



# Appendix B6

## Construction Air Quality Management Sub-plan

### M12 Motorway West

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## Details of Revision Amendments

### Document Control

The Project Director is responsible for ensuring that this plan is reviewed and approved. The Project Director is responsible for updating this plan to reflect changes to construction, legal and other requirements, as required.

### Amendments

Any revisions or amendments must be approved by the Project Director and/or client before being distributed / implemented.

### Revision Details

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A	18/02/2022	G. Bolton	First Draft
B	13/05/2022	G. Bolton	Second draft following TfNSW/Arcadis review and comment
C	16/06/2022	A. Zvirzdinas	Third draft following TfNSW/Arcadis review and comment on Rev B
D	06/07/2022	A. Zvirzdinas	Fourth draft following TfNSW/Arcadis/ER review and comment on Rev C. New document number.
00	28/07/2022	A. Zvirzdinas	First Controlled Issue
E	31/01/2023	K. Purkiss	6-Monthly Review
01	31/01/2023	K. Purkiss	Second Controlled Issue
02	22/10/2024	T. Chezzi	Annual Review

### Document Review

Position	Name	Signature	Date
Project Director	Nick Fryday		22/10/2024

### Distribution of controlled copies

Copy no.	Issued to	Version



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## Acronyms and Abbreviations

Term	Expanded text
<b>AQI</b>	Air quality index
<b>AQMS</b>	Air Quality Monitoring Station
<b>ARSR</b>	Amendment Report to the Submissions Report
<b>AWS</b>	Automatic Weather Station
<b>BoM</b>	Bureau of Meteorology
<b>CA</b>	Consistency Assessment
<b>CAQMP</b>	Construction Air Quality Management Sub-plan
<b>CCLMP</b>	Construction Contaminated Land Management Sub-plan
<b>CEMP</b>	Construction Environmental management Plan
<b>CFFMP</b>	Construction Flora and Fauna Management Plan
<b>CSWMP</b>	Construction Soil and Water Management Sub-plan
<b>CWRMP</b>	Construction Waste and Resources Management Sub-plan
<b>CMS</b>	Complaints Management System
<b>CO</b>	Carbon monoxide
<b>CoA</b>	Conditions of Approval
<b>Construction</b>	Includes all activities required to construct the CSSI as described in the documents listed in Condition A1, including commissioning trials of equipment and temporary use of any part of the CSSI, but excluding Low Impact Work which is carried out to complete prior to the approval of the CEMP, works approved under a Site Establishment Management Plan, demolition of acquired residential houses, structures and sheds, and approved under an environmental management plan(s) in accordance with Condition A24.
<b>CPBGG JV</b>	CPB Contractors and Georgiou Group Joint Venture
<b>CSEP</b>	Community and Stakeholder Engagement Plan
<b>CSSI</b>	Critical State Significant Infrastructure
<b>DAWE</b>	Former Commonwealth Department of Agriculture, Water and the Environment
<b>DCCEEW</b>	Commonwealth Department of Climate Change, Energy, the Environment and Water
<b>DEC</b>	Former Department of Environment and Conservation
<b>DECC</b>	Former Department of Environment and Climate Change
<b>DPHI</b>	NSW Department of Planning, Housing and Infrastructure (formerly NSW DPE which has now been split into NSW DCCEEW and NSW DPHI, with all planning functions falling to DPHI)
<b>DPIE</b>	Former NSW Department of Planning, Industry and Environment
<b>EAD</b>	Environmental Assessment Documentation
<b>EES</b>	Former Environment, Energy and Science
<b>EHG</b>	Former Environment and Heritage Group (a part of NSW DPE)
<b>EIS</b>	Environmental Impact Statement



Term	Expanded text
EMS	Environmental Management System
Environmental Assessment Documentation	<p>The set of documents that comprise the Division 5.2 Approval:</p> <ul style="list-style-type: none"><li>• Roads and Maritime Services (October, 2019) M12 Motorway, Environmental Impact Statement (EIS)</li><li>• Transport for NSW (October, 2020) M12 Motorway, Submissions Report (the Submissions Report)</li><li>• Transport for NSW (October, 2020) M12 Motorway, Amendment Report (AR)</li><li>• Transport for NSW (December, 2020) M12 Motorway, Amendment Report submissions report (ARSR)</li><li>• Transport for NSW (March, 2021) The M12 Motorway Amendment Report Submissions Report – Amendment (ARSR amendment)</li><li>• WSP (October, 2021) M12 Motorway – West Package Detailed Design Consistency Assessment</li><li>• GHD (October, 2021) M12 Motorway – Central Package Detailed Design Consistency Assessment</li><li>• Arcadis (June, 2022) M12 Motorway – Sydney Water Crossings Consistency Assessment</li><li>• Arcadis (July, 2022) M12 Motorway – Design Boundary Changes Consistency Assessment</li><li>• Arcadis (August, 2022) M12 Motorway Minor Consistency Assessment for Proposed Change to the M12 Motorway Project (M12 Central)</li><li>• Arcadis (September, 2023) M12 Motorway – Devonshire Road Temporary Roundabout Consistency Assessment</li><li>• WSP (September, 2023) M12 Motorway – Elizabeth Drive Connections Consistency Assessment</li><li>• TfNSW (September, 2023) M12 Motorway – Minor Consistency Assessment M12 West demolition of structures as 752 Luddenham Road</li><li>• Arcadis (October, 2023) M12 Motorway – East Minor Consistency Assessment</li><li>• TfNSW (October, 2023) M12 Motorway – Minor Consistency Assessment M12 East AF9 Power Supply</li><li>• TfNSW (October, 2023) M12 Motorway – Minor Consistency Assessment M12 East Cecil Road Laydown Area</li><li>• TfNSW (October, 2023) M12 Motorway – Minor Consistency Assessment M12 East Temporary Construction Signage</li><li>• Arcadis (December, 2023) M12 Motorway Project (M12 East) Sites 48, 50 and 51</li><li>• Arcadis (January, 2024) M12 Motorway – Minor Consistency Assessment M12 Central Water Tower Access Road</li></ul> <p>The documents that comprise the EPBC referral:</p>



Term	Expanded text
	<ul style="list-style-type: none"> <li>Submission #3486 – The M12 Motorway Project between the M7 Motorway, Cecil Hills and The Northern Road, Luddenham, NSW</li> </ul> <p>Notification of referral decision and designated proponent - controlled action; date of decision 19 October 2018; ID: 2018-8286.</p>
<b>Environmental Representative</b>	A suitably qualified and experienced person independent of project design and construction personnel employed for the duration of construction. The principal point of advice in relation to all questions and complaints concerning environmental performance.
<b>EPA</b>	NSW Environment Protection Authority
<b>EP&amp;A Act</b>	<i>NSW Environmental Planning and Assessment Act 1979</i>
<b>EPBC Act</b>	<i>Commonwealth Environmental Protection and Biodiversity Conservation Act 1999</i>
<b>EPL</b>	Environmental Protection Licence
<b>ER</b>	Environmental Representative
<b>ERG</b>	Environmental Review Group
<b>ESM</b>	Environment and Sustainability Manager (TfNSW)
<b>ESR</b>	Environmental Site Representative (CPBGG JV)
<b>EU</b>	European Union
<b>EWMS</b>	Environmental Work Method Statements
<b>FCC</b>	Fairfield City Council
<b>GHG</b>	Greenhouse gas
<b>km</b>	Kilometres
<b>LCC</b>	Liverpool City Council
<b>LGAs</b>	Local Government Areas
<b>M7 Motorway (MOD 6 Widening)</b>	Refers to the State Significant Infrastructure project (SSI-663-MOD 6) to construct and operate an additional lane in both directions within the existing median of the M7 Motorway, south of the Kurrajong Road overhead bridge at Prestons to the M7 Motorway bridge at Richmond. This project interacts with the M12 East stage at the M7 interchange.
<b>M7 Widening</b>	Shorthand term for M7 Motorway (MOD 6 Widening)
<b>M7-M12 Integration Project</b>	<p>The M7-M12 Integration project incorporates the following:</p> <ul style="list-style-type: none"> <li>M7 Motorway (Mod 6 Widening) (SSI 663 Mod 6) – modification (mod) to the M7 Motorway approved on 17 February 2023 under Division 5.2 of the Environmental Planning and Assessment Act 1979 (EP&amp;A Act)</li> <li>M12 Motorway (CSSI 9364) – approved on 23 April 2021 under Division 5.2 of the EP&amp;A Act and split into separate stages or packages of work (West, Central (main construction), Central (temporary roundabout) and East). The M12 Motorway is also subject to a federal approval under the Environment Protection and Biodiversity Conversation Act 1999. The M7-M12 Integration project incorporates the M12 East package only.</li> </ul>
<b>MP</b>	Monitoring Program
<b>NEPC</b>	National Environment Protection Council
<b>NEPM</b>	National Environment Protection Measure



Term	Expanded text
NO <sub>2</sub>	Nitrogen dioxide
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water (formerly NSW DPE which has now been split into NSW DCCEEW and NSW DPHI)
O <sub>3</sub>	Ozone
OCEMP	Overarching Construction Environmental Management Plan
OCS	Overarching Communication Strategy
OEH	NSW Office of Environment and Heritage, now part of EES
PCC	Penrith City Council
Planning Secretary	Secretary of the NSW Department of Planning and Environment, or delegate
PM <sub>10</sub>	Particulate matter 10 micrometres or less in diameter
PM <sub>2.5</sub>	Particulate matter 2.5 micrometres or less in diameter
POEO Act	<i>Protection of Environment Operations Act 1997</i>
Primary CoA/REMM	CoA/REMM that are specific to the development of this Plan
REMM	Revised Environmental Management Measure
SAP	Sensitive Area Plans
SEARs	Secretary's Environmental Assessment Requirements
Secondary CoA/REMM	CoA/REMM that are related to, but not specific to, the development of this Plan
SEMP	Site Establishment Management Plan
SEO	Senior Environment Officer
TfNSW	Transport for New South Wales (formerly Roads and Maritime Services (RMS))
TSP	Total suspended particulate matter
VOC	Volatile organic compound
Work	Any physical work to build or facilitate the building of the CSSI, including low impact work, environmental management measures and utility works. However, it does not include activities that inform or enable detailed design of the CSSI and generate noise that is no more than 5 dB(A) above the rating background level at any sensitive receiver.
WSIA	Western Sydney International Airport
WSP	Western Sydney Parklands

# 1 Introduction

## 1.1 Context

This Construction Air Quality Management Sub-plan (CAQMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the M12 Motorway West Project (the Project).

An Overarching Construction Environmental Management Plan (OCEMP) has been prepared by TfNSW to address the requirements of the NSW Conditions of Approval (CoA), the Revised Environmental Management Measures (REMMs) listed in the M12 Motorway Environmental Impact Statement (EIS), Amendment Report (AR), Amendment Report Submissions Report (ARSR), Consistency Assessments (CA), all applicable legislation and Transport for New South Wales (TfNSW) specifications. The OCEMP was approved by DPIE on 21/12/2021.

This CAQMP has been prepared by CPBGG JV to address the requirements of the OCEMP and overarching CAQMP, all relevant TfNSW specifications, EPL conditions and legislation.

## 1.2 Background

Transport for New South Wales (TfNSW) is planning to construct and operate the M12 Motorway (the Project) to provide direct access between the Western Sydney International Airport (WSIA) at Badgerys Creek and Sydney's motorway network. The M12 Motorway will run between the M7 Motorway at Cecil Hills and The Northern Road at Luddenham for about 16 kilometres (km) and is expected to be opened to traffic prior to opening of the WSIA.

The CPB Contractors and Georgiou Group Joint Venture (CPBGG JV) has been awarded the M12 West (construct only contract) – between The Northern Road, Luddenham and about 250 metres east of Badgerys Creek.

The Project is subject to an approval under Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) as Critical State Significant Infrastructure (CSSI). The Project is also a controlled action under Section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), requiring a separate approval from the Australian Minister for the Environment.

An EIS was prepared to describe and assess the Project and recommend management measures to address impacts.

The following additional assessments have since been undertaken:

- M12 West Minor Consistency Assessment for the demolition of structures at 752 Luddenham Road required to address the need for the demolition of structures within Ancillary Facility 11. Whilst this ancillary facility is already located within the construction footprint and was previously assessed in the M12 Motorway Amendment Report, the demolition and disposal of structures in this location required assessment; approved in September 2023.
- M12 West Minor Consistency Assessment for the temporary amendment to the construction footprint to facilitate the construction of Variable Message Sign (VMS) infrastructure scope on The Northern Road (TNR), Luddenham NSW. While the VMS scope had been previously assessed in the M12 Motorway Amendment Report, the works area had not been included as a part of the M12 West construction footprint and required inclusion; approved in August 2024.

The EIS assessed the impacts of construction of the Project on air quality. As part of EIS development, a detailed Air Quality Assessment Report was prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning, Industry and Environment (DPIE, now split into two departments, NSW Department of Planning, Housing and Infrastructure (DPHI) and NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW)) and the Commonwealth EIS Guidelines issued by the Commonwealth Department of the Water, Agriculture and Environment (DAWE).

TfNSW developed a Construction Air Quality Management Sub-plan as part of the Overarching Construction Environmental Management Plan (OCEMP) for the M12 Motorway Project. The OCEMP was approved by the Planning Secretary in accordance with NSW CoA C3 on 21/12/2021.

### 1.3 Scope of the plan

The scope of this CAQMP is to describe how the CPBGG JV propose to manage potential air quality impacts during construction of the Project.

Operational air quality impacts and operation measures do not fall within the scope of this CAQMP and therefore are not included within the processes contained within this CAQMP.

### 1.4 Environmental Management Systems overview

The Environmental Management System (EMS) for the Project is described in Section 1.5 of the CEMP. This overarching CAQMP forms part of the environmental management framework for the Project, as described in Section 1.5 of the CEMP.

The CPBGG JV will ensure that management of air quality is carried out in accordance with this CAQMP. A copy of this CAQMPs will be kept on the premises for the duration of construction.

The CAQMP should be read in conjunction with the Sustainability Strategy. The Sustainability Strategy includes objectives and targets for the delivery of the Project commitments to sustainability and that are relevant and complementary to the management measures outlined in this CAQMP.

Management measures identified in this CAQMP may also be incorporated into site or activity specific Environmental Work Method Statements (EWMS). EWMS incorporate appropriate mitigation measures and controls and identify key procedures to be used concurrently with the EWMS. The CEMP Section 3.2.5, Table 3-5 details which activities require a EWMS to be prepared.

EWMS will be prepared by the Environmental Site Representative (ESR) and reviewed by the TfNSW Environment and Sustainability Manager (ESM) (or delegate) and independent Environmental Representative (ER) before the commencement of the construction activities to which they apply. Construction personnel undertaking a task governed by a EWMS will undertake the activity in accordance with the mitigation and management measures identified in the EWMS.

Used together, the CEMP, strategies, procedures and EWMS form management guides that clearly identify required environmental management actions for reference by TfNSW and CPBGG JV.

#### 1.4.1 CAQMP Preparation, Endorsement and Approval

This CAQMP and Construction Air Quality Monitoring Program will be approved by the CPBGG JV Project Director and ESR prior to submission to TfNSW.

The CEMP and Sub-Plans will go through a review and update process as described in section 3.1 of TfNSW Specification G36 to ensure the CEMP and associated documents have been developed in accordance with the OCEMP and associated Overarching CQAMP. TfNSW will provide the CEMP to the ER for approval.

A hold point shall be submitted in accordance with G36 Section 3.1 - Preparation and submission of CEMP. TfNSW shall consider the documents prior to authorising the release of the Hold Point. TfNSW may request additional information for inclusion in the CEMP before authorising the release of the Hold Point.

Construction of the M12W Package did not commence prior to the approval of this Sub-Plan, as part of the M12W CEMP.

#### 1.4.2 Interactions with Other Management Plans and Strategies

This Plan has the following interrelationships with other management plans and documents:

- Sensitive Area Plans (SAP) in Appendix A6 of CEMP and Site Establishment Management Plan (SEMP) in Appendix B10 of the CEMP, which identify adjacent residential and other receivers. The SEMPs include details of site-specific air quality management requirements
- TfNSW's Overarching Communication Strategy (OCS), which details procedures and processes for community notification, consultation and complaints management

- Community and Stakeholder Engagement Plan (CSEP) which details procedures and processes for community notification, consultation, and complaints management
- Construction Soil and Water Management Plan (CSWMP) in Appendix B8 of the CEMP, which identifies procedures for minimising erosion within the construction footprint
- Construction Contaminated Land Management Plan (CCLMP) in Appendix B3 of the CEMP, which identifies the measure to manage identified areas of contamination and potential Acid Sulfate Soils that may generate offensive odours and/or gases
- Construction Flora and Fauna Management Plan (CFFMP) in Appendix B2 of the CEMP, which identifies the management measures to minimise impacts to flora and fauna, including impacts from dust and emissions
- Construction Waste and Resources Management Plan (CWRMP) in Appendix B5 of the CEMP, which identifies the appropriate storage, handling, treatment, reuse, recycling and/or disposal of construction waste material, that may generate offensive odours and/or gases
- The Sustainability Strategy sets out a framework covering energy management, workforce travel, resource use and procurement to minimise and manage greenhouse gas (GHG) emissions.

## 1.5 Consultation

### 1.5.1 Consultation for Preparation of the CAQMP

TfNSW consulted with government agencies and stakeholders during the development of the Overarching CEMP which included an overarching CAQMP. This included;

- Penrith City Council (PCC)
- Liverpool City Council (LCC)
- Fairfield City Council (FCC).

This CAQMP has been written in accordance with the TfNSW overarching CAQMP and no external consultation was required for its development.

### 1.5.2 Ongoing Consultation during Construction

Ongoing consultation between TfNSW, CPBGG JV, stakeholders, and community and relevant agencies regarding the management of impacts on air quality will be undertaken during the construction of the Project as required. The process for the consultation will be documented in the Overarching Communication Strategy (OCS) and Community and Stakeholder Engagement Plan (CSEP).

## 2 Purpose and Objectives

### 2.1 Purpose

The purpose of this CAQMP is to describe how potential air quality impacts will be managed during construction of the Project.

### 2.2 Objectives

The key objective of this CAQMP is to ensure that air quality impacts to the local community and the built environment from construction of the Project are minimised.

- The Environmental Assessment Documentation prepared for M12 Motorway
- NSW CoA granted to the project on 23 April 2021
- TfNSW Specifications
- All relevant legislation and other requirements described in Section 3.1 of this Plan
- Environmental Protection Licence (EPL 21595)

### 2.3 Targets

CPBGG JV are committed to ensuring the responsible management of air quality during construction. Targets for the management of air quality impacts during the Project include:

- Full compliance with the relevant legislative requirements, CoA and REMMs
- Implementation of feasible and reasonable air quality mitigation measures
- Minimising impacts on, and complaints from, the community and stakeholders
- Minimise and manage potential air quality / dust impacts from the construction of the Project
- Control dust and exhaust emissions of plant and equipment from construction activities
- Minimise adverse impacts on existing air quality
- Ensure training on best practice air quality management is provided to all construction personnel through site inductions
- Aim to achieve compliance of mobile non-road diesel plant and equipment with the relevant United States Environmental Protection Agency, European Union (EU) standards or approved equivalent emission standards

## 3 Environmental Requirements

### 3.1 Relevant Legislation and Guidelines

#### 3.1.1 Legislation

All legislation relevant to this Plan is included in Appendix A1 of the CEMP. Legislation and regulations considered relevant to air quality management during development of this Plan includes:

- *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*
- *Protection of the Environment Operations (General) Regulation 2009*, Part 5.4 Air pollution
- *National Greenhouse and Energy Reporting Act 2007* (NGER Act).

#### 3.1.2 Additional Approvals, Licences, Permits and Requirements

Relevant provisions of the above legislation are identified in the register of legal requirements included in Appendix A1 of the CEMP.

#### 3.1.3 Guidelines and Standards

The main guidelines, specifications, and policy documents relevant to this CAQMP, including the Construction Air Quality Monitoring Program provided in Appendix A, include:

- National Environment Protection Measure for Ambient Air Quality (AAQ NEPM) National Environment Protection Council (NEPC, 2016) National Environment Protection Measure
- for Air Toxics (Air Toxics NEPM) (NEPC, 2011) Australian Standard AS 3580.1.1-2007 Methods of Sampling Analysis of Ambient Air. Part 1.1 Guide to Siting Air Monitoring Equipment
- Australian Standard AS 3580.10.1-2016 Methods of Sampling Analysis of Ambient Air. Determination of Particulate Matter – Deposited Matter - Gravimetric Method
- *Approved Methods for Modelling and Assessment of Air Pollutants in NSW* (NSW EPA, 2017)
- *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (Department of Environment and Conservation (DEC, 2005)
- *Air Emissions Inventory for the Greater Metropolitan Region in New South Wales* (EPA, 2012)
- *Guidance on the assessment of dust from demolition and construction Version 1.1* (UK IAQM, 2014)
- *Air Quality Monitoring in the Vicinity of Demolition and Construction Sites* (UK IAQM, 2018)
- *Technical Framework: Assessment and management of odour from stationary sources in NSW* (DEC, 2006)
- *Managing Urban Stormwater: Soils and Construction, Volume 1* (Landcom, 2004) and *Volume 2* (Department of Environment and Climate Change (DECC), 2008) (the “Blue Book”)
- *Air Quality Monitoring Criteria for Deposited Dust* (DEC Guideline)
- *Government Resource Efficiency Policy* (NSW Office of Environment and Heritage (OEH), 2014)
- *Environmental Sustainability Strategy 2019-2023* (Roads and Maritime, 2019).

## 3.2 Minister's Conditions of Approval

The primary NSW CoA relevant to the development of this Plan are listed in Table 3-1 below. A cross reference is also included to indicate where the condition is addressed in this Plan or other project management documents.

Table 3-1: Primary NSW CoAs

CoA No.	Condition Requirements	Document Reference
C4	The following CEMP Sub-plans must be prepared in consultation with the relevant government and other agencies identified for each CEMP Sub-plan. Details of all information requested by an agency during consultation must be provided to the Planning Secretary as part of any submission of the relevant CEMP Sub-plan, including copies of all correspondence from those agencies as required by Condition A5. (g) Air Quality and Odour - Relevant Council(s)	Section 1.5.1
C5	The CEMP Sub-plans must state how:	
	a) The environmental performance outcomes identified in the documents listed in Condition A1 will be achieved	Section 1.5
	b) The mitigation measures identified in the documents listed in Condition A1 will be implemented	Section 7
	c) The relevant terms of this approval will be complied with	Section 3.1
	d) Issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed through SMART (Specific, Measurable, Achievable, Realistic and Timely) principles.	Section 6
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.	Section 7



### 3.3 Revised Environmental Management Measures

The primary REMMs relevant to the development of this Plan are listed in Table 3-2 below. A cross reference is also included to indicate where the REMM is addressed in this Plan or other Project documents.

Table 3-2: Primary REMMs

ID	Measure/Requirement	Timing	CAQMP Reference
AQ01	A Construction Air Quality Management Plan (CAQMP) will be developed and implemented for the project to manage potential air quality impacts associated with construction. The CAQMP will identify activities that may results in air quality impacts and associated mitigation measures to avoid or minimise these impacts. The CAQMP will provide:	Prior to and during construction	This Sub-plan
	<ul style="list-style-type: none"><li>Measures to minimise dust generation associated with earthworks and other activities that disturb the ground surface, stockpiles, and haulage routes</li></ul>		Section 7 Table 7-1
	<ul style="list-style-type: none"><li>Measures to minimise emissions from machinery and vehicles associated with the project</li></ul>		Section 7 Table 7-1
	<ul style="list-style-type: none"><li>Procedures for inspection, monitoring and addressing any impacts where required.</li></ul> The CAQMP will be implemented for the duration of construction.		Section 8.5.1 Appendix A – Construction Air Quality Monitoring Program

### 3.4 Environmental Protection Licence

The Project is subject to an Environmental Protection Licence (EPL) for scheduled activities for road construction. The EPL (#21595) prescribes air quality management requirements that must be complied with, these requirements will be managed by the construction monitoring program.

The EPL conditions relevant to the management of air quality are provided in Table 3-3.

The EPL also prescribes requirements for complaints handling, reporting and record keeping. These requirements will be implemented in accordance with the incident and complaints reporting requirements outlined in Section 3.7 of the CEMP.

Table 3-3: EPL requirements relevant to the management of air quality

Ref	Relevant Requirements	Document Reference
<b>L6</b>	<b>Potentially offensive odour</b>	
L6.1	No condition of this licence identifies a potentially offensive odour for the purposes of section 129 of the <i>Protection of the Environment Operations Act 1997</i> . Note: Section 129 of the <i>Protection of the Environment Operations Act 1997</i> , provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.	Section 7 Appendix A – Construction Air Quality Monitoring Program
<b>O2</b>	<b>Maintenance of plant and equipment</b>	
O2.1	All plant and equipment installed at the premises or used in connection with the licensed activity: a) must be maintained in a proper and efficient condition; and b) must be operated in a proper and efficient manner.	Section 7
<b>O3</b>	<b>Dust</b>	
O3.1	All activities occurring at the premises must be carried out in a manner that will prevent the generation and minimise the emission of air pollution from the premises as much as is reasonably practicable.	Section 7
O3.2	The premises must be maintained in a condition which prevents the generation and minimises the emission of air pollution from the premises as much as is reasonably practicable	Section 7
O3.3	The licensee must implement all reasonable and feasible measures to demonstrate compliance with condition O 3.1 and O 3.2.	Section 7
O3.4	Trucks entering and leaving the premises that are carrying loads must be covered at all times, except during loading and unloading.	Section 7
<b>O4</b>	<b>Processes and Management</b>	
O4.8	The licensee must ensure: a) all vehicular access points to the premises are designed, constructed, maintained, and stabilised to minimise vehicles tracking materials onto public roads and roads outside the premises as much as is reasonable and feasible; b) vehicle, motorised plant, and equipment movements onto or off the premises minimise the deposition of any material onto the surface of roads outside of the premises; c) mud, splatter, dust, and other material likely to fall from or be cast off the wheels, underside or body of any vehicle, trailer, motorised plant and equipment leaving the premises, is removed to the greatest extent practicable before it leaves the premises; and d) road surfaces subject to any tracking of material by vehicles leaving the premises must be cleaned as required to ensure compliance with a) and b) of this condition and condition L1.1 of this licence.	Section 7
<b>M5</b>	<b>Weather Monitoring</b>	



Ref	Relevant Requirements	Document Reference
M5.1	<p>The licensee must monitor and record temperature, humidity, wind direction, wind velocity and rainfall at either the project weather station, or through analysis of equivalent weather information obtained from the Australian Bureau of Meteorology. Monitoring must:</p> <ul style="list-style-type: none"> <li>a) be representative of each catchment area;</li> <li>b) commence prior to any works that may cause sediment to leave the premises; and</li> <li>c) continue to be operated until soil disturbance activities cease at the premises and the site has been stabilised.</li> </ul> <p>Note: The rainfall monitoring data collected in compliance with this condition can be used to determine compliance with condition L2.5.</p>	Appendix A – Construction Air Quality Monitoring Program
<b>M6</b>	<b>Recording of Pollution Complaints</b>	
M6.1	The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies	Section 8.3
M6.2	<p>The record must include details of the following:</p> <ul style="list-style-type: none"> <li>a) the date and time of the complaint;</li> <li>b) the method by which the complaint was made;</li> <li>c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;</li> <li>d) the nature of the complaint;</li> <li>e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and</li> <li>f) if no action was taken by the licensee, the reasons why no action was taken.</li> </ul>	Section 8.3
M6.3	The record of a complaint must be kept for at least 4 years after the complaint was made.	Section 8.3
M6.4	The record must be produced to any authorised officer of the EPA who asks to see them.	Section 8.3
<b>M7</b>	<b>Telephone Complaints Line</b>	
M7.1	The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.	OCS CSEP
M7.2	The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.	OCS CSEP
M8	Other monitoring and recording conditions	
M8.1	<p>The licensee must undertake monitoring, sampling, video recording and/or take photographs:</p> <ul style="list-style-type: none"> <li>a) if the EPA or licensee reasonably suspects that an event has occurred at the premises or in connection with the carrying out of the activities that has caused, is causing, is likely to cause or has the potential to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies);</li> <li>b) as soon as practicable; and</li> <li>c) as directed by an authorised officer.</li> </ul>	Section 8.6
<b>R4</b>	<b>Other Reporting Conditions</b>	
R4.1	<p>Daily Complaints Reports</p> <ul style="list-style-type: none"> <li>a) The licensee must submit by 2:00 pm each business day a report to the EPA that provides details of all complaints received in relation to activities regulated by this licence on the telephone complaints line required by Condition M7.1, or through any other means.</li> <li>b) The report must be provided in a format approved in writing by the EPA.</li> </ul>	Section 8.3



Ref	Relevant Requirements	Document Reference
	<p>c) If the works that are the subject of complaint have been carried out under Conditions L5.2, L5.3 or L5.4 the report must include details of how the requirements of these conditions have been met.</p> <p>d) The licensee is not required to submit a report:</p> <ul style="list-style-type: none"><li>i. for any reporting period during which no complaints have been received;</li><li>ii. that would otherwise be required to be submitted on a Saturday, Sunday or public holiday. It must instead be submitted not later than 2:00pm on the next business day.</li></ul>	

### 3.5 TfNSW Specifications

The TfNSW Specifications set out the minimum requirements for the detailed outcomes in terms of quality or performance expected in the finished product for construction projects and are relevant to various construction activities on work sites to minimise impacts to the environment.

The relevant TfNSW Specifications for development of this CAQMP are:

- G36 – Environmental Protection
- G38 – Soil and Water Management (Soil and Water Management Plan)
- R272 – Automatic Weather Stations.

The specifications set out environmental protection requirements, including Hold Points, that must be complied with by the CPBGG JV during construction of the Project. A Hold Point is a point beyond which a work process must not proceed without express written authorisation from TfNSW. The Hold Points that relate to environmental management are detailed in Table 3-6 of the CEMP.

## 4 Air Quality Criteria

Air quality criteria are used to assess the potential for ambient air quality to give rise to adverse health or nuisance effects.

### 4.1 Particulate Matter

The Approved Methods provides air quality criteria based on several pollutant criteria and averaging periods from multiple sources, including the NEPM-AAQ (1998) and NERDDC (1988).

Table 4-1 details the air quality criteria for particulate matter. Compliance criteria is related to a maximum 24-hour and annual average of PM<sub>10</sub> and PM<sub>2.5</sub> concentrations exceeding the microgram per cubic metre criterion. This is based on the maximum background concentration and the 100th percentile to obtain the total impact average over 24 hours.

Management criteria is based on the UK IAQM Air Quality Monitoring in the Vicinity of Demolition and Construction Sites (2018) used as a basis prior to conducting monitoring during construction. The 1-hour 'short-term' period has been adapted from the IAQM (2018) and although arbitrarily derived significantly greater concentrations than longer term (e.g., 24-hour average) air quality compliance criteria, it provides a reference point upon which CPBGG JV must act immediately to minimise dust emissions. Should the '1-hour' trigger level be breached, it is generally considered that the 24-hour compliance criterion is also likely to be breached.

If any of the variables are observed, the dust control measures will be reviewed and amended by the ESR where required in consultation with TfNSW. Adaptive management is described in Section 6 of the Air Quality Monitoring Program.

Table 4-1: Air quality criteria for particulate matter

Pollutant	Averaging time	Compliance Criteria	Management Criteria	Source
Particulate matter (PM <sub>10</sub> )	Annual	25 ug/m <sup>3</sup>	N/A	NSW EPA, 2017
	24 hours	50 ug/m <sup>3</sup>	38 ug/m <sup>3</sup>	NSW EPA, 2017 NEPM-AAQ, 1998
	1 hour (short term) <sup>a</sup>	N/A	190 ug/m <sup>3</sup>	IAQM, 2018
Particulate matter (PM <sub>2.5</sub> )	Annual	8 ug/m <sup>3</sup>	N/A	NSW EPA, 2017
	24 hours	25 ug/m <sup>3</sup>	21 ug/m <sup>3</sup>	NSW EPA, 2017 NEPM-AAQ, 1998
	1 hour (short term) <sup>a</sup>	N/A	190 ug/m <sup>3</sup>	IAQM, 2018

Source: Adapted from Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DECCW, 2005)

Notes:

a. Trigger level over 1-hour ('short-term') period (IAQM, 2018)

#### 4.1.1 Real time particulate monitoring

Real time digital particulate monitoring equipment, SiteHive, is installed by a suitability qualified person, with relevant air quality monitoring experience.

SiteHive equipment:

- Use a light-scattering laser photometer to log real-time aerosol mass fraction concentrations for PM<sub>2.5</sub> and PM<sub>10</sub>
- Issue an alert when the short-term 1-hr average concentration Trigger level is exceeded via alarm, email or SMS.

Real time monitoring trigger levels are generally determined on a case-by-case basis as there are variables that can affect the relationship between the dust levels measured within the site and the resulting dust levels occurring off-site including;

- Distance between the monitoring location and sensitive receivers
- Intensity, duration and frequency of dust generating activities
- Background dust levels
- Direction of the prevailing winds in relation to sensitive receivers
- Other environmental factors, including heavy fog.

The trigger levels for real time monitoring are arbitrary figures with consideration for the above factors and are generally significantly greater concentrations than longer term (e.g., 24-hour average) air quality compliance criteria. The site PM10 and PM2.5 trigger level is set at 190 µg/m3 (one-hour average) (based on IAQM 2018). See Table 4-1 for air quality criteria for particulate matter.

The trigger level will be reviewed if:

- Complaints are received and verified
- Dust is observed to be leaving site risking the amenity of the surrounding environment
- Other dust monitoring methods indicate frequent exceedances of the relevant Project criteria attributable to the Project.

If any of the variables are observed, the dust control measures will be reviewed and amended by the CPBGG JV where required.

#### 4.1.2 Site selection and positioning

The siting of monitors considers the below criteria:

- Positioning in accordance with AS 3580.1.1:2016: Methods of Sampling and Analysis of Ambient Air, Part 1.1: Guide to Siting Air Monitoring Equipment
- Proximity to ancillary facilities and stockpile locations
- Proximity to sensitive receivers and location of threatened species or endangered ecological communities (EECs). However, if feasible, will be located in low or sparsely built-up areas
- Typical wind direction
- Avoiding locations where:
  - Airflow is restricted, including behind trees or structures, with a minimum clear sky angle of 120° required
  - Objects might alter the pollution concentration by adsorption or absorption, such as leafy vegetation and some building materials
  - Chemical interference may interfere with dust monitoring, such as near vehicle or plant emissions or other unrelated local emissions
  - Physical interference may produce atypical results or where electrical interference to sampling equipment could occur from nearby high voltage power lines
- Monitoring sites, to the extent possible, are located where:
  - There is a low potential for vandalism
  - There is adequate access for transporting equipment
  - Personnel can perform their activities in a safe environment
  - The priority for siting of monitors will be on TfNSW or publicly owned land first, then private land second. If monitors are located on private property, permission must be granted by the landowner to locate the monitor on their property, to access a power supply (if required) and to access the monitors for maintenance, calibration etc.
  - Access to a power source (if necessary)

The location of the air monitoring is included in the Sensitive Area Plans (CEMP Appendix A6). The locations of the air monitoring may change throughout the construction based on changes to the factors used for site selection detailed above.

#### 4.1.3 Calibration

SiteHive Hexanode monitors are used on the Project for real time measurements. These monitors use the Alphasense R2 Optical Particle Sensor to provide real-time dust measurements. Calibration occurs in accordance with the manufacturer's specification and all calibration certificates will be provided to TfNSW when requested. Calibration will be tracked on the project instrument calibration register.

### 4.2 Mobile Non-Road Diesel Plant and Equipment Emissions

The CPBGG JV will identify the relevant United States Environmental Protection Agency, EU standards or approved equivalent emission standards for mobile non-road diesel plant and equipment, in accordance with the requirements of TfNSW QA G36 Specification. All Mobile Non-Road Diesel Plant and Equipment plant will be recorded in the GREP "Clean Air data management tool" with the relevant emission standard. The types of diesel plant and equipment that are to be included, or excluded, from the report are detailed in <http://www.rms.nsw.gov.au/documents/about/environment/grep-clean-air-data-management-tool.xlsm>. A GREP report will be provided to TfNSW at the end of each financial year during the project. It will be provided;

- Before 31 July, for the reporting period ending 30 June for the previous 12 months
- At Actual Completion Date, for the final reporting period.

Strategies for the reduction in energy use are outlined in section 4.2 of the Sustainability Management Plan.

## 5 Existing Environment

This section summarises the existing air quality conditions within and adjacent to the Project corridor, based on information contained in the Environmental Assessment Documentation. The information provided below comprises the baseline data used for the Construction Air Quality Monitoring Program (Appendix A). As referenced in the Amendment Report, it is considered that the baseline data obtained during the EIS is sufficiently comprehensive and that no further baseline data will be required to be collected.

### 5.1 Surrounding Receivers

The Project is situated within two (2) local government areas (LGAs); Penrith to the north, and Liverpool to the south. The West stage of the M12 Project will traverse the suburbs Badgerys Creek and Luddenham.

Generally, existing land uses near the Project are characterised by large rural and grazing properties towards Luddenham to the west, transitioning to a mix of intensive agriculture (horticulture and animal production) and resources at Kemps Creek to the east.

The site of the WSIA at Badgerys Creek is located to the south of Elizabeth Drive on land that was previously used for agricultural (grazing) purposes, however, ongoing staged works for WSIA have now progressed. Sensitive receivers (locations where sensitive land uses take place, including residences, schools, and hospitals) near the Project are shown in Figure 5-1, noting the West section is outlined in green.

The locations of the sensitive receivers are also shown on the Sensitive Area Plans (SAPs) in Appendix A6 of the CEMP.

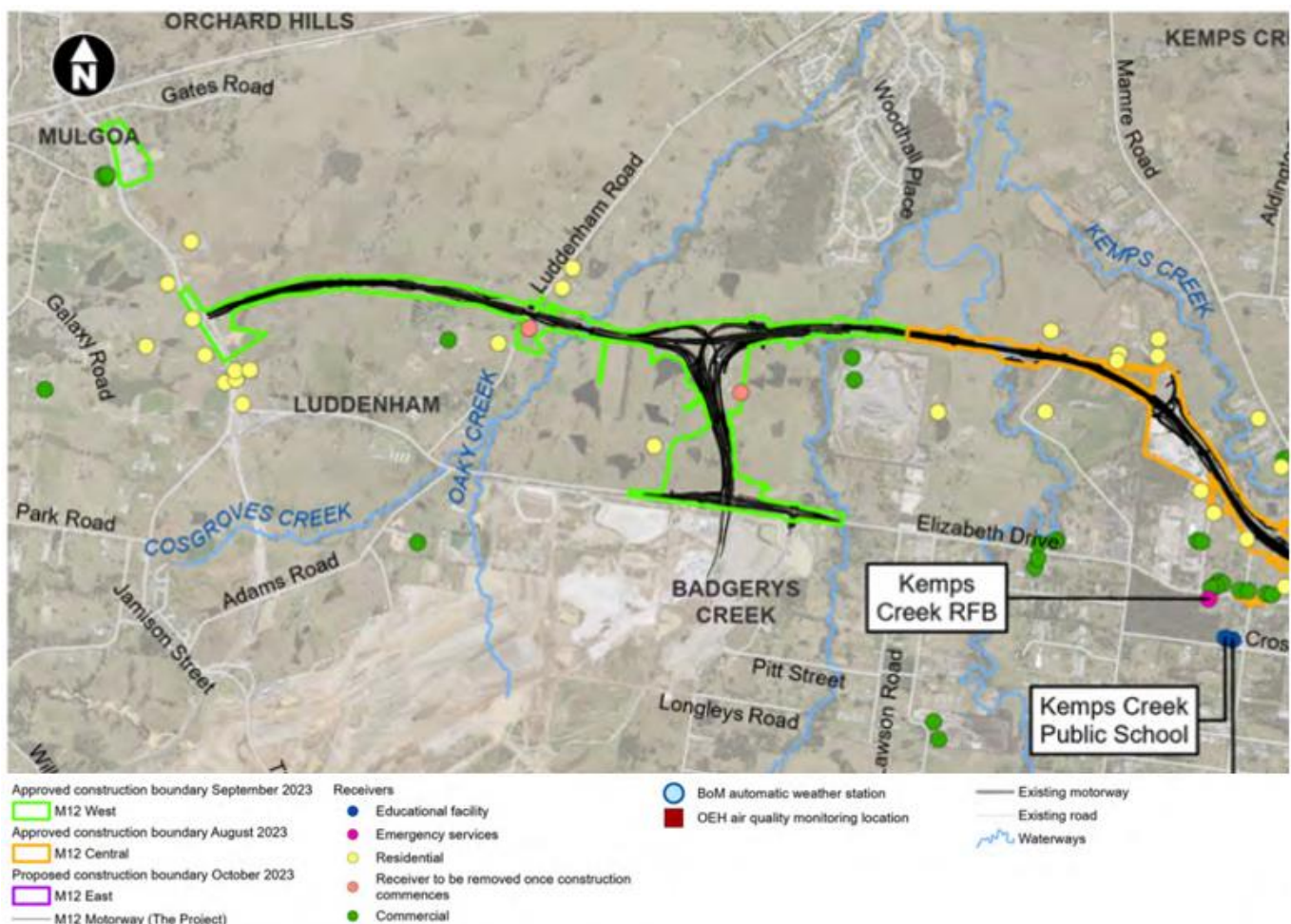


Figure 5-1: Surrounding sensitive receivers (Source: Overarching CAQMP)

## 5.2 Local Air Quality

The NSW Department of Planning and Environment (DPE, now DPHI) has developed a metric known as the 'Air Quality Index' (AQI). The AQI provides an indication of overall air quality by considering pollutant data measurements for ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), sulphur dioxide (SO<sub>2</sub>) and PM<sub>10</sub>, as well as visibility against criteria presented in the Variation to the National Environment Protection (Ambient Air Quality) Measure (NEPM) and relevant NSW standard for visibility. NSW DCCEEW operates a state-wide air quality monitoring network which provides information on current and historical air quality. The nearest NSW DCCEEW air quality monitoring stations (AQMS) to the Project are:

- Bringelly (approximately 4 km to the south)
- Liverpool (approximately 9 km to the south-east).

The approved methods (NSW EPA, 2016 and DEC, 2006) contain criteria for assessing whether potential changes in air quality conditions predicted as a result of a project would result in an unacceptable level of impacts. The criteria presented Table 5-1 were used to determine the significance of the Project's effect on air quality during operations.

Table 5-1: Air quality criteria for other pollutants (EPA, 2016)

Pollutant	Averaging time	Concentration	Criterion application location
Solid particles (as PM <sub>10</sub> )	24-hour	50 µg/m <sup>3</sup>	Nearest existing or likely future offsite sensitive receptors
	Annual	25 µg/m <sup>3</sup>	
Solid particles (as PM <sub>2.5</sub> )	24-hour	25 µg/m <sup>3</sup>	
	Annual	8 µg/m <sup>3</sup>	
Nitrogen dioxide (NO <sub>2</sub> )	1 hour	246 µg/m <sup>3</sup>	Nearest existing or likely future offsite sensitive receptors
	Annual	62 µg/m <sup>3</sup>	
Carbon monoxide (CO)	15 minutes	100 mg/m <sup>3</sup>	
	1 hour	30 mg/m <sup>3</sup>	
	8 hours	10 mg/m <sup>3</sup>	
Benzene	1 hour	29 µg/m <sup>3</sup>	At and beyond the site boundary

### 5.2.1 PM<sub>10</sub>

Monitoring of these pollutants between 2014 and 2018 at both Bringelly and Liverpool AQMS indicate that the maximum 24-hour average PM<sub>10</sub> concentrations occasionally exceeded the 50 µg/m<sup>3</sup> criterion (Table 5 1). The 95<sup>th</sup> per centile values (the value exceeded 5% of the time) were about 88% of the criterion or less.

Annually averaged PM<sub>10</sub> concentrations were found to vary between the two stations with the highest value of 24 µg/m<sup>3</sup> recorded at the Liverpool station in 2018. This is still below the 25 µg/m<sup>3</sup> impact assessment criterion. Values were found to typically range between 16 and 21 µg/m<sup>3</sup>.

### 5.2.2 PM<sub>2.5</sub>

Maximum 24-hour averaged PM<sub>2.5</sub> concentrations exhibited the same trend as PM<sub>10</sub>, with the 25 µg/m<sup>3</sup> assessment criterion occasionally being exceeded, but with the 95<sup>th</sup> percentile values well below.

Annually averaged PM<sub>2.5</sub> concentrations were always in exceedance of the 8 µg/m<sup>3</sup> criterion at Liverpool AQMS but were at or below this limit at the Bringelly AQMS, for all years between 2014 and 2018.

### 5.2.3 Adopted background concentrations

Background concentrations were established for the receiving environment for construction of the Project, based on the monitoring data collected by the Bringelly and Liverpool AQMS. The background values adopted are presented in Table 8-17 of the EIS and reproduced in Table 5-2.

Table 5-2: Adopted background concentrations

Pollutant	Averaging time	Adopted background concentration	Justification
PM <sub>10</sub>	24-hour	38 µg/m <sup>3</sup>	Highest 2014 to 2018 95 <sup>th</sup> percentile 24-hour averaged value recorded at Bringelly
	Annual	21 µg/m <sup>3</sup>	Maximum 2014 to 2018 value recorded at Bringelly
PM <sub>2.5</sub>	24-hour	15 µg/m <sup>3</sup>	Highest 2014 to 2018 95 <sup>th</sup> percentile 24-hour averaged value recorded at Bringelly
	Annual	8.0 µg/m <sup>3</sup>	Maximum 2014 to 2018 value recorded at Bringelly
NO <sub>2</sub>	1-hour	74 µg/m <sup>3</sup>	Maximum 2014 to 2018 value recorded at Bringelly
	Annual	12 µg/m <sup>3</sup>	Maximum 2014 to 2018 value recorded at Bringelly
CO	1-hour	3 mg/m <sup>3</sup>	Maximum 2014 to 2018 value recorded at Liverpool
	8-hour	2 mg/m <sup>3</sup>	Maximum 2014 to 2018 value recorded at Liverpool

### 5.3 Climatic Conditions

Long term mean climate data recorded at the Bureau of Meteorology (BoM) Badgerys Creek automatic weather station (AWS) (BoM station no. 067108) has been adopted to represent the climatic conditions at the Project. An average of key monthly climate data statistics from the Badgerys Creek AWS for the period 2014-2018 is provided in

Table 5-3.



Table 5-3: Monthly climate data (Badgerys Creek AWS)

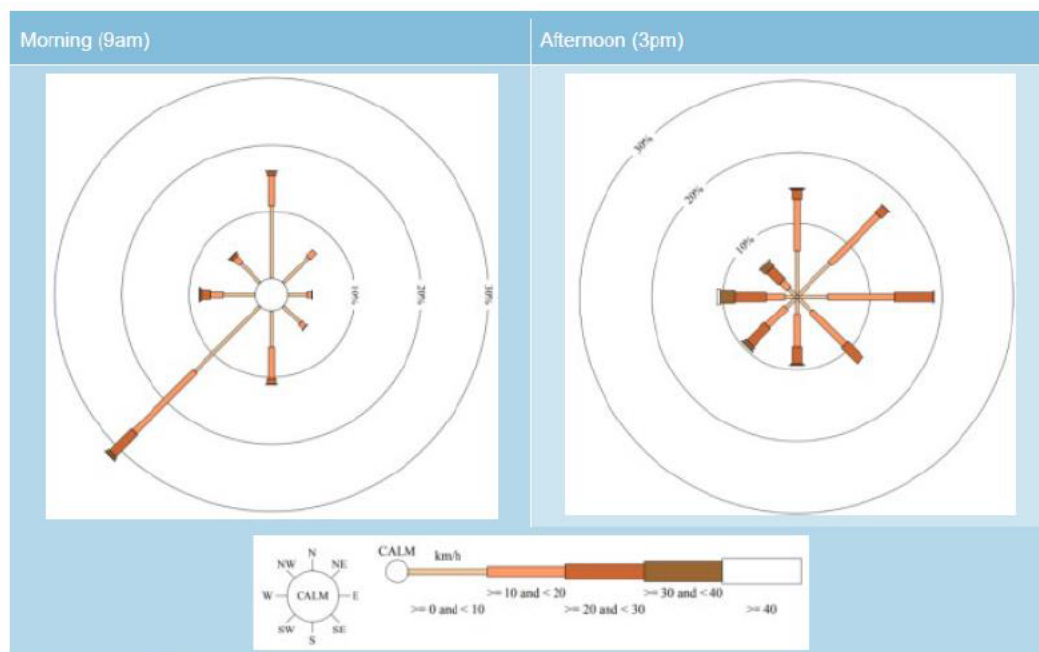
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mean max. temperature (°C)	30.1	28.1	26.9	24.1	20.8	17.8	17.4	19.2	22.6	24.9	26.4	28.5
Mean min. temperature (°C)	17.1	17.1	15.3	11.5	7.7	5.6	4.1	4.7	7.7	10.4	13.5	15.5
Mean rainfall (mm)	79.4	98.5	81.3	49.4	37.0	61.8	23.6	36.8	32.3	51.4	69.0	57.1
Mean number of rain days (>1 mm)	7.0	7.3	7.4	5.7	3.8	5.6	3.9	3.5	4.6	5.5	6.9	6.6

In general, the Project site experiences warm and wet summers (December to February) with mean daily maximum temperatures between 28 and 30°C. Early spring is the driest season, with average monthly rainfall from July to September around 31 mm per month. The average annual rainfall is 680.9 mm over an average of 67.8 rain days per year.

Climatic factors such as prolonged dry weather, combined with high winds and high evaporation, can increase the likelihood of dust particulate emissions. Local wind conditions, including speed and direction, can affect which receivers are most likely to be affected by dust emissions.

Meteorological data collected at Badgerys Creek AWS from 2014 to 2018 identified that average wind speeds are lowest during nighttime and early morning periods, increasing to around 2 m/s at 9 am and further increasing to nearly 4 m/s at 4 pm, before decreasing back below 2 m/s at 9 pm. Winds blowing from the south-west and north are most common in the morning. Winds blowing from the north through to the south-east are prevalent in the afternoons. This indicates that receivers to the north-east and south of Project will be most likely to experience winds blowing from the direction of the Project during mornings; and receivers orientated to the south through to the north-west in the afternoons.

Figure 5-2 shows the long-term morning and afternoon wind conditions as presented in Section 8.2.3 of the EIS.



Source: BoM, 2018b

Figure 5-2: Long-term morning and afternoon wind conditions (Badgerys Creek AWS)

## 6 Construction Impacts on Air Quality

The CEMP describes the risk management approach used for the project to determine the severity and likelihood of an activity's impact on the environment and to prioritise its significance.

The EIS evaluated impacts to air quality at surrounding receivers as a result of the operation of the proposed upgrade by quantitative modelling, using the Roads and Maritime Tool for Roadside Air Quality (TRAQ) screen level dispersion model. Predictions from this assessment concluded that the Project would not lead to unacceptable air quality impacts, nor was there a need for more detailed assessments. The assessment also concluded that with the application of appropriate safeguards, it is anticipated that air quality impacts from the Project during construction would be effectively managed.

### 6.1 Construction Activities

Construction activities that generate dust and particulates represent the primary air quality-related risk during construction. Key construction activities associated with the Project that could result in dust emissions include:

- Earthworks, particularly during site establishment
- Installation of construction signage and environmental controls
- Geotechnical and soil investigations
- Establishment and operation of ancillary facilities and compounds
- Demolition activities
- Vegetation clearing and grubbing
- Excavation
- Pavement construction
- Preparation of road subgrade and grade
- Landscaping and finishing works
- Bridge preparation and installation
- Spray painting of the road for line marking
- Drainage works
- Operation of concrete / asphalt batching plant / pug mill
- Topsoil / material handling including stripping, stockpiling, material loading and material haulage
- Vehicular movements over unpaved surface (including unsealed access roads)
- Temporary stockpiling which may result in wind erosion of exposed areas.

The settlement of dust may cause nuisance to sensitive receivers located near the Project, and excessive dust generation could result in health impacts to nearby receivers, particularly if over a prolonged period.

Other potential air quality risks include exhaust emissions from construction plant and equipment, odour, and airborne hazardous materials. Emissions other than dust which may be generated by construction activities include:

- Vehicle and plant exhaust emissions, which may be excessive if vehicles and plant are poorly maintained
- Odours / gases released during:
  - Excavations of organic or contaminated materials
  - During sealing works
  - Operation of concrete / asphalt batching plant / pugmill
  - Road line marking.

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

## 6.2 Factors likely to affect dust generation

In addition to the inherent risks of specific construction activities creating the potential to generate dust, a number of other environmental 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 or dust erosion potential
- Rainfall or dew – rainfall or heavy dew that wets the surface of the soil and reduces the risk of dust generation
- Evaporation – dries out the surface of the soil and leads to increased risk of dust generation
- Exposed surfaces – during construction non-vegetated surfaces will be exposed prior to revegetation, which is a key factor influencing dust emissions.

## 6.3 Nature of air quality impacts

Construction activities listed in Section 6.1 have the potential to increase airborne particulate matter and cause nuisance impacts where construction is in close proximity to sensitive receivers. Potential impacts to air quality that may arise during construction include:

- Temporarily increased air emissions from dust and products of combustion (from equipment operations)
- Temporarily increased windborne dust emanating from disturbed/exposed surfaces
- Increased dust and debris arising from haulage of materials during construction
- Odours arising from uncovered contaminated and/or hazardous materials
- Deposition of dust on surfaces where it may cause damage and/or lead to a need for increased cleaning or repair
- Aesthetic effects that arise from visible airborne dust plumes and from deposits of dust on surfaces
- Need for increased maintenance of air filtering systems (e.g. air conditioners etc.)
- Potential adverse health effects including eye, nose and throat irritation from excessive inhalation of fine particles
- Impacts on water quality and/or vegetation health from dust deposition
- Impacts on residential sensitive receivers, including impacts on living areas, swimming pools and general amenities
- Dust deposition impacts on sensitive agricultural receivers
- Complaints from the public relating to dust or odours.

## 6.4 Ecological impacts

The IAQM risk assessment detailed in the EIS concluded that ecological sensitivity was determined to be high for the Project due to the presence of protected ecological habitat areas within 20 metres of the construction footprint.

Construction activities listed in Section 6.1 have the potential to increase airborne particulate matter and cause direct and indirect impacts to biodiversity located within and near the construction boundary, including:

- Dust deposition on plant foliage during construction
- Accidental release of contaminants into the environment that may potentially affect biodiversity
- Impacts on water quality and/or vegetation health from dust deposition.

## 6.5 Cumulative impacts

The concurrent construction of various projects within the vicinity of the M12 West Project gives rise to the potential of cumulative air quality impacts, however it is noted that the scale of impact is dependent upon timing, location, and type of construction activities. It is also considered that although there is the potential for cumulative local dust impacts during construction, that emissions from neighbouring projects (including dust, exhaust, odours, and airborne hazardous materials) will be effectively controlled so that the potential for cumulative impacts at receivers is limited.

Projects within the vicinity of the M12 West Project include, but is not limited to:

- M7 Widening
- M12 Central Project
- Western Sydney International Airport
- Sydney Metro – Western Sydney Airport The Northern Road upgrade
- Western Sydney Aerotropolis
- Other potential road projects such as Elizabeth Drive upgrade, Mamre Road upgrade, and Outer Sydney Orbital
- Development land releases such as Southwest Growth Area and Western Sydney Employment Area.

Regular interface meetings will be undertaken with government authorities, neighbouring projects, and stakeholders as detailed in the CEMP and within the Overarching Communication Strategy (OCS) and Community and Stakeholder Engagement Plan (CSEP).

Air quality impacts as a result of dust generation are anticipated to be short-term and minor as they will be limited to the construction phase and will be minimised through the implementation of management measures identified in Section 7.

## 7 Environmental Control Measures

A range of environmental requirements and management measures are identified in the Environmental Assessment Documentation, the CoAs, REMMs and relevant TfNSW documents.

Specific measures and requirements to address impacts on air quality are outlined in Table 7-1.



Table 7-1: Air quality management and mitigation measures

ID	Management Measure	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
AQ1	<p>All employees, and sub-contractors will receive a Project induction prior to commencing work on site. The induction will include:</p> <ul style="list-style-type: none"> <li>Requirements of this CAQMP</li> <li>Relevant legislation and guidelines</li> <li>Location of sensitive receivers</li> <li>Complaints reporting and recording</li> <li>How to implement air quality management measures</li> <li>Specific responsibilities to minimise air quality impacts on the community associated with construction activities.</li> </ul>	During construction	ESR	REMM AQ01	Induction records
AQ2	<p>Dust generation will be minimised during construction where possible. Where practicable, specific measures will include (but not be limited to):</p> <ul style="list-style-type: none"> <li>Regularly watering exposed and disturbed areas including stockpiles, especially during inclement weather conditions</li> <li>Adjusting the intensity of activities based on measured and observed dust levels, weather forecasts and the proximity of and direction of the works in relation to the nearest identified sensitive receivers</li> <li>The planning and undertaking of demolition activities, including the removal of hazardous building materials in a manner that minimises dust generation. This will also include the removal of hazardous building materials before the start of general demolition works.</li> <li>Erosion and sediment control structures will be checked regularly for build up of silt and other materials to ensure deposits do not become a dust source.</li> </ul>	During construction	ESR	REMM AQ02 G36 Good Practice	Air Quality Monitoring Reports Site inspections
AQ3	<p>Odorous materials identified on site will be excavated in a staged process. Exposed areas of odorous material will be kept to a minimum to reduce the total emissions from the site where feasible.</p>	During construction	ESR	REMM AQ03	Air Quality Monitoring Reports Site inspections
AQ4	<p>Dust generation of stockpiles will be minimised where possible including:</p> <ul style="list-style-type: none"> <li>Minimising the number of stockpiles and amount of material stockpiled where practicable</li> <li>Minimising the potential for mobilisation and transport of dust and sediment in runoff in accordance with TfNSW Stockpile Sites Management Guideline (Roads and Maritime, 2015).</li> </ul>	During construction	ESR	REMM SWH04 REMM AQ02	Air Quality Monitoring Reports Site inspections



ID	Management Measure	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
	<ul style="list-style-type: none"> <li>Covering, or otherwise protecting from erosion, stockpiles that will be in place for more than 20 days as well as any stockpiles that are susceptible to wind or water erosion, within 10 days of forming each stockpile</li> <li>Positioning stockpiling areas as far as possible from identified sensitive receivers, including potentially ecologically sensitive receivers</li> <li>Limiting stockpiling activities during conditions where winds are blowing strongly in the direction(s) from the stockpiling location to identified sensitive receivers</li> </ul>				
AQ5	This CAQMP will be implemented, updated as required and monitored for the duration of construction works to ensure the effectiveness of air mitigation controls.	Construction	Project Director / ESR	G36 clause 4.4	Section 2
AQ6	All activities occurring at the premises must be carried out in a manner that will prevent the generation and minimise the emission of air pollution from the premises as much as is reasonably practicable.	Construction	Project Director / ESR	G36 clause 4.4 EPL O3.1	CEMP
AQ7	Air quality control measures from this plan will be included in relevant Environmental Work Method Statements (EWMS) and/or Progressive Erosion and Sediment Control Plans (ESCP).	Pre-construction Construction	Project Director / Superintendent / ESR	OCAQMP	EWMS ESCP
AQ8	Consultation will be undertaken with surrounding residents and receivers in accordance with Community and Stakeholder Engagement Plan relating to air quality management measures implemented on the project. Consultation will also be undertaken with nearby developers to co-ordinate and plan activities where practicable to minimise the potential for cumulative dust-related impacts	Pre-construction Construction	Community and Stakeholder Relations Manager	REMM AQ02 G36 clause 4.4.1	Consultation Manager records
AQ9	Perimeter/boundary screening will be provided around all Site facilities/ancillary facilities to minimise dust, noise, and visual impacts	Construction	Project Director / Superintendent / ESR	G36 Clause 4.4.1	Site inspections
AQ10	Wheel-wash or rumble grid facilities will be installed at Site access points to limit the tracking of materials beyond the Site boundary and onto public roads.	Construction	Project Director / Superintendent / ESR	REMM AQ02 G36 Clause 4.4.1	ESCP Site inspections
AQ11	Manual cleaning will also be carried out where appropriate using brooms, bobcat attachments or street sweepers. In the event of any spillage or tracking of mud/dirt/material onto public roads. The material will be removed immediately, or as soon as reasonably practical after being identified, and measures (such as additional controls or restricting vehicle movements) implemented to prevent further tracking.	Construction	Project Director / Superintendent / ESR	G36 Clause 4.4.1	ESCP Site inspections
AQ12	Revegetating completed work progressively, maintaining and watering in accordance with TfNSW R178 and R179	Construction	Project Director / Superintendent / ESR	REMM AQ02 G36 Clause 4.4.1	Site inspections
AQ13	Processes for monitoring weather conditions and for monitoring the effectiveness of air quality mitigation measures during each shift. The frequency of visual monitoring should be commensurate to the risk of dust impacts dependant on activities and weather conditions	Pre-construction Construction	ESR	G36 Clause 4.4.1	Appendix A Site Inspections



ID	Management Measure	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
AQ14	A change management process to investigate, assess and improve management of air quality if changed circumstances require amended mitigation methods, or if monitoring, visual observations, inspections, or complaints indicate dust or odours are emanating from site or existing mitigation measures may not be effective	Construction	ESR	G36 Clause 4.4.1	EWMS Site Inspections Appendix A
AQ15	Non-potable water will be used for dust suppression where possible in preference to potable water supply.	Pre-construction Construction	Project Director / ESR	G36 Clause 4.4.1	EWMS Site Inspections
AQ16	Construction activities (including stockpiling activities) will be modified, reduced, or controlled during high or unfavourable wind conditions if they have a potential to increase off-site dust generation.	Construction	Superintendent / Supervisor	REMM AQ02 G36 Clause 4.4.1	EWMS Site Inspections
AQ17	Minimise the extent of disturbed and exposed surfaces	Construction	Superintendent / Supervisor	G36 Clause 4.4.1	EWMS Site inspections
AQ18	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.	Construction	Superintendent / Supervisor	G36 Clause 4.12	EWMS Site inspections
AQ19	There will be no burning of waste materials.	Construction	Superintendent / Supervisor	G36 Clause 4.5	EWMS Site inspections
AQ20	Truck speeds will be controlled, and truck movement's onsite restricted to designated roadways.	Construction	Superintendent / Foreman	G36 Clause 4.4.1	Vehicle Movement Plans Site inspections
AQ21	The intensity of activities shall be reviewed and/or adjusted based on measured dust levels, adverse weather forecasts, and the proximity of and direction of the works in relation to the nearest surrounding receivers.	Construction	Superintendent / Foreman	G36 Clause 4.4.1	Appendix A ESCP EWMS
AQ22	Vehicle loads involving loose materials will be covered when travelling to and from site.	Construction Demolition	Superintendent / Foreman	REMM AQ02	ESCP EWMS
AQ23	Control measures, such as compaction or stabilisation and watering will be implemented, to minimise dust from stockpile sites, work areas and exposed soils.	Construction	Superintendent / Foreman	G36 Clause 4.4.1	ESCP EWMS Site inspections
AQ24	Areas of disturbed material and access roads will be stabilised, where possible, by methods such as compaction. Compounds, ancillary facilities, administration access roads and standing areas will be hard surfaced and/or spray sealed.	Construction	Superintendent / Foreman	G36 Clause 4.4.1	ESCP EWMS Site inspections
AQ25	Control measures including water carts, sprinklers, sprays, dust screens or the application of geo-binding agents will be utilised, where applicable, to control dust	Construction	Superintendent / Foreman	REMM AQ02 G36 Clause 4.4.1	ESCP EWMS



ID	Management Measure	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
	emissions. The frequency of use will be modified accommodate prevailing conditions.				Site inspections
AQ26	Carrying out consultation, consistent with the Community and Stakeholder Engagement Plan, in relation to air quality and relevant incident management process during construction	Construction	ESR CLR	G36 Clause 4.4.1	Community and Stakeholder Engagement Plan
AQ27	Wherever possible, internal haulage routes shall be positioned away from surrounding receivers. Loaded haulage trucks will be covered at all times when using public roads and will be covered where there is a risk of release of dust or other materials when entering and leaving any project sites (except during location and unloading). Any loose materials/debris are removed before vehicles exit the site	Construction	Site Engineer / Foreman	G36 Clause 4.4.1 EPL O3.4 REMM AQ02	Vehicle Movement Plans
AQ28	Waste will be managed in terms of the waste hierarchy, segregated and collected on a regular basis to ensure odours associated with waste do not become an issue.	Construction	Site Engineer / Foreman	G36 Clause 4.11	CWRMP Site inspections
AQ29	Stockpiles will be located in accordance with the criteria established in the Stockpile Management Protocol - CSWMP Appendix A. A suitable cover crop, or provision of other covering, over topsoil stockpiles will be implemented where stockpiles prone to wind erosion are in place for longer than three (3) weeks. Stockpiles will be located away from sensitive receivers wherever possible. Wherever possible, the number and amount of material stockpiles on site will be minimised.	Construction	Site Engineer / Foreman	REMM AQ02 G36 Clause 4.4.1	EWMS Site inspections
AQ30	All new plant, equipment or machinery brought to the Construction sites will be inspected and verified to ensure that it is in good working order. Any plant, equipment or machinery will be immediately switched off should there be visible signs of smoke emissions emitting from equipment/machinery. Construction plant and equipment will be maintained to ensure exhaust emissions comply with applicable regulations (POEO Act). Emissions controls used on vehicles and construction equipment will comply with standards listed in Schedule 4 of the <i>Protection of the Environment Operations (Clean Air) Regulation 2010</i> .	Construction	Superintendent / Foreman	G36 Clause 4.3.1 Good practice	CEMP EWMS
AQ31	All construction plant and equipment will be maintained so they do not emit visible smoke for any period greater than: <ul style="list-style-type: none"> <li>15 consecutive seconds for plant not being registered for use on public roads; and</li> <li>10 consecutive seconds for plant registered for use on public roads.</li> </ul>	Construction	Superintendent / Foreman	Good Practice	EWMS Site inspections
AQ32	Plant will be operated in a proper and efficient manner including low speed operation on site to minimise dust from vehicle movements	Construction	Superintendent / Foreman	REMM GG01	Site inspections



ID	Management Measure	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
AQ33	Undertake routine inspections and maintenance to ensure that equipment is in good operating condition to reduce the potential for dust creation	Construction	Superintendent / Foreman	G36 Clause 4.3.1	CEMP EWMS Plant inspection forms Maintenance records
AQ34	Engines of plant will be switched off when not in operation to minimise GHG emissions and targets to reduce GHG emissions during construction will be included in the project's Sustainability Management Plan.	Construction	Foreman / Operators ESR	REMM GG01	Site inspections Sustainability Management Plan
AQ35	All items of plant used during proclaimed high fire danger periods that could discharge sparks must be fitted with spark arresters.	Construction	Superintendent / Foreman	G36 Clause 4.5	CEMP EWMS Plant inspections
AQ36	Do not undertake cutting, welding, grinding or other activities likely to generate fires in the open on days when a total fire ban is proclaimed. Relevant hot works permits will be compiled by the Contractor to ensure compliance with this requirement.	Construction	Superintendent / Foreman	G36 Clause 4.5	CEMP EWMS Site inspections
AQ37	When there is a risk of fire being caused by work such as welding, thermal or oxygen cutting, heating or other fire producing or spark producing operations are proposed, provide training to all personnel in fire prevention, fire safety and basic firefighting skills. All personnel and vehicles involved in such activities will be provided with firefighting equipment.	Construction	Superintendent / Foreman	G36 Clause 4.5	Hot Work Permit/Procedure

## 8 Compliance Management

### 8.1 Roles and responsibilities

The Project'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 7 of this Plan.

### 8.2 Communication

CPBGG JV will adhere to the requirements as outlined in the Overarching Communication Strategy (OCS). The OCS identifies opportunities and tools for providing information and consulting with the community and stakeholders during the construction of the Project. CPBGG JV will support the delivery of the OCS through implementation of CPBGG JV's Community and Stakeholder Engagement Plan (CSEP).

Air quality management information will be communicated to the community and stakeholders in accordance with the principles and procedures outlined in the OCS and CPBGG JV's CSEP. CPBGG JV will provide timely, accurate, relevant, and accessible information about construction activities that may impact upon air quality through letter box notifications and website project updates including the contact details for community feedback through a complaints line during construction.

Further detail about the OCS and CSEP are provided in Section 3.7 of the CEMP.

### 8.3 Complaints management

A Complaints Management System (CMS) has been developed to document the overall approach to complaints management for the Project. CPBGG JV will adopt the requirements of the CMS, including reporting requirements. The CMS will include a Complaints Register which will record the details of all complaints relating to the Project.

Further detail about the CMS is provided in Section 3.7.5 of the CEMP.

Based on the EPL condition R4.1, CPBGG JV are required to submit a report to the EPA that provides details of all complaints received in relation to Construction activities on the telephone complaints line or through any other means by 2:00 pm each business day. The report will:

- Be submitted to the email address nominated by the EPA;
- Include a unique identifier number for each complainant;
- Include date and time as reported by the complainant of the event that is the subject of the complaint;
- Include the method by which the complaint was made;
- Include any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
- Include an outline of the work or activity that is the subject of the complaint;
- Include the complaints received between 12:00 am and 12:00 pm; and
- Include the action taken in relation to the complaint, including any follow-up contact with the complainant, or if no action was taken, the reasons why no action was taken.

CPBGG JV will not be required to submit a report for a reporting period during which there have been no complaints received. CPBGG JV will advise each complainant of the results of its investigation of their complaint and any proposed remedial action. If the investigation identifies construction works or activities being undertaken as the likely source of the complaint CPBGG JV will undertake air quality monitoring at appropriate intervals to determine compliance against the air quality criteria. This monitoring will be undertaken as soon as practicable or at an agreed time with the complainant.

### 8.4 Training

To ensure that this Plan is effectively implemented, all site personnel (including sub-contractors) will undergo site induction training that includes construction air quality management issues prior to

undertaking their duties. The induction training will address elements related to air quality management, including:

- Existence and requirements of this CAQMP and all plans and procedures prepared under the CAQMPs
- Relevant legislation, regulations and EPL conditions (where applicable)
- Incident response, management, and reporting
- Location of sensitive receivers
- Complaints response and reporting
- General air quality management controls including amending site activities to prevailing weather conditions, the use of water trucks, progressive rehabilitation and stabilization, reduced speed limits, turning off vehicles when not in use, covering of loads.
- Specific responsibilities to minimise air quality impacts on the community associated with the works.

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 or those undertaking an activity with a high risk of environmental impact. Site personnel will undergo refresher training at not less than six monthly intervals.

Examples of training topics could include:

- Erosion and sediment (ERSED) control installation methodology;
- Planning and preparedness for high wind events / dust risk periods; and
- Lessons learnt from dusty periods, incidents, and other event e.g., low rainfall/high wind.

The ESR will review and approve the induction and training program prior to the commencement of construction and monitor implementation.

Daily pre-start meetings conducted by the Foreman/Site Supervisor will inform the site workforce of any environmental issues relevant to air quality that could potentially be impacted by, or impact on, the day's activities.

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

## 8.5 Inspection and Monitoring

### 8.5.1 Monitoring

A Construction Air Quality Monitoring Program has been prepared and is provided in Appendix A – Construction Air Quality Monitoring Program. Table 8-1 details the air quality and climate monitoring procedures that will be undertaken during construction by the CPBGG JV.

Table 8-1 Summary of Air Quality and Climate Monitoring Procedures

Monitoring Details	Frequency	Test Procedure	Responsibility
Prevailing wind conditions and weather forecast	Daily	Weather conditions and forecasts will be obtained from the Australian Bureau of Meteorology (BoM) operated weather stations such as Badgerys Creek AWS (station ID 067108)	<ul style="list-style-type: none"> <li>• ESR</li> <li>• Site Engineer</li> <li>• Superintendent</li> </ul>
Climate monitoring	Daily	Daily rainfall monitoring will be undertaken via automatic weather stations installed at ancillary facilities or construction sites and confirmed with manual rainfall gauges installed across the Project	<ul style="list-style-type: none"> <li>• ESR</li> <li>• Site Engineer</li> </ul>
	Hourly	Hourly temperature, humidity, wind velocity and rainfall from either the Project weather station, or through analysis of equivalent weather information obtained from the BoM (Badgerys Creek AWS station ID 067108)	<ul style="list-style-type: none"> <li>• ESR</li> <li>• Site Engineer</li> </ul>
Suspended particulate	Continuous (Real time)	Real-time monitoring using a light-scattering laser photometer (aerosol	<ul style="list-style-type: none"> <li>• ESR</li> </ul>

monitoring (PM <sub>10</sub> and PM <sub>2.5</sub> concentrations in µg/m <sup>3</sup> )		monitor) at various locations within each stage dependent upon location of environmentally sensitive areas and receivers.	<ul style="list-style-type: none"> <li>Site Engineer</li> </ul>
Odour monitoring	Daily, or in response to complaints	No detectable odours beyond the site boundary, or at the nearest sensitive land use downwind	<ul style="list-style-type: none"> <li>ESR</li> <li>Supervisor</li> </ul>

## 8.5.2 Inspections

Regular inspections of sensitive areas and activities will occur for the duration of the Project. The ESR will carry out weekly site inspections. TfNSW will also conduct independent inspections to confirm compliance with air quality management requirements.

Weekly and other routine inspections by the TfNSW SEO (or delegate), Environmental Review Group (ERG) representatives and ER will occur throughout construction. Detail on the nature and frequency of these inspections are documented in Section 3.9 and Appendix A8 of the CEMP.

Inspections to be carried out by CPBGG JV that are relevant to air quality are contained in Table 8-2..

Table 8-2: Air quality inspections

Inspection	Frequency	Responsibility
Visual surveillance for dust emissions or sediment tracking off-site	Daily	<ul style="list-style-type: none"> <li>Supervisor</li> <li>Site Engineer</li> <li>Superintendent</li> </ul>
Inspection of dust controls to ensure effective implementation	Daily	<ul style="list-style-type: none"> <li>Supervisor</li> <li>Site Engineer</li> <li>Superintendent</li> </ul>
Project entry/ exit integrity to minimise dust/ mud tracking on public roads	Daily	<ul style="list-style-type: none"> <li>Supervisor</li> <li>Site Engineer</li> <li>Superintendent</li> </ul>
Site inspection for visible dust emissions, dust deposits on surfaces	Weekly	<ul style="list-style-type: none"> <li>Supervisor</li> <li>Site Engineer</li> <li>Superintendent</li> <li>Environmental Team representatives</li> </ul>
Haul road integrity	Daily	<ul style="list-style-type: none"> <li>Superintendent</li> </ul>
Plant / equipment inspections including maintenance and emissions	As required, prior to use	<ul style="list-style-type: none"> <li>Superintendent</li> </ul>
Inspection following a complaint about dust	Following receipt of complaint	<ul style="list-style-type: none"> <li>Superintendent</li> <li>ESR</li> </ul>

Construction activities based on measured dust levels, weather forecasts and the proximity of and direction of the works in relation to the nearest surrounding receivers, will be reviewed and adjusted in response to high risk to sensitive receivers. These measures may include reducing the scope or methods of earthworks and dust creating activities, increase the application of dust suppression and cease operations in extreme weather conditions.

## 8.6 Incident planning and response

Response to incidents will be undertaken as described in Section 3.8 of the CEMP and in accordance with the Environmental Incident Classification and Reporting Procedure (refer to Appendix A7 of the CEMP).

EPL (#21595) condition M8.1 requires that the licensee must undertake monitoring, sampling, video recording and/or take photographs:

- if the EPA or licensee reasonably suspects that an event has occurred at the premises or in connection with the carrying out of the activities that has caused, is causing, is likely to cause or has

the potential to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies);

- b) as soon as practicable; and
- c) as directed by an authorised officer.

In the event that such a situation occurs, CPBGG JV will undertake the required actions in accordance with EPL condition M8.1.

## 8.7 Licences and permits

An EPL has been obtained for M12 Motorway West (#21595) by TfNSW for the scheduled activity “road construction”. The prescribed air quality requirements stipulated in the EPL have been outlined in section 3.4 and through the implementation of the environmental control measures listed in section 7.

## 8.8 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of air quality management measures, compliance with this CAQMP, CoA and other relevant approvals, licenses, and guidelines.

Audit requirements are detailed in Section 3.9.3 and Appendix A8 of the CEMP.

## 8.9 Non-conformances

A non-conformance is the failure or refusal to comply with the requirements of project system documentation, including this CAQMP and Construction Air Quality Monitoring Program. Any member of the Project team may raise a non-conformance or improvement opportunity.

Where a non-conformance is detected or monitoring results directly attributable to the Project exceed the target set in the Construction Air Quality Monitoring Program, the process described in the Monitoring Program and Section 3.10 of the CEMP will be implemented. The Quality Plan will describe the process for managing non-conforming work practices and initiating corrective / preventative actions or system improvements in accordance with the process outlined in Section 3.10 of the CEMP.

## 8.10 Reporting and identified records

Reporting requirements and responsibilities are documented in Section 3.9 and 3.11 of the CEMP.

The CPBGG JV will report on air quality monitoring in accordance with the Section 5 of the Construction Air Quality Monitoring Program provided in Appendix A.

The CPBGG JV will maintain accurate records substantiating all construction activities associated with the Project or relevant to the conditions of approval, including measures taken to implement this CAQMP.

## 9 Review and Improvement

### 9.1 Continuous Improvement

Continuous improvement of this CAQMP and the Construction Air Quality Monitoring Program (Appendix A) 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. Refer to Sections 3.12 and 3.13 of the CEMP for details on review and continuous improvement.

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of air quality management and performance
- Identify environmental risks not already included in the risk register
- 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

CPBGG JV will ensure Project environmental risks are identified and included in the risk register and appropriate mitigation measures implemented throughout the construction of the Project, as part of the continuous improvement process. The process for ongoing risk identification and management during construction is outlined in Section 3.2.1 of the CEMP.

### 9.2 AQMP Update and Amendment

The processes described in Sections 3.8, 3.10 and 3.12 of the CEMP may result in the need to update or revise this CAQMP. This will occur as needed. Any revisions to this CAQMP will be in accordance with the process outlined in Section 3.13 of the CEMP.

A copy of the updated CAQMP and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure (refer to Section 3.1 of the CEMP). The review and document control processes for this CAQMP is described in Section 3.11 of the CEMP.

## Appendix A – Construction Air Quality Monitoring Program

## Appendix B – Secondary CoAs and REMMs



## Secondary CoAs

CoA No.	Condition Requirements	CAQMP Reference
A5	Where the terms of this approval require a document or monitoring program to be prepared or a review to be undertaken and submitted to the Planning Secretary, and the terms of this approval require the document, monitoring program or review to be prepared/undertaken in consultation with identified parties, evidence of the consultation must be submitted to the Planning Secretary with the relevant document, monitoring program or review. The evidence must include:	OCEMP Overarching CAQMP  Section 1.5.1 Appendix A
	(a) Documentation of the engagement with the party identified in the condition of approval that has occurred before submitting the document for approval	
	(b) A log of the dates of engagement or attempted engagement with the identified party	
	(c) Documentation of the follow-up with the identified party where engagement has not occurred to confirm that they do not wish to engage or have not attempted to engage after repeated invitations	
	(d) Outline of the issues raised by the identified party and how they have been addressed	
	(e) A description of the outstanding issues raised by the identified party and the reasons why they have not been addressed.	
B6	A Complaints Management System must be prepared and implemented before the commencement of any Work and maintained for the duration of construction and for a minimum for 12 months following completion of construction of the CSSI. The Complaints Management System must require complainants to be advised that:	Section 8.3
	(a) The Complaints Register may be forwarded to Government agencies, including the Department, to allow them to undertake their regulatory duties;	
	(b) By providing personal information, the complainant authorises the Proponent to provide that information to government agencies;	
	(c) The supply of personal information by the complainant is voluntary; and	
	(d) The complainant has the right to contact government agencies to access personal information held about them and to correct or amend that information (Collection Statement).	



CoA No.	Condition Requirements	CAQMP Reference
	The Collection Statement must be included on the Proponent's or project website to make prospective complainants aware of their rights under the Privacy and Personal Information Protection Act 1998. For any complaints made in person, the complainant must be made aware of the Collection Statement.	
B7	<p>The following information must be available to facilitate community enquiries and manage complaints one (1) month before the commencement of Work and for 12 months following the completion of construction:</p> <p>(a) 24- hour telephone number for the registration of complaints and enquiries about the CSSI</p> <p>(b) a postal address to which written complaints and enquires may be sent</p> <p>(c) an email address to which electronic complaints and enquiries may be transmitted; and</p> <p>(d) a mediation system for complaints unable to be resolved.</p> <p>This information must be accessible to all in the community regardless of age, ethnicity, disability or literacy level and must be provided on the website required under Condition B10.</p>	Section 8.3
C2	(h) A list of all the CEMP Sub-plans required in respect of construction, as set out in Condition C4. Where staged construction of the CSSI is proposed, the CEMP must also identify which CEMP Sub-plan applies to each of the proposed stages of construction	Section 1.3
	(k) For periodic review and update of the CEMP and all associated plans and programs	Section 9
	(l) The outcomes of consultation with government agencies in accordance with Condition A5.	Overarching CAQMP
C9	Any of the CEMP Sub-plans may be submitted to the Planning Secretary for approval along with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before the commencement of construction	OCEMP Overarching CAQMP Section 1.4
C10	Construction must not commence until the CEMP and all CEMP Sub-plans have been approved by the Planning Secretary. The CEMP and CEMP Sub-plans, as approved by the Planning Secretary, including any minor amendments approved by the ER, must be implemented for the duration of construction. Where construction of the Critical State Significant Infrastructure (CSSI) is staged,	OCEMP Overarching CAQMP



CoA No.	Condition Requirements	CAQMP Reference
	construction of a stage must not commence until the CEMP and sub-plans for that stage have been endorsed by the ER and approved by the Planning Secretary.	Section 1.4
C12	Details of all information requested by an agency during consultation must be provided to the Planning Secretary as part of any submission of the relevant Construction Monitoring Programs, including copies of all correspondence from those agencies as required by Condition A5.	OCEMP Overarching CAQMP
C13	Each Construction Monitoring Program must provide: <ul style="list-style-type: none"> <li>a) Details of baseline data available</li> <li>b) Details of baseline data to be obtained and when</li> <li>c) Details of all monitoring of the CSSI to be undertaken</li> <li>d) The parameters of the CSSI to be monitored</li> <li>e) The frequency of monitoring to be undertaken</li> <li>f) The location of monitoring</li> <li>g) The reporting of monitoring results and analysis of results against the relevant criteria;</li> <li>h) Details of methods that will be used to analyse monitoring data;</li> <li>i) Procedures to identify and implement additional mitigation measures where results of monitoring indicate unsatisfactory CSSI impacts</li> <li>j) A consideration of SMART principles;</li> <li>k) Any consultation to be undertaken in relation to the monitoring programs</li> <li>l) Any specific requirements as required by Condition C14.</li> </ul>	Appendix A
C15	The Construction Monitoring Programs must be endorsed by the ER and then submitted to the Planning Secretary for approval at least one (1) month before the commencement of construction	OCEMP



CoA No.	Condition Requirements	CAQMP Reference
		Overarching CAQMP Section 1.4
C16	Unless otherwise agreed with the Planning Secretary, construction must not commence until the all of the relevant Construction Monitoring Programs have been approved by the Planning Secretary, and all relevant baseline data for the specific construction activity has been collected.	OCEMP Overarching CAQMP Section 1.4 Appendix A
C17	The Construction Monitoring Programs, as approved by the Planning 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 Planning Secretary, whichever is the greater.	OCEMP Overarching CAQMP  Appendix A
C18	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, and relevant government agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.	OCEMP Overarching CAQMP  Appendix A



## Secondary REMMs

ID	Measure/requirement	Timing	CAQMP Reference
AQ02	Dust generation will be minimised during construction where possible. Where practicable, specific measures will include (but not be limited to):	During construction	Table 7-1
	<ul style="list-style-type: none"> <li>Regularly watering exposed and disturbed areas including stockpiles, especially during inclement weather conditions</li> </ul>		
	<ul style="list-style-type: none"> <li>Adjusting the intensity of activities based on measured and observed dust levels, weather forecasts and the proximity of and direction of the works in relation to the nearest surrounding receivers</li> </ul>	During construction	
	<ul style="list-style-type: none"> <li>Ensuring loads are covered, and any loose materials/debris are removed before vehicles exit the site</li> </ul>	During construction	
	<ul style="list-style-type: none"> <li>Minimising the number of stockpiles and amount of material stockpiled where practicable</li> </ul>	During construction	
	<ul style="list-style-type: none"> <li>Positioning stockpiling areas as far as possible from surrounding receivers, including potentially ecologically sensitive receivers</li> </ul>	During construction	
	<ul style="list-style-type: none"> <li>Limiting stockpiling activities during conditions where winds are blowing strongly in the direction(s) from the stockpiling location to nearby receivers</li> </ul>	During construction n	
	<ul style="list-style-type: none"> <li>Consultation with nearby developers to co-ordinate and plan activities where practicable to minimise the potential for cumulative dust-related impacts</li> </ul>	Prior to construction and during construction	
	<ul style="list-style-type: none"> <li>The planning and undertaking of demolition activities, including the removal of hazardous building materials in a manner that minimises dust generation. This will also include the removal of hazardous building materials before the start of general demolition works.</li> </ul>	Prior to construction and during construction	



ID	Measure/requirement	Timing	CAQMP Reference
AQ03	Odorous materials identified on site will be excavated in a staged process and exposed areas of odorous material will be kept to a minimum to reduce the total emissions from the site where feasible	During construction	Table 7-1
GG01	Targets to reduce GHG emissions during construction and operation will be included in the project's Sustainability Management Plan	During construction	Sustainability Management Plan



# Appendix A

# Construction Air Quality Monitoring Program

## M12 Motorway

Project number:	N81150
Document number:	M12WCO-CPBGGJV-ML1-AH-PLN-000001_App A
Revision date:	22/10/2024
Revision:	02

## Details of Revision Amendments

### Document Control

The Project Director is responsible for ensuring that this plan is reviewed and approved. The Project Director is responsible for updating this plan to reflect changes to construction, legal and other requirements, as required.

### Amendments

Any revisions or amendments must be approved by the Project Director and/or client before being distributed / implemented.

### Revision Details

Rev	Date	Reviewed By	Details
A	18/02/2022	G. Bolton	First Draft
B	13/05/2022	G. Bolton	Second draft following TfNSW/Arcadis review and comment
C	16/06/2022	A. Zvirzdinas	Third draft following TfNSW/Arcadis review and comment on Rev B
D	06/07/2022	A. Zvirzdinas	Fourth draft following TfNSW/Arcadis/ER review and comment on Rev C. New document number.
00	28/07/2022	A. Zvirzdinas	First Controlled Issue
E	31/01/2023	K. Purkiss	6-Monthly Sub-Plan Review
01	31/01/2023	K. Purkiss	Second Controlled Issue
02	22/10/2024	T. Chezzi	Annual review

### Document Review

Position	Name	Signature	Date
Project Direct	Nick Fryday		22/10/2024

### Distribution of controlled copies

Copy no.	Issued to	Version



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## Acronyms and Abbreviations

Term	Expanded text
<b>AQI</b>	Air quality index
<b>AQMS</b>	Air Quality Monitoring Station
<b>ARSR</b>	Amendment Report to the Submissions Report
<b>AWS</b>	Automatic Weather Station
<b>BoM</b>	Bureau of Meteorology
<b>CAQMP</b>	Construction Air Quality Management Sub-Plan
<b>CEMP</b>	Construction Environmental Management Plan
<b>CO</b>	Carbon monoxide
<b>CO<sub>2</sub></b>	Carbon dioxide
<b>CoA</b>	Conditions of Approval
<b>Construction</b>	Includes all activities required to construct the CSSI as described in the documents listed in Condition A1, including commissioning trials of equipment and temporary use of any part of the CSSI, but excluding Low Impact Work which is carried out to complete prior to the approval of the CEMP, works approved under a Site Establishment Management Plan, demolition of acquired residential houses, structures and sheds, and works specified in Appendix B and approved under an environmental management plan(s) in accordance with Condition A24.
<b>CPBGG JV</b>	CPB Contractors and Georgiou Group Joint Venture
<b>DEC</b>	Former Department of Environment and Conservation
<b>DECC</b>	Former Department of Environment and Climate Change
<b>DECCW</b>	Former Department of Environment, Climate Change and Water
<b>DPE</b>	Former NSW Department of Planning and Environment
<b>DPHI</b>	NSW Department of Planning, Housing and Infrastructure (formerly NSW DPE which has now been split into NSW DCCEEW and NSW DPHI)
<b>DPIE</b>	Former NSW Department of Planning, Industry and Environment
<b>Environmental Assessment Documentation</b>	<p>The set of documents that comprise the Division 5.2 Approval:</p> <ul style="list-style-type: none"> <li>• Roads and Maritime Services (October, 2019) M12 Motorway, Environmental Impact Statement (EIS)</li> <li>• Transport for NSW (October, 2020) M12 Motorway, Submissions Report (the Submissions Report)</li> <li>• Transport for NSW (October, 2020) M12 Motorway, Amendment Report (AR)</li> <li>• Transport for NSW (December, 2020) M12 Motorway, Amendment Report submissions report (ARSR)</li> <li>• Transport for NSW (March, 2021) The M12 Motorway Amendment Report Submissions Report – Amendment (ARSR amendment)</li> </ul>



Term	Expanded text
	<ul style="list-style-type: none"> <li>WSP (October, 2021) M12 Motorway – West Package Detailed Design Consistency Assessment</li> <li>GHD (October, 2021) M12 Motorway – Central Package Detailed Design Consistency Assessment</li> <li>Arcadis (June, 2022) M12 Motorway – Sydney Water Crossings Consistency Assessment</li> <li>Arcadis (July, 2022) M12 Motorway – Design Boundary Changes Consistency Assessment</li> <li>Arcadis (August, 2022) M12 Motorway Minor Consistency Assessment for Proposed Change to the M12 Motorway Project (M12 Central)</li> <li>Arcadis (September, 2023) M12 Motorway - Devonshire Road Temporary Roundabout Consistency Assessment</li> <li>WSP (September, 2023) M12 Motorway - Elizabeth Drive Connections Consistency Assessment</li> <li>TfNSW (September, 2023) M12 Motorway – Minor Consistency Assessment M12 West demolition of structures as 752 Luddenham Road</li> <li>TfNSW (October, 2023) M12 Motorway – Minor Consistency Assessment M12 East AF9 Power Supply</li> <li>TfNSW (October, 2023) M12 Motorway – Minor Consistency Assessment M12 East Cecil Road Laydown Area</li> <li>TfNSW (October, 2023) M12 Motorway – Minor Consistency Assessment M12 East Temporary Construction Signage</li> <li>Arcadis (December, 2023) M12 Motorway Project (M12 East) Sites 48, 50 and 51</li> <li>Arcadis (January, 2024) M12 Motorway – Minor Consistency Assessment M12 Central Water Tower Access Road</li> </ul> <p>The documents that comprise the EPBC referral:</p> <ul style="list-style-type: none"> <li>Submission #3486 – The M12 Motorway Project between the M7 Motorway, Cecil Hills and The Northern Road, Luddenham, NSW</li> </ul> <p>Notification of referral decision and designated proponent - controlled action; date of decision 19 October 2018; ID: 2018-8286.</p>
<b>EEC</b>	Endangered ecological communities
<b>EES</b>	NSW Environment, Energy and Science
<b>EHS</b>	Environment and Heritage Group (a part of NSW DPE)
<b>EIS</b>	Environmental Impact Statement
<b>EMS</b>	Environmental Management System
<b>EPA</b>	NSW Environment Protection Authority
<b>EP&amp;A Act</b>	<i>NSW Environmental Planning and Assessment Act 1979</i>
<b>ER</b>	Environmental Representative



Term	Expanded text
<b>ESM</b>	Environment and Sustainability Manager (TfNSW)
<b>ESR</b>	Environmental Site Representative (CPBGG JV)
<b>km</b>	kilometre
<b>MP</b>	Monitoring Program
<b>NEPC</b>	National Environment Protection Council
<b>NEPM</b>	National Environment Protection Measure
<b>NSW DCCEEW</b>	NSW Department of Climate Change, Energy, the Environment and Water (formerly NSW DPE which has now been split into NSW DCCEEW and NSW DPHI)
<b>NO<sub>2</sub></b>	Nitrogen dioxide
<b>NGER Act</b>	<i>National Greenhouse and Energy Reporting Act 2007</i>
<b>O<sub>3</sub></b>	Ozone
<b>O<sub>3</sub></b>	Ozone
<b>OCEMP</b>	Overarching Construction Environmental Management Plan
<b>OEH</b>	NSW Office of Environment and Heritage, now EES
<b>Planning Secretary</b>	Secretary of the NSW Department of Planning and Environment, or delegate
<b>PM<sub>10</sub></b>	Particulate matter 10 micrometres or less in diameter
<b>PM<sub>2.5</sub></b>	Particulate matter 2.5 micrometres or less in diameter
<b>POEO Act</b>	<i>Protection of Environment Operations Act 1997</i>
<b>REMM</b>	Revised Environmental Management Measure as provided in the Amendment Report
<b>SO<sub>2</sub></b>	Sulphur Dioxide
<b>TfNSW</b>	Transport for New South Wales (formerly Roads and Maritime Services (RMS))
<b>TSP</b>	Total Suspended Particulate matter
<b>Work</b>	Any physical work to build or facilitate the building of the CSSI, including low impact work, environmental management measures and utility works.  However, it does not include activities that inform or enable detailed design of the CSSI and generate noise that is no more than 5 dB(A) above the rating background level at any sensitive receiver.

# 1 Introduction

## 1.1 Context

This Construction Air Quality Monitoring Program (this Monitoring Program) is an appendix of the Construction Air Quality Management Sub-plan (CAQMP) and forms part of the Construction Environmental Management Plan (CEMP) for the project.

## 1.2 Scope of the Program

The scope of this Monitoring Program is to describe how CPBGG JV proposes to monitor dust and air pollutants during construction of the Project. This purpose of this Monitoring Program is to:

- Provide a procedure to monitor air quality impacts during construction of the Project
- Meet the requirements of the relevant Conditions of Approval (CoA) for the Project
- Meet any relevant legal and other requirements for the Project.

The SMART (Specific, Measurable, Achievable, Realistic and Timely) principles have been considered in the preparation of this Monitoring Program. Refer to Section 4 for further details on how the monitoring procedures are being conducted.

## 1.3 Environmental Management Systems overview

The Environmental Management System (EMS) for the Project is described in Section 1.5 of the CEMP. The CPBGG JV has an Environmental Management System (EMS) consistent with the overarching EMS described in the OCEMP. This Monitoring Program has been developed in accordance with the OCEMP, the Overarching CAQMP and CPBGG JV EMS.

## 1.4 Responsibilities

The Environmental Site Representative (ESR) or delegate with suitable experience and qualification will undertake the monitoring outlined in this Monitoring Program.

The Project Director and Construction Managers are responsible for ensuring that all legal and other requirements described in this Monitoring Program are met.

## 1.5 Approval, review and modification

TfNSW will review CPBGG JV' management plans to confirm consistency with the requirements of the OCEMP and TfNSW specifications. The OCEMP has been approved by the Secretary on 21/12/2021.

This CPBGG JV Monitoring Program (MP) will be submitted to the ER for endorsement and consistency with the approved plan by TfNSW and ER. Construction will not commence until this plan has been approved. This MP will be implemented for the duration of Construction and for any longer period set out in this plan or specified by the Secretary, whichever is greater.

This plan will be available for six monthly review by TfNSW in consultation with CPBGG JV. Minor amendments may be approved by the ER. Any amendments to the MP will be documented in subsequent revisions.

A copy of the updated MP and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure outlined in the CEMP. Site personnel with responsibilities relevant to air quality monitoring will be informed of any amendments to the Monitoring Program and training provided, where required.

## 1.6 Relevant legislation

Legislation and regulations relevant to air quality management includes:

- *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
- Protection of the Environment Operations (General) Regulation 2009, Part 5.4 Air pollution
- *National Greenhouse and Energy Reporting Act 2007 (NGER Act).*

Relevant provisions of the above legislation are identified in the register of legal requirements included in Appendix A1 of the CEMP.

## 1.7 Guidelines and standards

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

- TfNSW Specification G36 – Environmental Protection (Management System)
- TfNSW Specification G38 – Soil and Water Management (Soil and Water Management Plan)
- TfNSW Specification R272 – Automatic Weather Stations
- National Environment Protection Measure for Ambient Air Quality (AAQ NEPM)
- National Environment Protection Council (NEPC, 2016)
- National Environment Protection Measure for Air Toxics (Air Toxics NEPM) (NEPC, 2011)
- Australian Standard AS 3580.1.1:2007 Methods of Sampling Analysis of Ambient Air. Part 1.1 Guide to Siting Air Monitoring Equipment
- Australian Standard AS 3580.9.9: 2017 Methods for sampling and analysis of ambient air Determination of suspended particulate matter - PM 10 low volume sampler - Gravimetric method
- Australian Standard AS 3580.10.1: 2016 Methods of Sampling Analysis of Ambient Air. Determination of Particulate Matter – Deposited Matter - Gravimetric Method
- Approved Methods for Modelling and Assessment of Air Pollutants in NSW (NSW EPA, 2017)
- Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (Department of Environment and Conservation (DEC, 2005)
- Air Emissions Inventory for the Greater Metropolitan Region in New South Wales (EPA, 2012)
- Guidance on the assessment of dust from demolition and construction Version 1.1 (UK IAQM, 2014)
- Technical Framework: Assessment and management of odour from stationary sources in NSW (DEC, 2006)
- Managing Urban Stormwater: Soils and Construction, Volume 1 (Landcom, 2004) and Volume 2 (Department of Environment and Climate Change (DECC), 2008) (the “Blue Book”)
- Air Quality Monitoring Criteria for Deposited Dust (DEC Guideline)
- Government Resource Efficiency Policy (NSW Office of Environment and Heritage (OEH, 2014)
- Environmental Sustainability Strategy 2019-2023 (Roads and Maritime, 2021).

## 2 Baseline data

The Department of Planning, Industry and Environment (DPIE) have developed a metric known as the 'Air Quality Index' (AQI). The AQI provides an indication of overall air quality by considering pollutant data measurements for ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), sulphur dioxide (SO<sub>2</sub>) and PM<sub>10</sub>, as well as visibility against criteria presented in the *Variation to the National Environment Protection (Ambient Air Quality) Measure* (NEPM) and DPIE standard for visibility.

The DPIE operates a state-wide air quality monitoring network which provides information on current and historical air quality. The nearest DPIE air quality monitoring stations (AQMS) to the Project are:

- Bringelly (approximately 4 km to the south)
- Liverpool (approximately 9 km to the south-east).

The Approved Methods (NSW EPA, 2016 and DEC, 2006) contain criteria for assessing whether potential changes in air quality conditions predicted as a result of a project would result in an unacceptable level of impacts. The criteria presented Table 2-1 were used to determine the significance of the Project's effect on air quality during operations.

Table 2-1: Air quality criteria for other pollutants (EPA, 2016)

Pollutant	Averaging time	Concentration	Criterion application location
Solid particles (as PM <sub>10</sub> )	24-hour	50 µg/m <sup>3</sup>	Nearest existing or likely future offsite sensitive receptors
	Annual	25 µg/m <sup>3</sup>	
Solid particles (as PM <sub>2.5</sub> )	24-hour	25 µg/m <sup>3</sup>	Nearest existing or likely future offsite sensitive receptors
	Annual	8 µg/m <sup>3</sup>	
Nitrogen dioxide (NO <sub>2</sub> )	1-hour	246 µg/m <sup>3</sup>	Nearest existing or likely future offsite sensitive receptors
	Annual	62 µg/m <sup>3</sup>	
Carbon monoxide (CO)	15 minutes	100 mg/m <sup>3</sup>	Nearest existing or likely future offsite sensitive receptors
	1 hour	30 mg/m <sup>3</sup>	
	8 hours	10 mg/m <sup>3</sup>	
Benzene	1-hour	29 µg/m <sup>3</sup>	At and beyond the site boundary

### 2.1.1 PM<sub>10</sub>

Monitoring of these pollutants between 2014 and 2018 at both Bringelly and Liverpool AQMS indicate that the maximum 24-hour average PM<sub>10</sub> concentrations occasionally exceeded the 50 µg/m<sup>3</sup> criterion (Table 2-1). The 95<sup>th</sup> percentile values (the value exceeded 5% of the time) were about 88% of the criterion or less.

Annually averaged PM<sub>10</sub> concentrations were found to vary between the two stations with the highest value of 24 micrograms per cubic metre recorded at the Liverpool station in 2018. This is still below the 25 µg/m<sup>3</sup> impact assessment criterion. Values were found to typically range between 16 and 21 µg/m<sup>3</sup>.

### 2.1.2 PM<sub>2.5</sub>

Maximum 24-hour averaged PM<sub>2.5</sub> concentrations exhibited the same trend as PM<sub>10</sub>, with the 25 µg/m<sup>3</sup> assessment criterion occasionally being exceeded, but with the 95<sup>th</sup> percentile values well below.

Annually averaged PM<sub>2.5</sub> concentrations were always in exceedance of the 8 µg/m<sup>3</sup> criterion at Liverpool AQMS, but were at or below this limit at the Bringelly AQMS, for all years between 2014 and 2018.

### 2.1.3 Adopted Background Concentrations

Background concentrations were established for the receiving environment for construction of the Project, based on the monitoring data collected by the Bringelly and Liverpool AQMS. The background values adopted are presented in Table 8-17 of the EIS and reproduced in Table 2-2.



Table 2-2: Adopted background concentrations

Pollutant	Averaging time	Adopted background concentration	Justification
PM <sub>10</sub>	24-hour	38 µg/m <sup>3</sup>	Highest 2014 to 2018 95 <sup>th</sup> per centile 24-hour averaged value recorded at Bringelly
	Annual	21 µg/m <sup>3</sup>	Maximum 2014 to 2018 value recorded at Bringelly
PM <sub>2.5</sub>	24-hour	15 µg/m <sup>3</sup>	Highest 2014 to 2018 95 <sup>th</sup> per centile 24-hour averaged value recorded at Bringelly
	Annual	8.0 µg/m <sup>3</sup>	Maximum 2014 to 2018 value recorded at Bringelly
NO <sub>2</sub>	1-hour	74 µg/m <sup>3</sup>	Maximum 2014 to 2018 value recorded at Bringelly
	Annual	12 µg/m <sup>3</sup>	Maximum 2014 to 2018 value recorded at Bringelly
CO	1-hour	3 mg/m <sup>3</sup>	Maximum 2014 to 2018 value recorded at Liverpool
	8-hour	2 mg/m <sup>3</sup>	Maximum 2014 to 2018 value recorded at Liverpool

### 3 Air Quality Criteria

The Approved Methods provides air quality criteria based on several pollutant criteria and averaging periods from multiple sources, including the NEPM-AAQ (1998) and NERDDC (1988).

Table 3-1 details the air quality criteria for particulate matter. Compliance criteria is related to a maximum 24-hour and annual average of PM10 and PM2.5 concentrations exceeding the micrograms per cubic metre criterion. This is based on the maximum background concentration and the 100th percentile to obtain the total impact average over 24 hours.

Management criteria is based on the UK IAQM Air Quality Monitoring in the Vicinity of Demolition and Construction Sites (2018) used as a basis prior to conducting monitoring during construction. The 1-hour 'short-term' period has been adapted from the IAQM (2018) and although arbitrarily derived significantly greater concentrations than longer term (e.g. 24-hour average) air quality compliance criteria, it provides a reference point upon which CPBGG JV must act immediately to minimise dust emissions. Should the '1-hour' trigger level be breached, it is generally considered that the 24-hour compliance criteria is also likely to be breached.

If any of the variables are observed, the dust control measures will be reviewed and amended by the ESR where required in consultation with TfNSW.

Table 3-1: Air quality criteria for particulate matter

Pollutant	Averaging time	Compliance Criteria	Management Criteria	Source
Particulate matter (PM10)	Annual	25 ug/m <sup>3</sup>	N/A	NSW EPA, 2017
	24 hours	50 ug/m <sup>3</sup>	38 ug/m <sup>3</sup>	NSW EPA, 2017 NEPM-AAQ, 1998
	1 hour (short term) <sup>a</sup>	N/A	190 ug/m <sup>3</sup>	IAQM, 2018
Particulate matter (PM2.5)	Annual	8 ug/m <sup>3</sup>	N/A	NSW EPA, 2017
	24 hours	25 ug/m <sup>3</sup>	21 ug/m <sup>3</sup>	NSW EPA, 2017 NEPM-AAQ, 1998
	1 hour (short term) <sup>a</sup>	N/A	190 ug/m <sup>3</sup>	IAQM, 2018

Source: Adapted from Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DECCW, 2005)

Notes:

a. Trigger level over 1-hour ('short-term') period (IAQM, 2018)

## 4 Monitoring Procedures

The air quality and climate monitoring procedures to be adopted for the Project are provided in Table 4-1. Air quality and climate monitoring will be undertaken by the ESR (or delegate).

Table 4-1: Summary of air quality and climate monitoring procedures

Monitoring details	Frequency	Test procedure	Responsibility
Prevailing wind conditions and weather forecast	Daily	Weather conditions and forecasts will be obtained from the Australian Bureau of Meteorology (BoM) operated weather stations such as Badgerys Creek AWS (station ID 067108)	ESR
Climate monitoring	Daily	Daily rainfall monitoring will be undertaken via automatic weather stations installed at ancillary facilities or construction sites	ESR
	Hourly	Hourly temperature, humidity, wind velocity and rainfall from either the Project weather station, or through analysis of equivalent weather information obtained from the BoM (Badgerys Creek AWS station ID 067108)	ESR
Suspended particulate monitoring (PM10 and PM2.5 concentrations in µg/m3)	Continuous (Real time)	Real-time monitoring using a light-scattering laser photometer (aerosol monitor).	ESR
Odour monitoring	Daily, or in response to complaints	<ul style="list-style-type: none"> <li>No detectable odours beyond the site boundary, or at the nearest sensitive land use downwind of the project</li> </ul>	ESR
<b>Inspections</b>			
Investigation in response to recurring or major complaints, or authorised agency request, regarding exceedance of air emissions	As required	<ul style="list-style-type: none"> <li>Ongoing monitoring and data collection will be undertaken</li> <li>CPBGG JV will respond to complaints in accordance with the Project Complaints Management System (CMS).</li> <li>The CPBGG JV will undertake an investigation of the complaint including an assessment of operations, weather conditions and visual observation of impact.</li> <li>The CPBGG JV will review efficiency of dust mitigation measures and detail additional mitigation measures if required.</li> </ul>	ESR
Visual surveillance	Daily	<ul style="list-style-type: none"> <li>Dust control measures are in an adequate condition</li> <li>No long-term visible dust emissions from the site</li> <li>No mud-tracking off-site from haul roads</li> </ul>	ESR Superintendent Supervisors

### 4.1 Meteorological Monitoring

Rainfall at the construction site will be measured and recorded in millimetres per 24-hour period at the same time each day from the time that the site office associated with the activities is established. CPBGG JV will install automatic rainfall intensity / automatic weather stations (AWS) to record hourly rainfall, temperature, relative humidity, wind speed, wind direction and bathometric pressure. The annual data capture rate, of valid data, for the individual parameters of the AWS, must not be less than 98%.

The location of the AWS and manual rainfall gauges will be installed at the main compound for the project. The main compound location is detailed in the Site Establishment Management Plan (Appendix B10 of the CEMP).

The AWS will conform to TfNSW Specification R272 for the design and location of such devices. AWS will be located within the main compound area fully protected by fencing. AWS instrumentation,

communication or power cabling contained within conduits will be buried to a depth of at least 100 mm. The AWS is to be installed 2 weeks prior to the commencement of construction and remain in place until 4 weeks after the completion of construction.

Before establishment of the AWS, CPBGG JV will prepare a report identifying the proposed location for the AWS and other weather gauges in consultation with a suitably qualified person with experience installing and operating AWSs in accordance with BoM OS 2013.1. The installation of the AWS is subject to a hold point under clause 3.2 of R272 which requires the submission of a commissioning report. The TfNSW ESM (or delegate) will review the proposed location of the AWS for consistency with specifications and this Monitoring Program. Regular maintenance will occur during operation of the instruments, mounting structures and enclosure to assist with capturing high quality, continuous data.

In accordance with normal standard construction practices, weather forecasts will be used to guide work activities undertaken on-site. CPBGG JV will review the weather forecasts at the start of each day and before undertaking new work activities that may be affected by rainfall or adverse weather.

TfNSW and other authorised users (the User) will be provided with access to data via all of the following methods:

- a webpage displaying the latest telemetered data;
- a “self-service” data request web portal;
- Email, file transfer protocol (FTP) or transmitting of hard copy in response to a data request.

The Beaufort Wind Scale as detailed in Table 4-2 will be used to determine wind conditions. If wind conditions are classified as “strong winds” or greater, all dust generating activities are to cease. For wind categories less than “strong winds”, the CPBGG JV will assess dust generating activities and either implement additional mitigation measures or reschedule the activity to when dust can be contained on-site.

Table 4-2: Beaufort wind scale (adapted from BoM)

Beaufort scale number	Descriptive term	Wind speed (km/h)	Wind speed (knots)	Description on land
0	Calm	0	0	Smoke rises vertically
1-3	Light winds	≤19	≤10	Wind felt on face; leaves rustle; ordinary vanes moved by wind
4	Moderate winds	20 - 29	11 - 16	Raises dust and loose paper; small branches are moved
5	Fresh winds	30 – 39	17 - 21	Small trees in leaf begin to sway; crested wavelets form on inland waters
6	Strong winds	40 – 50	22 - 27	Large branches in motion; whistling heard in telephone wires; umbrellas used with difficulty
7	Near gale	51 – 62	28 - 33	Whole trees in motion; inconvenience felt when walking against wind
8	Gale	63 – 75	34 - 40	Twigs break off trees; progress generally impeded
9	Strong gale	76 – 87	41 - 47	Slight structural damage occurs -roofing dislodged; larger branches break off
10	Storm	88 – 102	48 - 55	Seldom experienced inland; trees uprooted; considerable structural damage
11	Violent storm	103 - 117	56 - 63	Very rarely experienced - widespread damage
12+	Hurricane	≥118	≥64	Very rarely experienced - widespread damage

At the conclusion of the operation and maintenance period of the AWS, or upon instruction by TfNSW, decommissioning of the AWS will be carried out by CPBGG JV. Decommissioning of the AWS will be undertaken in accordance with section 8 of R272 specification. The decommissioning of the AWS is subject to a hold point under clause 8.3 of R272 which requires the submission of a decommissioning report.

## 4.2 Air Quality Monitoring

#### 4.2.1 Real time particulate monitoring

Site Hive will be used on the project for continuous real time measurements. SiteHive is a new type of environmental monitoring device that can combine multiple digital sensors (eg, noise, dust, images and audio) into one device the Hexanode. These Hexanodes use a Alphasense R2 Optical Particle Sensor, to provide real-time dust measurements for PM2.5, PM10 and Total Suspended Particulate matter (TSP). These measurements can be adjusted using a k-factor if one is available. The Hexanodes have the capabilities to issue alerts (via SMS or alarm) when specific monitoring trigger levels are exceeded. The SiteHive proprietary software is a cloud-based package that allows the user to view what's happening in real time that can be readily accessed through the provision of dashboard of information (including data and graphs). It can also provide measurements from the nearest EPA air quality stations for reference.

Real time monitoring trigger levels are generally determined on a case-by-case basis as there are variables that can affect the relationship between the dust levels measured within the site and the resulting dust levels occurring off-site including;

- Distance between the monitoring location and sensitive receivers
- Intensity, duration and frequency of dust generating activities
- Background dust levels
- Direction of the prevailing winds in relation to sensitive receivers.

The trigger levels for real time monitoring are arbitrary figures with consideration for the above factors and are generally significantly greater concentrations than longer term (e.g. 24-hour average) air quality compliance criteria. The site PM10 and PM2.5 trigger level is set at 190 µg/m3 (one-hour average) (based on IAQM 2018). Refer to Table 3-1.

The trigger level will be reviewed if:

- Complaints are received and verified
- Dust is observed to be leaving site risking the amenity of the surrounding environment
- Other dust monitoring methods indicates frequent exceedances of the relevant Project criteria attributable to the Project.

If any of the variables are observed, the dust control measures will be reviewed and amended by the CPBGG JV where required.

#### 4.2.2 Site selection and positioning

The siting of monitors will consider the below criteria:

- Positioning in accordance with AS 3580.1.1:2016: Methods of Sampling and Analysis of Ambient Air, Part 1.1: Guide to Siting Air Monitoring Equipment
- Proximity to ancillary facilities and stockpile locations
- Proximity to sensitive receivers and location of threatened species or endangered ecological communities (EECs). However, if feasible, will be located in low or sparsely built-up areas
- Typical wind direction
- Avoiding locations where:
  - Airflow is restricted, including behind trees or structures, with a minimum clear sky angle of 120° required
  - Objects might alter the pollution concentration by adsorption or absorption, such as leafy vegetation and some building materials
  - Chemical interference may interfere with dust monitoring, such as near vehicle or plant emissions or other unrelated local emissions
  - Physical interference may produce atypical results or where electrical interference to sampling equipment could occur from nearby high voltage power lines
- Monitoring sites will, to the extent possible, be located where:
  - There is a low potential for vandalism



- There is adequate access for transporting equipment
- Personnel can perform their activities in a safe environment
- The priority for siting of monitors will be on TfNSW or publicly owned land first, then private land second. If monitors are located on private property, permission must be granted by the landowner to locate the monitor on their property, to access a power supply (if required) and to access the monitors for maintenance, calibration etc.
- Access to a power source (if necessary)

The location of the air monitoring is included in the Sensitive Area Plans (CEMP Appendix A6). The locations of the air monitoring may change throughout the construction based on changes to the factors used for site selection detailed above.

#### 4.2.3 Calibration

Calibration of the SiteHive system will occur in accordance with the manufacturer's specification and all calibration certificates will be provided to TfNSW when requested. Calibration will be tracked on the project instrument calibration register.

## 5 Reporting

### 5.1 Monthly Environmental Report

The ESR will prepare Monthly Environmental Reports for the duration of the Project for incorporation in the Monthly Reports and submitted to the TfNSW ESM (or delegate) for review. Information to be detailed in the reports includes:

- Results summary and analysis of the environmental monitoring
- Performance of this Monitoring Program
- Summary of any complaints received that are related to air quality complaints.

The monitoring data will be collected and analysed prior to the preparation of the report. The monitoring data will be compared with the air quality criteria. Following this, a Construction Air Quality Monitoring Report will be prepared (refer to Section 5.2).

Refer to Section 3.9 and Appendix A8 of the CEMP for further detail on environmental reporting.

### 5.2 Air Quality Monitoring Report

In accordance with NSW CoA C18, CPBGG JV will prepare Air Quality Monitoring Reports detailing the results of the monitoring undertaken in accordance with this Monitoring Program. The results of the monitoring will be collected in the form of a Construction Monitoring Report. The Construction Air Quality Monitoring Reports will be submitted quarterly to the Planning Secretary and to relevant regulatory agencies for information.

Reports will include, but not be limited to, the following information:

- The date(s) and time at which the monitoring was undertaken
- The locations and description of monitoring undertaken
- The name of the person who undertook the monitoring
- Tabulations of monitoring data
- Compliance monitoring results with the criteria identified in Section 3 of this Monitoring Program
- Identification of exceedances of the nominated criteria and descriptions of the causes of these exceedances
- Details of any alterations/deviations from the Monitoring Program
- Summary of any complaints received regarding air quality.

The ESR will maintain accurate records of all air quality monitoring activities. TfNSW are responsible for the provision of these reports to DPIE.

### 5.3 Reporting on Non-Conformances and Exceedances

In the event that the criteria identified in Section 3 of this Monitoring Program are exceeded, the ESR will investigate and report the exceedance to the TfNSW Senior Project Manager and the ESM (or delegate) and the ER within seven days of identification of the exceedance. Details of exceedances will be provided in the Monthly Environmental Reports.

The investigation into the exceedance will determine if the exceedance is related to Project activities or dust from another source. If the exceedance is attributed to Project activities, the exceedance will be classified as a non-compliance, incident or reportable event as defined by the Environment Incident Classification and Reporting Procedure (Appendix A7 of the CEMP).

### 5.4 Complaints management and reporting

Recording and reporting of complaints will be undertaken in accordance with the Complaints Management System for the Project (refer to Section 3.7.5 of the CEMP).

## 6 Adaptive Management

### 6.1 Response to Air Quality Issues

Where air quality monitoring results directly attributable to the Project exceeding the criteria set out in Section 3 of this Monitoring Program, the following steps will be undertaken:

- Analysis of the results by the ESR in more detail with a view of determining possible causes for the exceedance
- Site inspection by the ESR
- Advising relevant personnel of the problem
- Identifying and agreeing on actions and/or additional mitigation measures to resolve or mitigate the exceedance
- Implementing actions to rectify or mitigate the exceedance, including stop work arrangements where necessary or if directed by the ER
- Identifying and implementing additional mitigation measures.

Where air quality criteria are exceeded, the source of excessive air pollutants will be identified and, where available, additional measures will be implemented to either reduce emissions or reduce the impacts on receivers.

An example procedure identifying mitigation measures and preventative/ corrective actions for issues relating to management of air quality issues is provided in Table 6-1.

Table 6-1 Example procedure of mitigation measures and preventative/ corrective actions

Key Element	Trigger / Response	Condition Green	Condition Amber	Condition Red
Visible dust leaving the site	Trigger	Daily inspections show that there is no visible dust leaving the site.	Daily inspections show that there is visible dust leaving the site.	Daily inspections show that there is visible dust leaving the site multiple times during a day OR from multiple locations within the site.
	Response	Continue monitoring program as normal.	Review and investigate construction activities and respective control measures. Where appropriate, implement additional remedial measures, such as: <i>Deployment of additional water sprays, water trucks etc</i>	Undertake an investigation of the dust generating activities, and if necessary, temporarily halt the dust generating activities

Mitigation measures and preventative/ corrective actions will be developed in accordance with TfNSW specifications and the procedure for dealing with non-compliance with environmental management measures outlined in Section 3.10 of the CEMP. The ESR will verify and document the effectiveness of any management measures or preventative/ corrective actions implemented to avoid further exceedances.

The timing for any improvement will be agreed between the ESR, Project Engineer/ Superintendent and TfNSW Senior Project Manager and ESM (or delegate) based on the level of risk or reoccurrence of the exceedance (e.g. a significant risk will require immediate action).