prepared in consultation with the relevant authorities identified for each Construction Monitoring Program to compare actual performance of construction of the CSSI against predicted performance.												
	Required Construction Monitoring Programs	Relevant authority(s) and council(s) to be consulted for each Construction Monitoring Program										
(e)	Dust Deposition Monitoring Program	EPA										
C10	Each Construction Monitoring Program must provide: (a) details of baseline data available; (b) details of baseline data to be obtained and when;	Section 3.1 of the DDMP	No baseline dust deposition data is available.									
	(c) details of all monitoring of the project to be undertaken; (d) the parameters of the project to be monitored; (e) the frequency of monitoring to be undertaken; (f) the location of monitoring;	Section 3.2 and 4.1 of the DDMP	The details of monitoring to be undertaken by the Project, the parameters to be monitored, the frequency of monitoring and the identification of monitoring locations are described in Section 3.2 and 4.1 of the Dust Deposition Monitoring Program.									
	(g) the reporting of monitoring and analysis results against relevant criteria; (h) details of the methods that will be used to analyse the monitoring data;	Section 3.2.2 and 4.2 of the DDMP	Section 3.2.2 and 4.2 of the Dust Deposition Monitoring Program details the reporting of monitoring and analysis against relevant criteria as well as the methods that will be used to analyse the monitoring data.									
	(i) procedures to identify and implement additional mitigation measures where results of monitoring are unsatisfactory; and	Section 5.3 of the DDMP	Procedures to identify and implement additional mitigation measures where results of monitoring are outside of adopted									

CoA No.		Document Reference	How addressed
			triggers are presented in Section 5.3 of the Dust Deposition Monitoring Program.
	(j) any consultation to be undertaken in relation to the monitoring programs.	Section 2.3 of the DDMP	Section 2.3 of the Dust Deposition Monitoring Program details the consultation to be undertaken during the development of the monitoring program and also the ongoing consultation identified during construction.
C13	The Construction Monitoring Programs must be developed in consultation with the relevant authorities as identified in Condition C9.	Section 2.3 of the DDMP	The Dust Deposition Monitoring Program will be prepared in accordance with this condition. The monitoring program will be provided to EPA for consultation.
C14	The Construction Monitoring Programs must be endorsed by the ER and then submitted to the Secretary for approval at least one (1) month prior to commencement of construction.	Section 2.2 of the CEMP	This Dust Deposition Monitoring Program has been endorsed by the ER.
C15	Construction must not commence until the Secretary has approved all of the required Construction Monitoring Programs relevant to that activity and all the necessary baseline data for the required monitoring programs has been collected, to which the CEMP relates.	Section 2.2 of the CEMP	Construction will not commence until the CEMP and Sub-plans, including relevant construction monitoring programs have been approved by DPIE.
C16	The Construction Monitoring Programs, as approved by the Secretary, including any minor amendments approved by the ER, must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Secretary, whichever is the greater.	Section 1.2 of the DDMP	The Dust Deposition Monitoring Program will be implemented for the duration of construction as detailed in Section 1.2 of the Dust Deposition Monitoring Program.
C17	The results of the Construction Monitoring Programs must be submitted to the Secretary, and relevant regulatory authorities, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.	Section 5.5 of the DDMP	Section 5.5 of the Dust Deposition Monitoring Program details the reporting requirements and the frequency required for this reporting.

3.4. Environmental Management Measures

Refer to Annexure A for all REMMs relevant to the development of this Plan.

3.5. Consultation for preparation of this Plan

This Plan was provided to the NSW Environment Protection Authority (EPA), Inner West Council and City of Sydney in accordance with CoA C4(d), for review and comment.

Table 4 details a summary of the consultation undertaken for the development of this plan and the key issues identified by the relevant stakeholders.

Table 4 Summary of consultation for development of the AQMP

Agency	Contact with agency	Response received	Key issues	Where addressed
City of Sydney	Via email from the Project: <ul style="list-style-type: none"> 08/04/2019 10/04/2019 18/04/2019 01/05/2019 Via phone call from the Project: <ul style="list-style-type: none"> 12/06/2019 	Attendance at the Rozelle Interchange Regulator Briefing Session: <ul style="list-style-type: none"> 06/03/2019 Via phone call from the Project: <ul style="list-style-type: none"> 12/06/2019 Via email to the Project: <ul style="list-style-type: none"> 12/06/2019 – City of Sydney confirmed they had no comment on the AQMP. 	<ul style="list-style-type: none"> N/A 	N/A
Inner West City Council (IWC)	Via email from the Project: <ul style="list-style-type: none"> 08/04/2019 10/04/2019 18/04/2019 23/04/2019 	Attendance at the Rozelle Interchange Regulator Briefing Session: <ul style="list-style-type: none"> 06/03/2019 	N/A	N/A
		Meeting between JHCPB and IWC focussing on Noise and Vibration Management Plan and AQMP: <ul style="list-style-type: none"> 17/04/2019 	<ul style="list-style-type: none"> Management of dust issues discussed – no key concerns raised by IWC 	N/A
		Via email to the Project: <ul style="list-style-type: none"> 10/04/2019 – IWC confirmed receipt of the AQMP. 18/04/2019 – IWC advise that they will be able to provide feedback within the fortnight following the 29 April. 21/05/2019 – IWC provided comments on the AQMP. 	<ul style="list-style-type: none"> Monitoring of construction emissions Diesel emissions from construction truck movements Comprehensive dust monitoring 	<ul style="list-style-type: none"> Table 6 MMAQ19, Section 7.3 and Annexure B Section 5.2.2 and Table 6 MMAQ20, MMAQ 21 Table 6 MMAQ19, Section 7.3 and Annexure B

Agency	Contact with agency	Response received	Key issues	Where addressed
Environment Protection Authority (EPA)	Via email from the Project: ▪ 08/04/2019	Attendance at the Rozelle Interchange Regulator Briefing Session: ▪ 06/03/2019 Via email to the Project: ▪ 08/04/2019 – EPA advised in advance that it was not policy to review management plans. Their expectations will be specified in the project's EPL.	N/A	N/A
Port Authority of NSW	Via email from the Project: ▪ 10/04/2019 ▪ 18/04/2019	Via email to the Project: ▪ 24/04/2019 – Port Authority provided comments on the AQMP.	<ul style="list-style-type: none"> ▪ Dust impacts and the data collected on the Port of Authority land ▪ Complaints handling process 	<ul style="list-style-type: none"> ▪ Section 5, Table 6 MMAQ19, Section 7.3 and Annexure B ▪ Section 7.5
Sydney Water	Via email from the Project: ▪ 10/04/19	No response required, this document was provided to Sydney Water for information, as requested by Roads and Maritime Services.	N/A	N/A

Ongoing consultation with relevant stakeholders, including any unique local receivers (e.g. residents and schools), may be undertaken for particular issues, such as periods of excessive dust generation, pertaining to the Project's impact on air quality. Community feedback and complaints relating to air quality impacts will be dealt with in accordance with the Communication Strategy (CS) and the Complaints Management System.

4. Existing Environment

Emissions to the atmosphere during construction that could result in adverse impacts to air quality typically consist of dust and particulates, and gases.

The following sections summarise what is known about factors influencing air quality impacts and management associated with the Project, within and adjacent to the Project corridor.

4.1. Key reference documents

The key reference documents for this section are:

- Chapter 9 of the EIS (AECOM 2017)
- Volume 2C (Part A) Appendix I: Technical working paper: Air quality – Main report (August 2017) (the Technical working paper)
- SPIR, and
- Relevant guidelines, specifications and policy documents (refer to Section 3.1.2).

4.2. Air quality records

Annexure F of the Air Quality Technical Working Paper details the historical trends in Sydney's air quality from 2004-2015. These were based on hourly data from the following long-term monitoring stations:

- OEH Stations (urban background)
 - Chullora, Earlwood, Randwick, Rozelle, Lindfield, Liverpool, Prospect
- TfNSW stations
 - M5 East urban background
 - M5 East roadside

The records from these locations can be summarised as follows:

- Maximum one hours and rolling eight hour mean Carbon Monoxide (CO)
 - All values were well below the air quality criteria of 30mg/m³ (one hour) and 10 mg/m³ (eight hour)
- Annual mean Nitrogen Dioxide (NO₂)
 - Concentrations at all sites were well below the air quality criterion of 62 µg/m³, and ranged between around 15 and 25 µg/m³
 - Long-term average concentrations at roadside locations were around 10-20 µg/m³ higher than those at background sites
- Maximum one hour NO₂
 - Concentrations have been quite stable, value across all sites typically range from between 80 and 120 µg/m³, and continue to be well below the criterion of 246 µg/m³
- Annual mean Particulate Matter (10 micrometres or less in diameter) (PM₁₀)
 - Concentrations in recent years has been between 17-20 µg/m³ – these values are lower than the air quality criterion of 30 µg/m³ and the standard of 25 µg/m³
- Maximum 24 hour PM₁₀
 - Over the time period there was a slight downward trend, but there was a large amount of variation from year to year. In 2015 the concentrations were around 40 µg/m³
- Annual mean Particulate Matter (2.5 micrometres or less in diameter) (PM_{2.5})

- There was a systematic reduction between 2004 and 2012 followed by a substantial increase in 2013. The reason for this increase was a change in measurement method. This increase meant that background concentrations during 2015 were already very close to or above the standard of 8 µg/m³, and above the long-term goal of 7 µg/m³.
- Maximum 24 hour PM_{2.5}
 - One hour concentrations were very close to or above the standard of 25 µg/m³, and were generally above the long-term goal of 20 µg/m³.

4.3. Rainfall, temperature and wind

4.3.1. Rainfall and temperature

The historical records from the Bureau of Meteorology (BoM) weather station at Canterbury Racecourse (site number 066194), have been selected in the EIS to reflect the potential rainfall and temperature conditions as it is broadly representative of the Project area. The annual average daily maximum and minimum temperatures are 23.0°C and 12.3°C, respectively. On average, January is the hottest month with an average daily maximum temperature of 27.6°C. July is the coldest month, with average daily minimum temperature of 5.8°C. The wettest month is April, with 111 millimetres falling over eight rainy days. The average annual rainfall is 971 millimetres over an average of 85 rain days per year.

Table 5 Long-term average climate summary for Canterbury Racecourse (AWS)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean daily maximum temperature (°C)												
27.6	27.2	26.0	23.4	20.6	18.1	17.5	19.0	21.9	23.5	24.8	26.3	23.0
Mean daily minimum temperature (°C)												
18.3	18.3	16.5	12.8	9.3	7.1	5.8	6.5	9.5	12.1	14.9	16.7	12.3
Mean monthly rainfall (mm)												
85.2	99.1	74.6	111.0	81.1	108.2	59.5	66.8	46.8	59.0	78.7	64.8	970.9
Mean rain days per month (number)												
8.0	7.6	7.6	7.8	6.9	8.8	6.6	5.3	5.1	6.1	8.1	6.8	84.7

Source: BoM (2017) Climate average for Station: 066194; Commenced: 1995 – last record January 2017; Latitude: 33.91°S; Longitude: 151.11°E

Table 5 shows that rainfall is typically higher during summer and autumn months, and the beginning of winter. Winter and spring months are generally drier periods during the year. Climatic factors such as prolonged dry weather, combined with high winds, can increase the likelihood of dust particulate emissions.

4.3.2. Wind

Appendix I of the Air Quality Technical Working Paper details the data relevant to dispersion modelling such as wind speed, wind direction, temperature and cloud cover were obtained from the following:

- OEH meteorological stations:
 - Rozelle
 - Chullora
 - Earlwood
- BoM meteorological stations:
 - Canterbury Racecourse AWS (Station No. 066194)
 - Fort Denison (Station No. 066022)
 - Sydney Airport AMO (Station No. 066037)
 - Sydney Olympic Park AWS (Archery Centre) (Station No. 066212)

Data collected between 2009 and 2015, shows a high level of year-on-year consistency in the annual average wind speed and annual percentage of calms at each meteorological station. The wind speeds at the BoM Fort Denison and BoM Sydney Airport station were relatively high, with annual averages of 4.2–4.4 metres per second and 5.5–5.37 metres per second, respectively. This is reflective of the exposed nature of these stations and their proximity to large coastal waterbodies; Sydney Harbour and Botany Bay respectively. Wind speeds at Chullora, Earwood and Rozelle were the lowest, with annual averages of 1.7–2.3 metres per second, 1.3–1.6 metres per second and 1.7–1.8 metre per second. Wind speeds at Canterbury Racecourse were towards the middle of the range for all stations with an annual average of 3.2–3.3 metres per second. There were few calm conditions at Fort Denison and Sydney Airport.

Annual and seasonal wind roses created for all five stations show that the wind patterns at most stations were reasonably consistent from year-to-year, with some slight variation in the seasonal distribution between 2009 and 2015.

Wind speed and wind direction influence pollutant concentration and thus the air quality impacts from the construction of the Project. For example, grounded sources that do not travel up or down in the air, such as road traffic, tend to have the highest concentrations under low wind speed conditions. However, wind-blown dust will increase PM concentrations in the air with increasing wind speed.

Although wind direction varies slightly from year-to-year, due to the urban environment that surrounds the Project (i.e. temporary ancillary construction facilities will be fenced and much of the works will be underground); wind direction will not be a factor that greatly influences air quality management. Temporary localised stockpiles will be present next to the exhaust shaft opening, air supply shaft and within the cut and cover civil area.

These will be managed in accordance with control measures listed in Table 6.

4.4. Material Characteristics

Materials susceptible to aeolian erosion include demolition wastes, imported fill, imported road base and hardstand subgrade, historic imported soils and natural soils, and excavated sandstone bedrock. These materials when subject to mechanical forces from construction equipment and removal of existing groundcover such as pavements and vegetation are subject to forming nuisance dust.

The EIS construction Air Quality Assessment (Appendix I) did not base the risk of dust impacts on soil types, but rather based it on the construction activity and sensitivity of the area. The dust impact is determined by the nature of the activity, the magnitude of works and area of exposed material. Depending on this criteria wind erosion can be high due to the unconsolidated condition of the soil.

5. Environmental aspects and impacts

5.1. Construction activities

Emissions to the atmosphere during construction that could result in adverse impacts to air quality are typically divided into two categories. These are:

- Dust and particulates
- Gaseous.

Key aspects of the Project that could result in dust and particulate emissions include:

- Building demolition at temporary and permanent ancillary facility sites
- General earthworks
- Vegetation clearing
- Drilling, excavation and benching
- Surface mining and blasting (blasting will only be undertaken if required, following preparation and approval of a Blast Monitoring Program)
- Roadheader operations
- Operating plant and equipment, crushing and screening
- Cutting, grinding, sawing activities
- Operation of concrete / asphalt agitators
- Erection of demountable buildings at temporary and permanent ancillary facility sites
- Removal of redundant utilities and installation of new utilities
- Removal of loosened material from tunnelling construction works
- Topsoil/material handling including stockpiling, material and spoil loading and material and spoil haulage
- Vehicular movements over unpaved surface (including unsealed access roads)
- Wind erosion of exposed areas and temporary stockpiles
- Archaeological testing, heritage salvation and conservation works (if required)
- Treatment of contaminated sites (if required).

Air emissions, other than dust, which may be generated by construction activities include:

- Vehicle and plant exhaust emissions
- Odours/gases released during:
 - › Excavations of organic or contaminated materials
 - › Sealing works
 - › Groundwater treatment.

Refer also to the Aspects and Impacts Register included in Appendix A2 of the CEMP.

5.2. Factors likely to affect emissions

5.2.1. Dust generation

In addition to the inherent risks of specific construction activities creating the potential to generate dust, a number of other factors also affect the likelihood of dust emissions. These include:

- Wind direction – determines whether dust and suspended particles are transported in the direction of the sensitive receivers
- Wind speed – governs the potential suspension and drift resistance of particles
- Soil type – more erodible soil types have an increased soil or dust erosion potential
- Soil moisture – increased soil moisture reduces soil and dust erosion potential
- Rainfall or dew – rainfall or heavy dew that wets the surface of the soil and reduces the risk of dust generation.

Project related factors that have the potential to affect the likelihood of dust emissions include:

- The size of the site
- Proximity of the construction area to sensitive receivers
- Duration and nature of construction activities
- The number, type and condition of plant and equipment being used
- The duration of use of each item of plant and equipment
- Appropriate operation and maintenance of plant and equipment
- Compliance of plant and equipment with relevant emission standards, and
- Adequacy of mitigation measures applied to reduce or eliminate dust and offensive odour.

5.2.2. Gaseous / exhaust emissions

Emissions from vehicles would be associated with the combustion of fuel (diesel and petrol) in construction plant, vehicles and machinery. These sources would generate emissions of particulate matter, CO, oxides of nitrogen (NO_x), SO₂ and trace amounts of non-combustible hydrocarbons. The rates of emission and potential impact on surrounding land uses would depend on the number and power output of the combustion engines, the quality of the fuel used, the condition of the engines and the intensity of use.

Fugitive emissions would be expected from fuel and chemicals stored at construction compounds (e.g. LPG, diesel, lubricant oils, cleaning chemicals).

Project related factors that have the potential to affect the likelihood of gaseous emissions include:

- Duration and nature of construction activities
- The number, type and condition of plant and equipment being used
- The duration of use of each item of plant and equipment
- Appropriate operation and maintenance of plant and equipment
- Compliance of plant and equipment with relevant emission standards, and
- Adequacy of mitigation measures applied to reduce or eliminate gaseous emissions.

5.3. Impacts

The potential for impacts on air quality will depend on a number of factors. Primarily impacts will be dependent on the nature, extent and magnitude of construction activities and their interaction with the natural environment. Potential impacts attributable to construction may occur during work establishment, earthworks, spoil handling, storage and transport and due to plant and vehicle movement and emissions. These are covered in more detail in the following sections.

Overall, with the implementation of the control measures identified in Table 6, dust impacts on surrounding receivers are expected to be minimal.

5.3.1. Worksite establishment

The potential impacts related to overall management of air quality during worksite establishment include:

- Dust generation due to:
 - Vegetation clearance, clearing and grubbing
 - Stockpiling of topsoil and mulched vegetation
 - Demolition of buildings and associated infrastructure (asbestos is not addressed in this plan; refer to Asbestos Management Plan)
 - Wind erosion of exposed surfaces and stockpiles
 - Wheel-generated dust from vehicular traffic on unsealed roads and works site access points.
- Particulate matter (PM_{2.5}/PM₁₀) generation due to:
 - Operation of construction vehicles, plant and equipment

- › Dust generation activities set out above.

5.3.2. Earthworks

The potential impacts related to overall management of air quality during earthworks include:

- Dust generation due to:
 - › Drilling
 - › Operation of excavators, front end loaders, bulldozers, dump trucks and other plant on exposed surfaces
 - › Tunnelling
 - › Loading/unloading trucks with spoil and aggregate (including dust generation from within the acoustic sheds)
 - › Wind erosion of exposed surfaces and stockpiles
 - › Wheel-generated dust from vehicular traffic on unsealed roads and work site access points.
- Particulate matter (PM_{2.5}/PM₁₀) generation due to:
 - › Operation of construction vehicles and plant
 - › Dust generation activities set out above.

5.3.3. Spoil handling, storage and transport

The potential impacts related to overall management of air quality during spoil handling, storage and transport include:

- Dust generation due to:
 - › Spoil stockpiles
 - › Spoil haulage (uncovered loads)
 - › Wheel-generated dust from heavy vehicle movements around construction sites and along haulage routes
- Particulate matter (PM_{2.5}/PM₁₀) generation due to:
 - › Operation of construction vehicles and plant
 - › Dust generating activities set out above.

The potential for dust related impacts due to spoil handling within the Rozelle civil and tunnel site is reduced as the majority of spoil handling will occur within acoustic sheds.

5.3.4. Plant and vehicle movement and emissions

The potential impacts related to overall management of air quality related to plant and vehicle movement and emissions include:

- Dust generation (wheel generated) from:
 - › Construction vehicles
 - › Construction equipment, generators and other plant.
- Particulate matter (PM_{2.5}/PM₁₀) generation due to:
 - › Operation of construction vehicles and plant, including idling vehicles and poorly maintained equipment
 - › Dust generating activities set out above.

Gaseous emissions from plant and vehicles will be manageable through the implementation of air quality mitigation and management measures MMAQ20 and MMAQ21 in Table 6. All vehicles used on site, for transporting materials to or from site, or for any other activities associated with the Project, would be maintained to avoid the emission of excessive air impurities in accordance with Part 5.8 of the *Protection of the Environment Operations Act 1997* and the Protection of the Environment Operations (Clean Air) Regulation 2010.

6. Environmental control measures

Specific measures and requirements to meet the objectives of this AQMP and to address impacts on air quality are outlined in Table 6.

Table 6 Air Quality mitigation and management measures

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
Planning						
MMAQ1	Regular communication is to be carried out with WestConnex Projects under construction in close proximity to ensure that measures are in place to manage cumulative dust impacts. Regular communication between onsite personnel is also to be carried out to ensure mitigation measures are being identified, implemented and monitored.	Communication Strategy	Construction	Foreman	REMM AQ2 Best practice	CEMP Section 3.7 Communication Strategy
MMAQ2	All construction area plans/designs and construction activities will be planned and carried out to avoid where practicable, or minimise, the generation of dust and vehicle emissions.		Pre-Construction Construction	Foreman Engineers	Best practice	Construction area plans/designs
Incident management						
MMAQ3	All incidents (as defined in SSI 7485) will be notified to the Secretary as soon as	PIRMP Environmental incident Classification and Reporting – CEMP Annexure G	Construction	Environment and Sustainability	POEO Act CoA A40-A43	Environmental Incident Report

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	<p>possible and in any event within 24 hours of any incident (CoA A40).</p> <p>All incidents which cause or are likely to cause material harm to the environment are to be immediately reported to the EPA and other authorities as per the Pollution Incident Response Management Plan (PIRMP).</p> <p>The Secretary and Environmental Representative will also be notified within 24 hours of the incident being notified to EPA (CoA A43).</p>			Manager Foreman		
Dust management						
MMAQ4	<p>Construction activities with the potential to generate dust will be modified or ceased during unfavourable weather conditions to reduce the potential for dust generation.</p> <p>Expected unfavourable weather conditions will be communicated via daily pre-start and will be monitored, and communicated where necessary, throughout the day.</p>		Construction	Environment and Sustainability Manager Foreman	REMM AQ4	Daily Pre-Start Inspections

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
MMAQ5	<p>Appropriate measures to reduce potential dust generation, such as the use of water carts, sprinklers, dust screens and surface treatments, will be implemented within Project sites as required. These controls will also be implemented to reduce the emission of dust out of the door openings of acoustic sheds.</p> <p>These measures will be implemented to minimise dust leaving the premises and before any soil disturbance or vegetation clearing commences.</p>	Water carts, sprinklers, dust screens, sheds and surface treatments	Pre-construction Construction	Foreman Project Manager Environment and Sustainability Manager Foreman Engineer	REMM AQ5 REMM AQ1 REMM AQ7 EPL	Daily Pre-Start Inspections Weekly Environmental Inspection Checklist (internal document)
MMAQ6	Access roads and all sealed surfaces within Project sites and site accesses will be maintained and managed to reduce dust generation. At the commencement of establishment of Project ancillary facilities, controls such as wheel washing systems and rumble grids will be installed at all site exits to prevent deposition of loose	<p>Street sweeper</p> <p>Chip seal, concrete, asphalt and soil binders</p> <p>Wheel washes, rumble grids, wetting systems, segregation (clean/dirty areas)</p>	Pre-construction Construction	Project Manager Environment and Sustainability Manager Foreman	REMM AQ6 REMM AQ24 REMM AQ25	Daily Pre-Start Inspections Construction area plans/designs Weekly Environmental Inspection Checklist (internal document)

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	material on sealed surfaces outside Project sites. Sweep (not wash into drains) accumulated sediment from site roads; remove mud from wheels and bodies of haulage plant before they enter public roads					
MMAQ7	Storage of materials that have the potential to result in dust generation will be minimised within Project sites at all times, through construction planning and procurement / delivery timing. Where necessary to store materials for greater than 10 days that have the potential to result in dust generation, dust emissions will be minimised by storing material within site enclosures or stabilising material using soil binders / tackifiers, covering with anchored fabrics, surface compacting / crusting stockpiles or installing dust suppression systems such as misters /	Site enclosures Soil binders Covers Excavators Misters / sprinklers	Construction	Foreman Engineers	REMM AQ8	Weekly Environmental Inspection Checklist (internal document)

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	sprinklers This will be undertaken in accordance with the "Blue Book" (DECC, 2008).					
MMAQ8	Dust suppression and/or collection techniques will be used during cutting, grinding or sawing activities likely to generate dust in close proximity to sensitive receivers (e.g. vacuum extraction or water suppression or other engineered controls).	Engineered dust controls	Construction	Foreman	REMM AQ13	Weekly Environmental Inspection Checklist (internal document)
MMAQ9	The potential for dust generation will be considered during the storage and handling of loose and fine materials. Equipment will be selected and processes developed to minimise the potential for dust generation (e.g. location selection, avoiding double handling, use of misting or sprinklers).	Sucker truck Sprinklers Soil binders Geofabrics/plastics	Construction	Environment and Sustainability Manager Foreman	REMM AQ14 REMM AQ23	Weekly Environmental Inspection Checklist (internal document)
MMAQ10	All loaded spoil haulage trucks and other Project-related heavy vehicles that enter and leave the project site and are carrying materials with the potential to result in	Trailer covers	Construction,	Environment and Sustainability Manager Foreman	REMM AQ15 EPL	Weekly Environmental Inspection Checklist

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	dust generation (including dry bulk material) will be covered at all times, except during unloading and loading, to prevent dust emissions during transport in accordance with relevant road regulations.					
MMAQ11	Demolition activities will be planned and carried out with adequate dust suppression to minimise the potential for dust generation (e.g. considering weather conditions before works, removing unconsolidated material with dust generating capacity before mechanical demolition or misting sprays).	Sprinklers Soil binders Gurneys Hoses	Construction	Project Manager Engineer Environment and Sustainability Manager Foreman	REMM AQ16 REMM AQ17	Daily Pre-Start Inspections Weekly Environmental Inspection Checklist (internal document)
MMAQ12	Minimise areas of exposed soil at all times, where possible, to reduce the potential for dust generation. Exposed soils will be temporarily stabilised (e.g. soil binder, covering piles with Geofab, water suppression) during weather conditions	Soil binders and cover crop Staging work Geofabric Landscaping Hardstand	Construction	Environment and Sustainability Manager Foreman	REMM AQ19 REMM AQ20 REMM AQ21 EPL Best practice	Weekly Environmental Inspection Checklist (internal document)

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	conductive to dust generation and prior to extended periods of inactivity (e.g. over 10 days) to minimise dust generation. Exposed soils will be revegetated and/or permanently stabilised as soon as reasonable and feasible following disturbance					
MMAQ13	Ensure that stockpiles of materials with the potential to result in dust emissions are managed (i.e. enclosed or adequately protected) to reduce potential dust generation and odour.	Soil binders Water carts Stockpile compaction Geofabrics/plastics	Construction	Foreman	REMM AQ22 REMM CM05 REMM RW11 SSWMP	Daily Pre-Start Inspections Weekly Environmental Inspection Checklist (internal document)
MMAQ14	Haul roads will be treated with water carts and monitored during earthworks operations, ceasing works if necessary during high winds where dust controls are not effective.	Water carts	Construction	Foreman	REMM AQ12	Weekly Environmental Inspection Checklist (internal document)
MMAQ15	Long term stockpiles (e.g. stockpiles left exposed and undisturbed for longer than 10 days) of top soil will have cover crop established. Long term stockpiles of all other material will be appropriately covered	Seed cover Geofabrics/ plastics	Construction	Engineer	Best practice REMM RW11	Construction area plans/designs Refer to SSWMP

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	to prevent air quality impacts.					
MMAQ16	Areas surrounding tunnel door sheds and portals will be managed dependent on site conditions using measures such as water carts, wetting systems, segregation of clean and dirty areas, etc., to minimise dust generation.	Water carts Wetting systems Segregation (clean/dirty areas)	Construction	Foreman	REMM AQ1	Weekly Environmental Inspection Checklist (internal document)
MMAQ17	Tunnel works will have a dedicated dust collection and ventilation system. During tunnel construction, air will be ventilated through a filter until such that discharged air meets the requirements of the POEO (Clean Air) Regulations (as amended)."	Dust extraction and filtration system	Construction	Environment and Sustainability Manager	Best practice REMM AQ1	Weekly Environmental Inspection Checklist (internal document)
MMAQ18	All site personnel must report observations of release of dust from the premises to supervisory staff so that appropriate management measures can be implemented.		Pre-construction Construction	All staff	EPL	Informal site observations Weekly Environmental Inspection Checklist (internal document)
MMAQ19	Dust during construction will be monitored in accordance with the Dust Deposition	Dust Deposition Monitoring Program (refer to Annexure B)	Construction	Environment and Sustainability Manager	Best practice	Dust Deposition Monitoring Reports

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	Monitoring Program (refer to Annexure B).					
Operating vehicles/machinery						
MMAQ20	Construction plant and equipment will be operated, inspected and maintained to maximise efficiency and comply with relevant emission standards. Engine idling will be minimised when plant is stationary, and plant will be switched off when not in use to reduce emissions.		Construction	Foreman Plant Operators Environment and Sustainability Manager	REMM AQ10 REMM GHG4 REMM AQ9 EPL	Weekly Environmental Inspection Checklist (internal document) Plant and equipment records
MMAQ21	The use of mains electricity will be favoured over diesel or petrol- powered generators where practicable to reduce site emissions.		Construction	Procurement team	REMM AQ11	Procurement assessment records
Odour						
MMAQ22	In the event of uncovering waste with a noxious odour, or detection of nuisance odours (nuisance to workers or confirmed beyond landfill boundaries), construction personnel will investigate and report the odour source to the Environment and Sustainability Manager for further investigation	Application of odour suppressants	Construction	Foreman, Area Manager Engineers Environment and Sustainability Manager	Best practice	Weekly Environmental Inspection Checklist (internal document)

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	and implementation of any necessary management measures identified in the investigation process.					
Other						
MMAQ23	Ensure that Project specific control measures are communicated and documented into work plans.	Environmental Work Method Statements (EWMS)	Construction	Project Manager Environment and Sustainability Manager	Best practice	EWMS
MMAQ24	The application of pesticides will be modified, reduced or controlled during high or unfavourable wind conditions where wind can carry pesticides outside of the defined treatment area.	Environmental Work Method Statements (EWMS)	Construction	Foreman	Best practice	EWMS
MMAQ25	All potentially hazardous material will be identified and removed from buildings in an appropriate manner prior to the commencement of and/or progressively during demolition and in accordance with all relevant codes of practice.		Construction	Project Manager Environment and Sustainability Manager	REMM AQ18	Environmental Incident Report
MMAQ26	Undertake weekly documented site inspections while construction works are occurring to identify		Construction	Environment and Sustainability Manager	REMM AQ3	Weekly Environmental Inspection Checklist (internal document)

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	and action any air quality issues resulting from Project activities.					

7. Compliance management

7.1. Roles and responsibilities

The JHCPB Project Team's organisational structure and overall roles and responsibilities are outlined in Section 3.3 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Section 6 of this Plan.

7.2. Training

All employees, contractors and utility staff working on site will undergo site induction training relating to air quality issues. The induction training will address elements related to air quality management including:

- Requirements of this Plan
- Applicable and relevant legislative requirements
- Roles and responsibilities for air quality management
- Typical construction activities that may impact air quality and associated environmental mitigation and management measures
- Incident response procedure.

Targeted training in the form of toolbox talks or specific training will also be provided to personnel with a key role in air quality management. Examples of training topics would include:

- Potential sources of dust, emissions and other air pollutants
- Impacts to the environment and surrounding community
- Planning and preparedness for high wind events and dust risk periods
- Erosion and sediment controls installation methods.

Further details about staff induction and training are outlined in Section 3.5 of the CEMP.

7.3. Monitoring and inspection

7.3.1. Regular monitoring and inspections

7.3.1.1. Visual monitoring and inspections

Regular monitoring and inspections will be carried out during construction in accordance with regulatory requirements, CoAs and REMMs.

Monitoring and inspections will include, but are not limited to:

- Daily site inspections by the Foreman to identify and action any air quality issues related to:
 - › Visible sources of dust
 - › Visible dust emissions
 - › Implementation and effectiveness of all dust controls
 - › Minimising gaseous emissions
 - › No continuous visible vehicle/plant/equipment emissions for longer than 10 seconds as per the POEO Clean Air Regulation
 - › No mud tracking off-site; check main exit/entry points and material on public roads
 - › No detectable offensive odours and gases (e.g. inspection of potential odour sources including freshly disturbed areas, open stockpiles, water treatment plants, waste skips, etc)
 - › Weather forecast (e.g. rainfall) will be checked daily to allow for proactive dust management actions to be implemented.

- Weekly documented site inspections by the environmental team while construction works are occurring. The frequency of these inspections is to be reflective of the risk associated with potential impacts. The objectives of the inspections are to identify and action any air quality issues related to:
 - › Visual monitoring of dust and gaseous emissions
 - › Haul/access road integrity to be maintained
 - › Any other relevant mitigation measures listed in Table 6. An adaptive approach to dust management will be implemented, where mitigation measures will be amended and improved if they are found not be meeting the required outcomes.
- Weather data at the premises as required in accordance with the EPL.
- Pre-use plant inspections will be conducted and recorded to ensure that plant is in good working order and ensure no continuous visible emissions for longer than 10 seconds.

The regular site inspections required actions and ongoing issues will be recorded and actioned appropriately within agreed timeframes by relevant Project personnel. These inspections are to be recorded as part of Environmental Inspection Checklist (internal document).

Additional requirements and responsibilities in relation to inspections are documented in Section 3.9.1 of the CEMP.

7.3.1.2. Monthly depositional dust monitoring and inspections

An EPL has been obtained for the Project for the scheduled activity of “road construction”. EPL conditions relating to air quality have been included in Table 6.

Dust depositional monitoring will be undertaken in accordance with the Dust Deposition Monitoring Program (Annexure B).

7.4. Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this sub plan, CoA and other relevant approvals, licences and guidelines.

Audit requirements are detailed in Section 3.9.3 of the CEMP.

7.5. Reporting

Project reporting requirements relevant to the management of air quality are identified in Table 7.

Table 7 Reporting requirements

Item	Frequency	Standards	External reporting	Responsibility
Incidents and exceedances	After occurrence of identified incidents / exceedances	As required by the CoA, EPL, PIRMP, RMS Environmental Incident Classification and Reporting procedure, and RMS Environment incident report.	Appropriate authority dependant on the nature of the incident (e.g. EPA, the Secretary) (refer to Section 3.8 in the CEMP)	Environment and Sustainability Manager, Foreman or delegate
Complaints	<ul style="list-style-type: none"> ▪ Daily (ER) ▪ Daily, in accordance with the EPL (EPA) ▪ As requested (DPE) 	As required by the CoA and EPL. Communication, notification and complaints handling requirements regarding air quality matters will be managed through the Complaints Management System and the Communication Strategy.	ER (CoA A22(a)) EPA (in accordance with the EPL) DPE (as requested by the Secretary; CoA B10)	Environment and Sustainability Manager, Public Liaison Manager / Officer or delegate

Item	Frequency	Standards	External reporting	Responsibility
NSW Government Resource Efficiency Policy (GREP)	Annually (before 31 July) and on completion of construction	<p>A required by RMS G36 Specification.</p> <p>Reporting on the conformity, or otherwise, of mobile non-road diesel and plant equipment used for the Work Under deed with the relevant United States Environment Protection Authority (US EPA), European Union (EU) standards or approved equivalent emission standards.</p> <p>The report will be prepared in accordance with the GREP "Clean Air data management tool", which details the types of diesel plant and equipment that are to be included and excluded.</p>	RMS	Project Manager Environment and Sustainability Manager

All other legislative reporting requirements and responsibilities are documented in Section 3.9.5 of the CEMP.

For incident management and emergency management process refer to Section 3.8 of the CEMP.

8. Review and improvement

8.1. Continuous improvement

Continuous improvement of this Plan will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance
- Determine the cause or causes of non-conformances and deficiencies
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies
- Verify the effectiveness of the corrective and preventative actions
- Document any changes in procedures resulting from process improvement
- Make comparisons with objectives and targets
- Review contractual and legislative requirements.

8.2. AQMP update and amendment

The processes described in Section 3.9 to Section 3.13 of the CEMP may result in the need to update or revise this Plan.

Only the Environment and Sustainability Manager, or delegate, has the authority to change any of the environmental management documentation. The ER can approve minor amendments to the Plan.

Any reviews to the AQMP will be in accordance with the process outlined in Section 3.13.1 of the CEMP. A copy of the updated plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure – refer to Section 3.11.2 of the CEMP.

Annexure A Other Conditions of Approval and Revised Environmental Management Measures relevant to this Plan

Table 8 Other Conditions of Approval relevant to the development of this plan

CoA No.	Condition Requirements	Document Reference
E1	In addition to the performance outcomes, commitments and mitigation measures specified in the documents listed in Condition A1, all reasonably practicable measures must be implemented to minimise the emission of dust and other air pollutants during the construction and operation of the CSSI.	Table 6

Table 9 Air Quality revised environmental management measures relevant to the development of this plan

Impact	Ref #	Commitment	Timing	Document reference
Impacts on ambient air quality and human health from dust generation and plant emissions during construction	AQ1	A Construction Air Quality Management Plan will be developed and implemented to monitor and manage potential air quality impacts associated with the construction of the Project. The management plan will include controls required to reduce the emission of dust from the acoustic sheds. The Plan will be implemented for the duration of the construction.	Construction	Table 6, MMAQ5, MMAQ17
	AQ2	Regular communication to be carried out with other WestConnex projects under construction in close proximity to ensure that measures are in place to manage cumulative dust impacts.	Construction	Table 6, MMAQ1
	AQ3	Regular site inspections will be conducted to monitor potential dust issues. The site inspections, required actions and ongoing issues will be recorded and actioned appropriately within agreed timeframes by relevant Project personnel.	Construction	Table 6, MMAQ26, Section 7.3
	AQ4	Construction activities with the potential to generate dust will be modified or ceased during unfavourable weather conditions to reduce the potential for dust generation.	Construction	Table 6, MMAQ4
	AQ5	Measures to reduce potential dust generation, such as the use of water carts, sprinklers, dust screens and surface treatments, will be implemented within Project sites as required.	Construction	Table 6, MMAQ5
	AQ6	Access roads within Project sites will be maintained and managed to reduce dust generation.	Construction	Table 6, MMAQ6
	AQ7	Where reasonable and feasible, appropriate control methods will be implemented to minimise dust emissions from the Project site.	Construction	Table 6, MMAQ5
	AQ8	Storage of materials that have the potential to result in dust generation will be minimised within Project sites at all times.	Construction	Table 6, MMAQ7
	AQ9	All construction vehicles and plant will be inspected regularly and maintained to ensure that they comply with relevant emission standards.	Construction	Table 6, MMAQ20
	AQ10	Engine idling will be minimised when plant is stationary, and plant will be switched off when not in use to reduce emissions.	Construction	Table 6, MMAQ20

Impact	Ref #	Commitment	Timing	Document reference
	AQ11	The use of mains electricity will be favoured over diesel or petrol-powered generators where practicable to reduce site emissions.	Construction	Table 6, MMAQ21
	AQ12	Haul roads will be treated with water carts and monitored during earthworks operations, ceasing works if necessary during high winds where dust controls are not effective.	Construction	Table 6, MMAQ14
	AQ13	Suitable dust suppression and/or collection techniques will be used during cutting, grinding or sawing activities likely to generate dust in close proximity to sensitive receivers.	Construction	Table 6, MMAQ8
	AQ14	The potential for dust generation will be considered during the handling of loose materials. Equipment will be selected and handling protocols developed to minimise the potential for dust generation.	Construction	Table 6, MMAQ9
	AQ15	All loaded spoil haulage trucks and other Project-related heavy vehicles carrying materials with the potential to result in dust generation will be covered to prevent dust emissions during transport in accordance with relevant road regulations.	Construction	Table 6, MMAQ10
	AQ16	Demolition activities will be planned and carried out to minimise the potential for dust generation.	Construction	Table 6, MMAQ11
	AQ17	Adequate dust suppression will be applied during all demolition works required to facilitate the Project.	Construction	Table 6, MMAQ11
	AQ18	All potentially hazardous material will be identified and removed from buildings in an appropriate manner prior to the commencement of and/or progressively during demolition and in accordance with all relevant codes of practice.	Construction	Table 6, MMAQ25
	AQ19	Areas of soil exposed during construction will be minimised at all times to reduce the potential for dust generation.	Construction	Table 6, MMAQ12
	AQ20	Exposed soils will be temporarily stabilised during weather conditions conducive to dust generation and prior to extended periods of inactivity to minimise dust generation.	Construction	Table 6, MMAQ12
	AQ21	Exposed soils will be permanently stabilised as soon as practicable following disturbance to minimise the potential for ongoing dust generation.	Construction	Table 6, MMAQ12
	AQ22	Ensure that stockpiles of materials with the potential to result in dust emissions are adequately protected and managed to reduce potential dust generation.	Construction	Table 6, MMAQ13
	AQ23	Ensure fine materials are stored and handled to minimise dust.	Construction	Table 6, MMAQ9
	AQ24	All sealed surfaces within sites and site accesses will be managed to reduce dust generation and sediment tracking onto roads.	Construction	Table 6, MMAQ6

Impact	Ref #	Commitment	Timing	Document reference
	AQ25	At the commencement of establishment of Project ancillary facilities, controls such as wheel washing systems and/or rumble grids will be installed at all site exits to prevent deposition of loose material on sealed surfaces outside Project sites to reduce potential dust generation.	Construction	Table 6, MMAQ6
Impacts on human and/or ecological receptors through disturbance and mobilisation of contaminated material	CM05	Stockpile management procedures will be implemented to control dust, odour and cross contamination.	Construction	Table 6, MMAQ13
Emission of greenhouse gases during construction	GHG4	Construction plant and equipment will be operated and maintained to maximise efficiency and reduce emissions, with construction planning used to minimise vehicle wait times and idling onsite and machinery turned off when not in use.	Construction	Table 6, MMAQ20

Annexure B Dust Deposition Monitoring Program

JHCPB Joint Venture

Dust Deposition Monitoring Program

RIC-JHC-MPL-00-PL-410-002

Project	Design and Construction of Rozelle Interchange Project
Design Lot No.	00-PL-410
Document No.	RIC-JHC-MPL-00-PL-410-002
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Document Approval

Developed By:				
Name: Ali Gotch		Position: Planning Approvals Advisor		
Reviewed By:				
Name	Position		Date Reviewed	
Ali Gotch	Planning Approvals Manager		16/12/2020	
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Rev	Rev Date	Reason for issue	Developed by	Approved by
A	02/04/2019	Draft for RMS review	Alison Kriegel	Alison Kriegel, Charles Scarf
B	10/04/2019	Updated draft to address RMS comments	Zoe McLaughlin	Jacinta Fuller
00	07/05/2019	Reviewed following RMS, ER and Agency comments – For submission to DPE	Stephan Mitchell	Alison Kriegel
01	14/06/2019	Updated to address DPE comments	Matilda Wachsmann / Jamie Fermio	Alison Kriegel Charles Scarf
02	25/06/2019	Updated to address additional DPE comments	Zoe McLaughlin	Alison Kriegel
03	16/07/2020	Updated Figure 1 Dust Deposition Gauge locations	Prajna Shetty	Ali Gotch
04	16/12/2020	For DPIE approval to update in response to DPIE request for monitoring program submission timing	Adrian Broger	Ali Gotch

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Glossary/Abbreviations

Abbreviation	Expanded text
AQMP	Air Quality Management Sub-plan
CEMP	Construction Environmental Management Plan
CoA	Conditions of Approval
DDMP	Dust Deposition Monitoring Program (this Program)
DPIE	Department of Planning, Industry and Environment
EIS	WestConnex M4-M5 Link Environmental Impact Statement
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence
JHCPB	John Holland CPB Contractors Joint Venture
REMMs	Revised Environmental Management Measures
Roads and Maritime	NSW Roads and Maritime Services
SPIR	WestConnex M4-M5 Link Submissions and Preferred Infrastructure Report

1. Introduction

1.1. Context

This Dust Deposition Monitoring Program (DDMP or Program) has been prepared for the construction stage of the WestConnex Rozelle Interchange (the Project). The Program forms Annexure B of the Air Quality Management Sub-plan (AQMP).

The DDMP addresses the requirements of the Minister's Conditions of Approval (CoA), the WestConnex M4-M5 Link Environmental Impact Statement (EIS), the Revised Environmental Management Measures (REMMs) listed in the WestConnex M4-M5 Link Submissions and Preferred Infrastructure Report (SPIR) and applicable guidelines and legislation.

2. Purpose and objectives

2.1. Purpose

The purpose of the DDMP is to describe how JHCPB propose to monitor dust deposition during construction of the Project.

The DDMP will be implemented to monitor the effectiveness of mitigation measures applied during the construction phase of the Project. Monitoring of dust deposition will be undertaken to identify potential impacts and ensure an appropriate management regime can be implemented to address those impacts and manage local air quality.

This Program provides details of the dust deposition monitoring network, frequency of monitoring, and test parameters. This DDMP supplements the AQMP, which itself is an appendix of the Construction Environmental Management Plan (CEMP).

Operational monitoring and operation measures do not fall within the scope of the construction phase and therefore are not included within the processes contained within this DDMP.

2.2. Objectives

The key objective of this DDMP is to ensure that CoA, REMMs, and licence/permit requirements relating to dust deposition monitoring are described, scheduled, and assigned responsibility as outlined in:

- The EIS prepared for WestConnex M4-M5 Link,
- The SPIR prepared for WestConnex M4-M5 Link,
- The CoA granted to the project on 17 April 2018, as modified on 25 February 2019,
- Roads and Maritime Specifications G36 and G40,
- The Project's Environment Protection Licence (EPL), and
- Relevant legislation and other requirements described in Section 3 of the AQMP.

2.3. Consultation

This Program has been provided to the NSW Environment Protection Authority (EPA) as part of the Air Quality Management Plan (AQMP) in accordance with CoA C9(e). The EPA stated that it is not EPA policy to review management plans. Refer to Section 2 of the CEMP for the consultation requirements relating to the CEMP and all sub-plans.

Ongoing consultation with relevant councils (City of Sydney Council and Inner West Council) and other stakeholders, including any unique local receivers (e.g. residents and schools), may be undertaken for particular issues pertaining to the Project's impact on local air quality. Community feedback and complaints relating to local air quality will be dealt with in accordance with the Communication Strategy and Complaints Management System.

3. Dust deposition monitoring

3.1. Baseline monitoring

Baseline monitoring data for dust deposition was not undertaken during the EIS. Additionally, a review of the EPA's Sydney air quality monitoring stations identified that the EPA do not measure dust deposition as part of their air quality monitoring program. Therefore, no baseline data for dust deposition has been presented.

The EPA criteria of $4\text{g/m}^2/\text{month}$ as detailed in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (2016) will be used in place of baseline data.

3.2. Construction monitoring

3.2.1. Overview

Dust deposition gauges record airborne dust which can be derived from construction activities and provide a useful measure of changing local air quality. A total network of five dust deposition gauges will be installed during construction of the Project (refer to Section 4.1).

Data from these gauges enables determination of dust deposition levels at the relevant ancillary facility. Data will be collected on a monthly basis, and results for dust deposition will be compared against the criterion and reported in the Dust Deposition Monitoring Reports prepared every six months (Section 5.5).

3.2.2. Performance criteria

The EPA expresses dust deposition criteria in two ways. Firstly; in terms of an acceptable increase in dust deposition over the existing background/baseline deposition levels. As background/baseline dust deposition levels are not available this criterion has not currently been adopted.

The second criterion is a measure of maximum total dust deposition levels. This criterion has currently been adopted for the Project. The long-term (annual average) EPA criterion for depositional dust that applies to the Project is provided in Table 1.

Table 1 Long-term impact assessment criterion for deposited dust

Pollutant	Averaging period	Maximum total* deposited dust level
Deposited dust	Annual	$4\text{g/m}^2/\text{month}$

* Total impact (i.e. concentrations due to the Project plus background concentrations due to other sources)

Monitoring will be undertaken on a monthly basis for the duration of construction.

The Project is located in an urban environment, and in the absence of background / baseline data, there is a potential that existing deposited dust levels may already be in exceedance of the criterion listed in Table 1.

If the above trigger is observed, a review will be initiated to determine the significance of the exceedance(s) and possible causes. The review will assess the available dust deposition data, recent weather records, and recent activities or recorded air quality control incidents occurring at the relevant ancillary facility. In addition, the review will also identify what, if any dust minimisation improvements can be made.

4. Monitoring methodology / Sampling protocol

4.1. Monitoring locations

Monitoring will be undertaken using dust deposition gauges located at each of the Project ancillary facilities as identified in Table 2 and shown in Figure 1.

Table 2 Dust deposition gauges proposed location

Ancillary facility	Description
Rozelle civil and tunnel site (C5)	Two (2) gauges will be installed within the Rozelle civil and tunnel site on the 'northern' / Lilyfield Road side of the site. One gauge will be located in the eastern half of the site and one gauge in the western half of the site.
The Crescent civil site (C6)	One (1) gauge will be installed within The Crescent civil site. This gauge is also expected to capture any potential dust deposition from the 'southern' / City West Link side of the Rozelle civil and tunnel site.
Victoria Road civil site (C7)	One (1) gauge will be installed within the Victoria Road civil site.
Iron Cove Link civil site (C8)	One (1) gauge will be installed within the Iron Cove Link civil site.

The specific locations for each of the sampling locations will be selected in accordance with AS/NZS 3580.1.1 2016, *Methods for Sampling and analysis of ambient air – Guide to siting air monitoring equipment*, as far as practicable. The requirements for AS/NZS 3580.1.1 2016 are outlined in Table 3. The specific sampling locations will be determined in consultation with the Project's Environmental Representative.

Table 3 Locating criteria

Pollutant	Type of Monitoring Station	Height above ground	Other locating criteria (minimum requirements)*
Deposited matter	Peak, neighbourhood and background	1.8 – 2.2m	<ul style="list-style-type: none"> Clear sky angle 120° Unrestricted airflow of 360° around sample gauge 10m from nearest object or tree dripline 5m from road No boiler or incinerator flues nearby

* As detailed in AS/NZS 3580.1.1 2016, where these distances are not possible justification will be provided as to site selection.

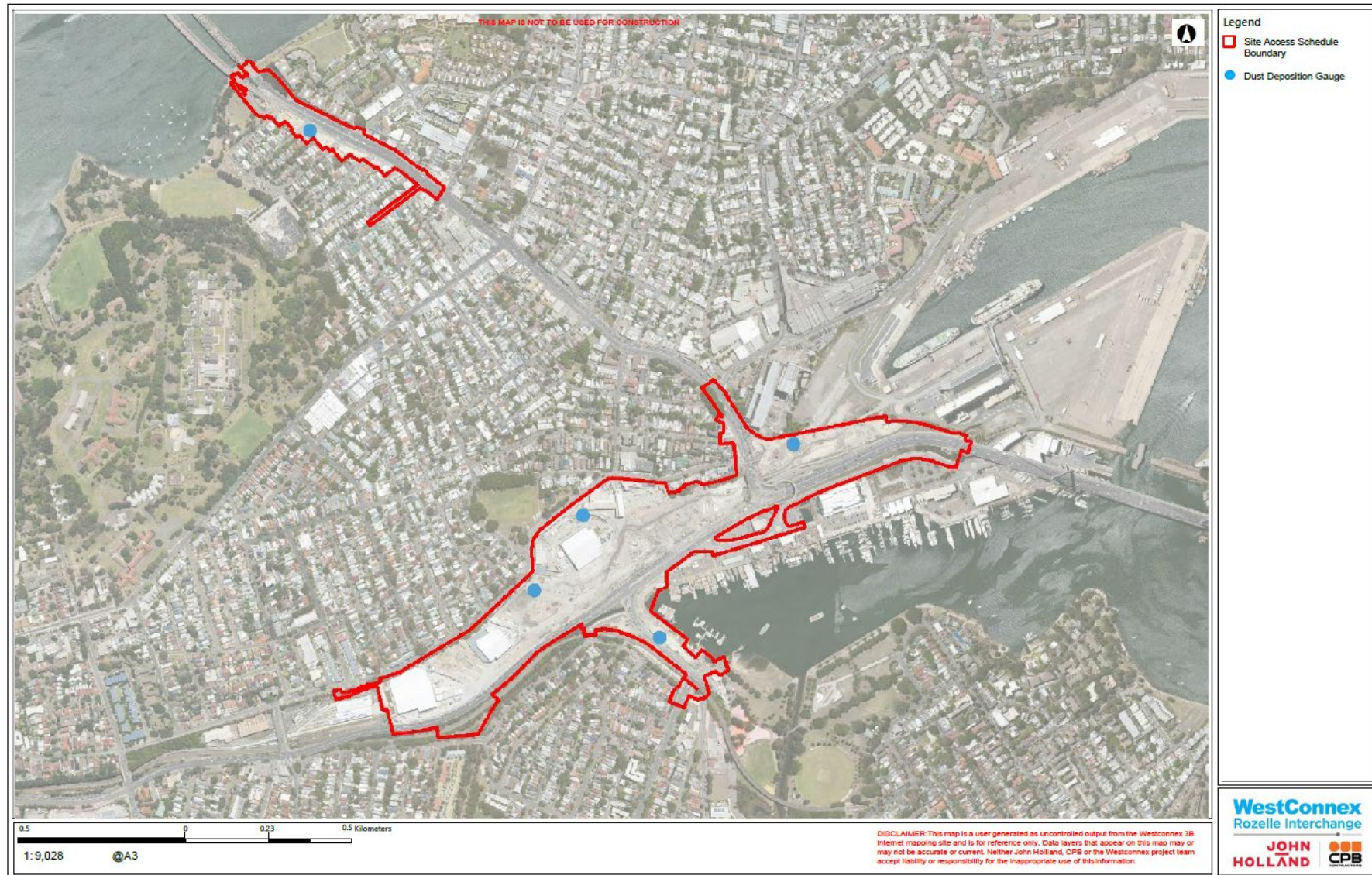


Figure 1 Proposed Dust Deposition Gauge Locations

4.2. Sample collection and laboratory analysis

The dust deposition gauges will be collected, and replaced, from site every 30 ± 2 days and then analysed for insoluble solids.

Analysis will be undertaken by a National Association of Testing Authorities (NATA) accredited laboratory. Monitoring for depositional dust must comply with AS/NZS 3580.10.1 2016, *Methods for sampling and analysis of ambient air – Determination of particulates – Deposited Matter – Gravimetric Method* and the NSW EPA *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (2016).

4.3. Quality Assurance and documentation

Any sample to be sent to a laboratory will be subject to quality assurance protocols.

Quality assurance and control protocols during sampling and recording parameters will be undertaken with each sampling event in accordance with AS/NZS 3580.10.1 2016, *Methods for sampling and analysis of ambient air – Determination of particulates – Deposited Matter – Gravimetric Method* to ensure the integrity of the dataset.

Samples are to be transported to a NATA-accredited laboratory under documented chain-of-custody protocols.

Monitoring records will be maintained in accordance with the appropriate standard.

5. Compliance management

5.1. Roles, responsibilities and training

The JHCPB Project Team's organisational structure and overall roles and responsibilities are outlined in Section 3.3 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in AQMP.

All employees, contractors and utility staff working on site will undergo site induction and targeted training relating to air quality issues, detailed in the AQMP.

Further details regarding staff induction and training are outlined in Section 3.5 of the CEMP.

5.2. Monitoring and inspection

This Program details the monitoring requirements for dust deposition.

Additional requirements and responsibilities in relation to inspections are documented in Section 3.8.1 and Section 3.8.2 of the CEMP.

5.3. Data analysis and management responses

Results from the construction monitoring program will be compared with the criterion identified in Table 1 and with results previously recorded on the project.

Monthly monitoring results for dust deposition will be compared against the criterion and reported in the Dust Deposition Monitoring Reports (Section 5.5). If a trigger is observed (see Section 3.2.2), a review will be initiated to determine the significance of the exceedance(s) and possible causes.

The review will assess available dust deposition data, recent weather data, and recent activities or air quality incidents occurring at the relevant ancillary facility site.

If the exceedance is determined to be attributable to Project works, the event will be treated as an environmental incident and managed in accordance with the requirements of the CEMP. Corrective and preventative actions will be identified and implemented as part of that process.

5.4. Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this Program, CoA and other relevant approvals, licences and guidelines.

Audit requirements are detailed in Section 3.9.3 of the CEMP.

5.5. Reporting

During construction, dust deposition data will be collected, tabulated and assessed against the criterion identified in Table 1. Monitoring reports will be submitted to DPIE, EPA and Port Authority within 30 days of the reporting period unless otherwise agreed with DPIE.

Reporting requirements associated with the Program for the construction phase of the Project are presented in Table 4.

Table 4 Reporting requirements

Schedule (during construction)	Requirements	Recipient (relevant authority)
Dust Deposition Monitoring Reports (every six months)	Data summary reports presenting tabulated dust deposition data collected during the reporting period. Dust deposition monitoring exceedance results will be presented. Applicable management responses will be documented.	EPA, DPIE, Port Authority

6. Review and improvement

6.1. Continuous improvement

Continuous improvement of this Program will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets, and the Project performance outcomes of the EIS for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance,
- Determine the cause or causes of non-conformances and deficiencies,
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies,
- Verify the effectiveness of the corrective and preventative actions,
- Document any changes in procedures resulting from process improvement, and
- Make comparisons with objectives and targets.

6.2. DDMP update and amendment

The processes described in Section 3.13.1 and Section 3.13.2 of the CEMP may result in the need to update or revise the Program.

Revisions of this Program will be in accordance with the process outlined in Section 3.13.1 of the CEMP.

A copy of the updated Program and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure – refer to Section 3.11.2 of the CEMP.