Appendix E

Air Quality Management Sub-Plan

STW-JHC-PLN-00-EN-002-000008

Western Harbour Tunnel Stage 3A

3 November 2022

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Document status

Revision	Date	Prepared by	Reviewed by	Remarks
A	15/04/2022	Roger Posgate	Adrian Broger	Internal review
B	31/05/2022	Roger Posgate	Adrian Broger Kathy Lloyd	Internal review
C	10/06/2022	Adrian Broger	Kathy Lloyd	For ER and TfNSW
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00	25/08/2022	Roger Posgate	Adrian Broger	Address comments from stakeholder consultation. For ER endorsement
01	25/10/2022	Roger Posgate	Adrian Broger Charles Scarf	Address comments from DPE
02	03/11/2022	Roger Posgate	Adrian Broger Charles Scarf	Address final comments from DPE

Distribution of controlled copies

This AQMP as part of the CEMP is available to all personnel and sub-contractors via the Project document control management system. An electronic copy can be found on the Project website.

The document is uncontrolled when printed.

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Glossary/ Abbreviations

Abbreviations	Expanded text
AMS	Activity Method Statement
Ancillary facility	A temporary facility for construction of the CSSI including an office and amenities compound, construction compound, material crushing and screening plant, materials storage compound, maintenance workshop, testing laboratory, material stockpile area and car parking facilities. *Note: where an approved management plan contains a stockpile management protocol, a material stockpile area located within the construction boundary is not considered to be an ancillary facility*
AQMP	Air Quality Management Sub-Plan (this document)
BOM	Australian Government Bureau of Meteorology
CCS	Community Communication Strategy
CEMP	Construction Environmental Management Plan
CSSI	Critical State Significant Infrastructure
Construction	Includes all work required to construct the CSSI as described in the document listed in Condition A1 including commissioning trials of equipment and temporary use of any part of the CSSI but excluding low impact work which carried out or completed prior to approval of the CEMP.
DEC	Former Department of Environment & Conservation NSW
DPE	NSW Department of Planning and Environment (formerly the Department of Planning, Industry and Environment)
DPIE	NSW Department of Planning, Industry and Environment (now known as Department of Planning and Environment)
EIS	Environmental Impact Statement
EPA	NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPL	Environmental Protection Licence
ER	Environmental Representative
EU	European Union

Abbreviations	Expanded text
JHCPB	John Holland CPB Contractors
MCoA	Minister's Conditions of Approval
Minister, the	Minister for Planning and Homes
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
OEH	Former Office of Environment and Heritage
$PM_{2.5}$	Particulate matter less than or equal to 2.5 micrometres in diameter
PM_{10}	Particulate matter less than or equal to 10 micrometres in diameter
POEO Act	*Protection of the Environment Operations Act 1997*
Project, the	Western Harbour Tunnel Stage 3A
Project Area	The area required to facilitate the construction of the Project (ie construction footprint)
REMM	Revised Environmental Management Measure
Roads and Maritime	Former NSW Roads and Maritime Services, now part of Transport for NSW
RtS	Response to Submissions Report
SMART	Specific, Measurable, Achievable, Relevant and Time-based
TfNSW	Transport for NSW
WFU	Warringah Freeway Upgrade (component of the Western Harbour Tunnel and Warringah Freeway Upgrade project)
WHT	Western Harbour Tunnel (component of the Western Harbour Tunnel and Warringah Freeway Upgrade project)

1 Introduction

1.1 Context

This Air Quality Management Sub-Plan (AQMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for Stage 3A of the Western Harbour Tunnel project (the Project), a component of the Western Harbour Tunnel and Warringah Freeway Upgrade project.

This AQMP has been prepared for the Project to address the relevant requirements of the Minister's Conditions of Approval (MCoA) for the Western Harbour Tunnel and Warringah Freeway Upgrade project (SSI #8863), the Western Harbour Tunnel and Warringah Freeway Upgrade Environmental Impact Statement dated January 2020 (the EIS), the Western Harbour Tunnel and Warringah Freeway Upgrade Response to Submissions Report dated September 2020 (the RtS) and applicable guidelines and legislation.

This Plan describes how the Project propose to manage potential air quality impacts during the construction of Stage 3A (for further details on staging, refer to the Staging Report). Other construction stages and operational impacts are not included within this AQMP.

1.2 Background and project description

The Western Harbour Tunnel and Warringah Freeway Upgrade project comprises a new motorway tunnel connection across Sydney Harbour, and an upgrade of the Warringah Freeway to integrate the new motorway infrastructure with the existing road network and to enable future connection to the proposed Beaches Link and Gore Hill Freeway Connection project.

The Western Harbour Tunnel (WHT) will connect the approved M4-M5 Link in Rozelle to the Warringah Freeway at North Sydney/Cammeray.

The Western Harbour Tunnel and Warringah Freeway Upgrade is being constructed in three stages. The Project (Stage 3A) includes the following key features:

- A portion of the twin mainline tunnels connecting the M4-M5 at Rozelle to the Warringah Freeway, near Cammeray, of about 2 kilometres long and commencing from the stub tunnels at the M4-M5 Link in Rozelle and terminating underground at Birchgrove
- Ventilation cavern and tunnel excavation in Rozelle
- Limited in tunnel operational infrastructure including road pavement and drainage to enable Stage 3B works.

The construction of the Project will be supported by two surface based ancillary facilities, located at the Western Harbour Tunnel cut and cover structure in Rozelle (WHT12) and at White Bay in Rozelle (WHT3). Figure 1-1 gives an overview of the construction support sites required for Stage 3A, along with the extent of the tunnelling activities.

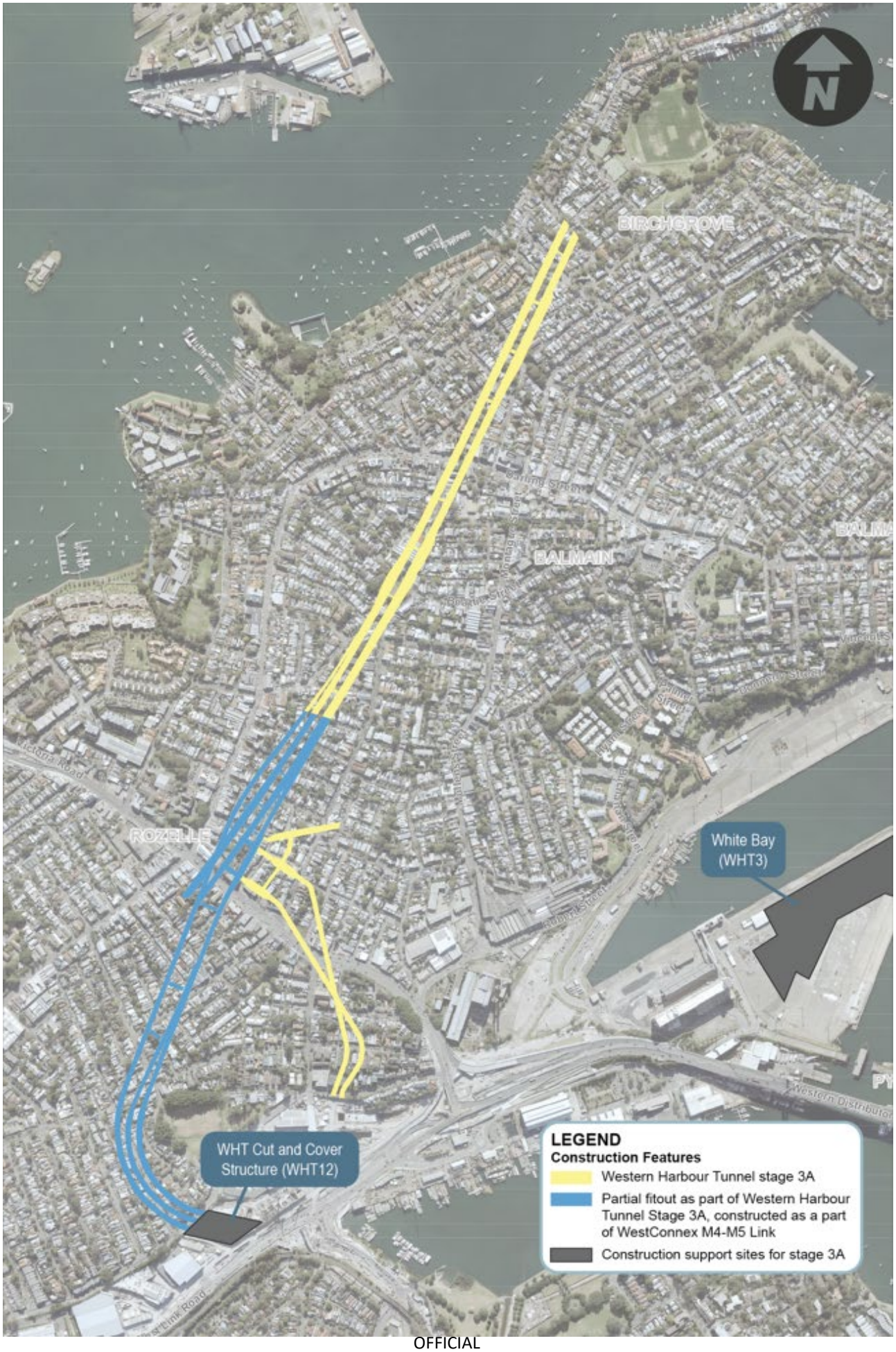

N
BIRCHGROVE
BALMAIN
ROZELLE
White Bay
(WHT3)
WHT Cut and Cover
Structure (WHT12)
LEGEND
Construction Features
Western Harbour Tunnel stage 3A
Partial fitout as part of Western Harbour Tunnel Stage 3A, constructed as a part of WestConnex M4-M5 Link
Construction support sites for stage 3A

Figure 1-1 WHT Stage 3A construction overview

The EIS was prepared to assess the impacts of construction and operation of the Western Harbour Tunnel and Warringah Freeway Upgrade project. As part of the EIS development, a detailed construction and operational air quality assessment was prepared as Appendix H (Technical working paper: Air Quality) (Jacobs, January 2020). The findings are summarised in Chapter 12 (Air Quality) of the EIS.

A RtS report was prepared in response to submissions received on the EIS. The RtS includes clarifications as well as further detail relating to air quality management issues of the Project. The EIS environmental management measures were revised and included in Part D of the RtS report, with specific air quality measures contained in Table 3-2 of this Plan.

The Western Harbour Tunnel and Warringah Freeway Upgrade project was declared to be Critical State Significant Infrastructure (CSSI) by the then Minister for Planning and Public Space on 9 November 2020 and approved by the then Minister for Planning and Public Spaces on 21 January 2021.

The administration of provisions under the *NSW Environmental Planning and Assessment Act 1979* including the Western Harbour Tunnel and Warringah Freeway Upgrade project's planning consent (SSI#8863) is now under the portfolio of the NSW Minister for Planning and Homes (the Minister).

The documents listed in the planning approval assessed the potential for air quality and odour impacts and concluded that overall, the construction phase of the Western Harbour Tunnel and Warringah Freeway Upgrade Project is unlikely to represent any serious ongoing problem with dust and any effects would be temporary and relatively short-lived.

Impacts specific to the Project will be managed through the implementation of mitigation and management measures described in this AQMP.

The Project description is provided in Section 1.2 of the CEMP.

1.3 Scope of the Sub-Plan

The scope of this AQMP is to describe how the Project will manage potential air quality impacts during construction of the Project. Operational impacts and operational measures do not fall within the scope of this Plan.

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

1.4 Environmental management systems overview

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

1.5 Interface with other planning documents

This AQMP is one of several plans and documents established to manage construction of the Project. The key documents that interface with the AQMP are outlined in Table 1-1.

Table 1-1 Key interfaces with the AQMP

Plan	Interface
Construction Environmental	▪ Provides details on overall Project staging, interactions between Sub-Plans of the CEMP, and management of cumulative impacts

Plan	Interface
Management Plan (CEMP)	▪ Provides a framework for how the construction works will be managed ▪ Identifies procedures, processes and management systems that will apply in relation to construction activities ▪ Provides environmental planning and controls for construction including environmental risk assessment, regulatory requirements, protection measures and sustainability requirements
Soil and Water Management Plan	▪ Sets out how soil and surface water will be managed during construction of the Project
Community Communication Strategy and Complaints Management System	▪ Describes how community and stakeholder engagement will be managed and facilitates communication about construction of the project with the community as well as relevant councils and agencies ▪ Specifies the process for receiving, addressing, resolving and recording complaints as well as outlines the process required in the escalation of a complaint to an independent mediator

2 Purpose and objectives

2.1 Purpose

The purpose of this AQMP is to describe how the Project will manage potential air quality impacts during construction of the Project.

This AQMP has been prepared to address the applicable statutory requirements and aims to ensure that the commitments in the planning approval are met with regard to impacts to air quality.

2.2 Objectives

The objective of the AQMP is to ensure all avoidance, mitigation and management measures, and licence/permit requirements relevant to air quality impacts are properly implemented.

To achieve these objectives, the Project will undertake the following:

- Ensure appropriate controls and procedures are implemented during construction activities to address air quality impacts along the Project corridor, as well as manage risks from analysis of relevant construction activities as per MCoA C2(d)(ii)
- Ensure appropriate measures are implemented to address the relevant MCoA requirements outlined in Table 3-1 and the safeguards detailed in the Response to Submissions report (RtS) and outlined in Table 3-2
- Ensure that the requirements of Roads and Maritime specification G36 Environment Protection are met
- Ensure the requirements of the Project's Environment Protection Licence (EPL) are met
- Implement relevant legislation and other requirements detailed in Section 3.1 of this AQMP.

Furthermore, the Contractor will meet the performance outcomes from the EIS that are relevant to air quality impacts, as required by MCoA C5(a), as identified in Table 2-1 below.

Table 2-1 Performance outcomes identified in the EIS relevant to this Plan

Performance outcome	How performance will be addressed	Records	Source
The project is designed, constructed and operated in a manner that minimises air quality impacts (including nuisance dust and odour) to minimise risks to human health and the environment to the greatest extent	Provide effective management of dust, and other emissions during construction • Implement the air quality mitigation measures in Section 7	Environmental inspection records Environmental monitoring results and reporting Sensitive Area Plans Complaints procedure	EIS – Chapter 28 (Table 28-4)

2.3 Targets

The following targets have been established for the management of air quality impacts during the project:

- Ensure full compliance with the relevant legislative requirements, MCoA and revised environmental management measures (REMMs)
- Meet EPL air quality parameters
- Meet Infrastructure Sustainability Council of Australia (ISCA) requirements
- Ensure air quality complaints from the community and stakeholders are managed in accordance with the Complaints Management System, as detailed within the Community Communication Strategy (CCS)
- Ensure training on best practice air quality management is provided to all construction personnel through site inductions
- Provide effective management of dust, other emissions during construction to minimise risks to human health and the environment.

3 Environmental requirements

3.1 Relevant legislation and guidelines

3.1.1 Legislation

Legislation and regulatory requirements relevant to air quality for this Project include:

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

Legislation relevant to this AQMP is included in Appendix A1 of the CEMP.

3.1.2 Additional approvals, licences, permits and requirements

An Environmental Protection Licence (EPL) is required for the Project. Refer to Appendix A1 of the CEMP for all other requirements.

3.1.3 Guidelines and standards

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

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

3.2 Air quality criteria

Air quality performance criteria applicable to the Project is detailed in the Air Quality Monitoring Program (Appendix E2, Section 3.2.2).

No dust generating activities will be undertaken at WHT3 as this site will be solely used for laydown of construction materials and parking. Odour monitoring is not deemed necessary as part of the Stage 3A scope of works. The EIS only identifies potential construction related odour

impacts generated during the dredging, handling and management of harbour sediments within Sydney Harbour and at the White Bay construction support site (WHT3) which are not relevant to Stage 3A of the WHT.

3.3 Minister's Conditions of Approval

The MCoA relevant to this Plan are listed in Table 3-1. A cross reference is also included to indicate where and how the conditions are addressed in this Plan or other Project management documents.

Table 3-1 Minister's Conditions of Approval relevant to this Plan

MCoA No.	Condition Requirements	Document Reference	How addressed
General			
A5	Where the terms of this approval require a document or monitoring program to be prepared or a review to be undertaken in consultation with identified parties, evidence of the consultation undertaken must be submitted to the Planning Secretary with the document. The evidence must include: (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; and (e) a description of the outstanding issues raised by the identified party and the reasons why they have not been addressed.	Section 4.1	This AQMP has been prepared in consultation with the relevant agencies identified in MCoA C4(d). A summary of consultation is included in Table 4-1.

<table>
<tr><th>MCoA No.</th><th>Condition Requirements</th><th>Document Reference</th><th>How addressed</th></tr>
<tr><td colspan="2">Construction Environmental Management Plan</td><td></td><td></td></tr>
<tr><td>C4</td><td>CEMP Sub-plans must be prepared in consultation with the relevant government 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.
<table>
<tr><th></th><th>Required CEMP Sub-plan</th><th>Relevant government agencies to be consulted for each CEMP Sub-plan</th></tr>
<tr><td>(d)</td><td>Air quality and odour</td><td>NSW Health, relevant council(s)</td></tr>
</table></td><td>Section 4.1</td><td>This AQMP has been prepared in consultation with the relevant agencies identified in this condition. A summary is included in Table 4-1.</td></tr>
<tr><td rowspan="2">C5</td><td>The CEMP Sub-plans must state how:
(a) the environmental performance outcomes identified in the documents listed in Condition A1 will be achieved;</td><td>Section 2.2</td><td>This AQMP was prepared in accordance with the environmental performance outcomes identified in the EIS and RtS as outlined in Section 2.2</td></tr>
<tr><td>(b) the mitigation measures identified in the documents listed in Condition A1 will be implemented;</td><td>Table 3-2
Table 7-1</td><td>Relevant environmental management measures are detailed in Table 3-2 including where and how they are addressed in this Plan
Measures to achieve these requirements are detailed in Section 7 of this Plan</td></tr>
</table>

MCoA No.	Condition Requirements	Document Reference	How addressed
	(c) the relevant terms of this approval will be complied with; and	Table 3-1	Details of how the Project will comply with the relevant terms of the approval are listed in this Table, including references to the relevant sections of this AQMP
	(d) issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed through SMART principles.	Table 7-1 Environmental Risk Assessment Workshop (Section 3.2.1 of the CEMP) Section 6.2 Appendix E2 Section 4	Air quality issues requiring management during construction of the Project have been identified through the EIS, RtS and Environmental Risk Assessment Workshop. These issues, including cumulative impacts, have been outlined in Appendix A2of the CEMP. Environmental risk analysis will be ongoing and regularly reviewed in accordance with Section 3.2.1 of the CEMP. Air quality issues, including cumulative impacts, are detailed in Section 6 of this AQMP. Management measures identified in Table 7-1 of this AQMP have been developed with consideration of SMART principles
C9	The CEMP Sub-plans must 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 month before construction.	Table 3-1 Section 2 of the CEMP	The CEMP Sub-plans will be submitted for approval to DPE with, or subsequent to, the submission of the CEMP no later than one month before construction.

<table>
<tr><th>MCoA No.</th><th>Condition Requirements</th><th>Document Reference</th><th>How addressed</th></tr>
<tr><td>C10</td><td>Construction must not commence until the CEMP and all CEMP Sub-plans have been approved, unless otherwise agreed 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 CSSI is staged, 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.</td><td>Section 2 of the CEMP</td><td>Construction of the Project will not commence until the CEMP and applicable Sub-plans as per the Staging Report have been approved, unless it is otherwise agreed by the Planning Secretary. The CEMP and CEMP Sub-plans will be implemented for the duration of construction</td></tr>
<tr><td colspan="2">Construction Monitoring Programs</td><td></td><td></td></tr>
<tr><td>C11</td><td>The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies identified for each to compare actual performance of construction of the CSSI against the performance predicted in the documents listed in Condition A1 or in the CEMP:<table><tr><th></th><th>Required Construction Monitoring Program</th><th>Relevant government agencies to be consulted for each Construction Monitoring Program</th></tr><tr><td>(b)</td><td>Air Quality (including Odour) Monitoring</td><td>EPA</td></tr></table></td><td>Section 7
Table 7-1 – AQMP12
Air Quality Monitoring Program (Appendix E2)</td><td>An Air Quality Monitoring Program has been prepared in accordance with this condition and is included in Appendix E2 of this Plan.</td></tr>
<tr><td>C12</td><td>Each Construction Monitoring Program must provide:
a) Details of baseline data available</td><td>Section 3.1 of the Air Quality Monitoring Program (Appendix E2)</td><td>The Air Quality Monitoring Program is included in Appendix E2</td></tr>
</table>

MCoA No.	Condition Requirements	Document Reference	How addressed
	b) Details of baseline data to be obtained and when	Section 3.1 of the Air Quality Monitoring Program (Appendix E2)	The Air Quality Monitoring Program is included in Appendix E2
	c) Details of all monitoring of the project to be undertaken;	Section 3, 4 and 5 of the Air Quality Monitoring Program (Appendix E2)	The Air Quality Monitoring Program is included in Appendix E2
	d) The parameters of the project to be monitored;	Section 3 of the Air Quality Monitoring Program (Appendix E2)	The Air Quality Monitoring Program is included in Appendix E2
	e) The frequency of monitoring to be undertaken;	Section 3 of the Air Quality Monitoring Program (Appendix E2)	The Air Quality Monitoring Program is included in Appendix E2
	f) The location of monitoring;	Section 3 of the Air Quality Monitoring Program (Appendix E2)	The Air Quality Monitoring Program is included in Appendix E2
	g) The reporting of monitoring results and analysis results against relevant criteria;	Section 5.5 of the Air Quality Monitoring Program (Appendix E2)	The Air Quality Monitoring Program is included in Appendix E2

MCoA No.	Condition Requirements	Document Reference	How addressed
	h) Details of the methods that will be used to analyse the monitoring data;	Section 3 of the Air Quality Monitoring Program (Appendix E2)	The Air Quality Monitoring Program is included in Appendix E2
	i) Procedures to identify and implement additional mitigation measures where the results of the monitoring indicate unacceptable project impacts;	Section 5 of the Air Quality Monitoring Program (Appendix E2)	The Air Quality Monitoring Program is included in Appendix E2
	j) A consideration of SMART principles;	Section 4 of the Air Quality Monitoring Program (Appendix E2)	The Air Quality Monitoring Program is included in Appendix E2
	k) Any consultation to be undertaken in relation to the monitoring programs	Section 2.3 of the Air Quality Monitoring Program (Appendix E2) and Section 4 of this Plan	The Air Quality Monitoring Program is included in Appendix E2
	l) Any specific requirements as required by Conditions C13 to C16.	Not applicable	These conditions are not applicable to this Plan and apply to other Project Monitoring Plans

MCoA No.	Condition Requirements	Document Reference	How addressed
C17	The Construction Monitoring Programs must be developed in consultation with relevant government agencies as identified in Condition C11. 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.	Section 4.1 Table 4-1 Appendix E2	This AQMP, including the Air Quality Monitoring Program (Appendix E2), has been prepared in consultation with the relevant agencies identified in MCoA C4(d). A summary of consultation is included in Table 4-1
C18	The Construction Monitoring Programs must be endorsed by the ER and then submitted to the Planning Secretary for approval at least one month before the commencement of construction.	Section 1.3 of the Air Quality Monitoring Program (Appendix E2) Section 2 of the CEMP	This Plan and the Air Quality Monitoring Program (Appendix E2) will be endorsed by the Environmental Representative and then submitted to the Planning Secretary for approval at least one month before the commencement of construction.
C19	Unless otherwise agreed with the Planning Secretary, construction must not commence until 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	Section 1.3 of the Air Quality Monitoring Program (Appendix E2) Section 2 of the CEMP	Construction will not commence until this Plan has been approved by the Planning Secretary.

MCoA No.	Condition Requirements	Document Reference	How addressed
C20	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.	Section 1.3 of the Air Quality Monitoring Program (Appendix E2) Section 9.2 of this Plan Section 3.1.3 of the CEMP	The Air Quality Management Program (Appendix E2), as approved by the Planning Secretary, including any minor amendments approved by the Environmental Representative, will be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the DPE, whichever is the greater.
C21	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program. *Note: Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan*	Section 6.5 of the Air Quality Monitoring Program (Appendix E2) Section 8.6	The results of monitoring undertaken in accordance with the Air Quality Management Plan will be submitted to the EPA and DPE as required and at the frequency outlined in Section 6.5 of the Air Quality Monitoring Program (Appendix E2).
Air Quality and Odour			
E1	Measures must be implemented to minimise and manage the emission of dust, odour and other air pollutants during construction and operation	Section 7.3 and Table 7-1	Measures to achieve this condition are detailed in Section 7 and Table 7-1 of this Plan.

3.4 Revised Environmental Management Measures

Relevant Revised Environmental Management Measures (REMMs), as identified in Part D of the RtS, are listed in Table 3-2 below. This includes reference to required outcomes, the timing of when and how the commitment applies and where it has been addressed in the AQMP.

Table 3-2 Revised Environmental management measures relevant to this AQMP

Ref #	Commitment	Timing	Document Reference	How Addressed
AQ1	Standard construction air quality mitigation and management measures will be detailed in construction management documentation and implemented during construction, such as: a) Reasonable and feasible dust suppression and/or management measures, including the use of water carts, dust sweepers, sprinklers, dust screens, site exit controls (eg wheel washing systems and rumble grids), stabilisation of exposed areas or stockpiles, and surface treatments	Construction	Section 7.3 Table 7-1 – AQMP1	Appropriate dust suppression measures will be implemented during construction as outlined in Section 7.3 and Table 7-1.
	b) Selection of construction equipment and/or materials handling techniques that minimise the potential for dust generation		Section 7.3 Table 7-1 – AQMP2	Construction equipment and/or materials handling techniques will be selected that minimise the potential for dust generation
	c) Management measures to minimise dust generation during the transfer, handling and on-site storage of spoil and construction materials (such as sand, aggregates, or fine materials) (e.g. the covering of vehicle loads)		Section 7.3 Table 7-1 – AQMP3	Measure to minimise dust generation during the transfer, handling and on-site storage of spoil and construction materials will be implemented

Ref #	Commitment	Timing	Document Reference	How Addressed
	d) Adjustment or management of dust generating activities during unfavourable weather conditions, where possible		Section 7.3 Table 7-1 – AQMP4	Management and mitigation techniques will continue to function in accordance with requirements of the AQMP as dust generating activities will predominately occur underground and are not susceptible to unfavourable weather conditions.
	e) Minimisation of exposed areas during construction		Section 7.3 Table 7-1 – AQMP5	Not relevant to Stage 3A of the WHT Project
	f) Management measures for managing unexpected odour generation likely to result in odour impacts at sensitive receivers in the vicinity during the disturbance, handling and storage of potentially odorous materials, including any contingency measures		Section 7.3 Table 7-1 – AQMP4 Table 7-1 – AQMP6 Table 7-1 – AQMP14	Generation of offensive odours are not expected for Stage 3A of the WHT Project. Proactive identification of unexpected odours will be completed as part of weekly site inspections.
	g) Internal project communication protocols to ensure dust-generating activities in the same area are coordinated and mitigated to manage cumulative dust impacts of the project		Section 7.3 Table 7-1 – AQMP10	Internal project communication protocols will be implemented to minimise cumulative impacts due to dust-generating activities in the same area
	h) Site inspections will be carried out to monitor compliance with implemented measures.		Section 7.3 Table 7-1 – AQMP7	Site inspections will be carried out to monitor compliance with implemented measures

Ref #	Commitment	Timing	Document Reference	How Addressed
AQ2	Dust and air quality complaints will be managed in accordance with the overarching complaints handling process for the project. Appropriate corrective actions, if required, will be taken to reduce emissions in a timely manner.	Construction	Section 7.3 Table 7-1 – AQMP11	Dust and air quality complaints will be managed in accordance with the overarching complaints handling process for the project. Appropriate corrective actions, if required, will be taken to reduce emissions in a timely manner

4 Consultation

4.1 Consultation for AQMP Preparation

This AQMP has been developed and finalised in consultation with the agencies outlined in MCoA C4(d) and in accordance with MCoA A5.

The Air Quality Monitoring Program included in Appendix E2 has been finalised in consultation with the agencies outlined in MCoA C11(b) and in accordance with MCoA A5.

Consultation with each agency, including responses received and how any issues raised were addressed in the development of this Plan are summarised in Table 4-1.

4.2 Ongoing consultation

Any ongoing consultation with agencies, where required, will be undertaken in accordance with Section 7 of this Plan. Community feedback and complaints relating to air quality will be managed in accordance with the Community Communication Strategy and Complaints Management System.

Table 4-1 Summary of consultation undertaken for the development of this Plan

Agency	Date of engagement	Date correspondence received	Key issues	Where addressed / how addressed	Outstanding issues / why not addressed
AQMP (this Plan)					
NSW Health	Via phone call: 14/07/2022 – Project details left with NSW Health representative 19/07/2022 – Overview of Project provided to NSW Health and offer briefing of Stage 3A works. Via email: 14/07/2022 – Submission of AQMP formally to NSW Health Via planning portal: 14/07/2022 – Submission of AQMP formally to NSW Health Via video conference: 25/07/2022 – Project led briefing	Via phone call: 03/08/2022 – Nick Ives from Northern Sydney LHD confirming no comments on Stage 3A works. Via email: 03/08/2022 – Letter provided regarding AQMP	Air quality monitoring location rationale	Air quality monitoring locations are to be determined in accordance with the relevant standards, as outlined in Section 4.1 of the Air Quality Monitoring Program.	

Inner West Council	Via phone call: 06/07/2022 – Initial contact with IWC to overview management plans and organise a briefing to be run by the Project Via email: 14/07/2022 – Submission of AQMP formally to IWC Via planning portal: 14/07/2022 – Submission of AQMP formally to IWC Via video conference: 18/07/2022 – Project briefing held with key members from IWC to overview Stage 3A Via email: 16/08/2022 – Follow up with IWC to check whether comments on the plan would be provided 25/10/2022 – follow up email to IWC seeking confirmation of any comments on AQMP.	3/11/2022 – IWC provided comments on AQMP	IWC notes the reduced risk of air quality impacts given the siting of WHT12. IWC notes there are a significant number of potential 'receivers' in the Inner West Council area. IWC expects the Project to comply with relevant standards and implement best practice measures to mitigate any residual air quality risk.	Mitigation measures, including best practice measures, are contained in Section 7.3.	N/A

Agency	Date of engagement	Date correspondence received	Key issues	Where addressed / how addressed	Outstanding issues / why not addressed
	03/11/2022 – phone call with IWC representative to discuss council comments and confirm timing of IWC's comment submission				
Air Quality Monitoring Program (Appendix E2 of this Plan)					

Agency	Date of engagement	Date correspondence received	Key issues	Where addressed / how addressed	Outstanding issues / why not addressed
EPA	Via phone call: 06/07/2022 – Call to Stuart Clark (Senior Compliance Officer) advising submission of management plans for consultation. Project briefing offered and accepted. 18/07/2022 – Call to Michael Simpson, message left to discuss management plan consultation and briefing date Via email: Submission of AQMP formally to EPA Via planning portal: Submission of AQMP formally to EPA	Via email: 10/08/2022 – Comments received from EPA in regard to Air Quality Monitoring Program	EPA acknowledge the risk to air quality is low for WHT Stage 3A stage of works, considering most works will be completed underground. EPA provided suggestions for future AQMPs	N/A	N/A

5 Existing Environment

Air quality in a region is influenced by a number of factors including the terrain, meteorology (weather patterns), historical trends in road traffic emissions and the current (ambient) and historical air quality environment.

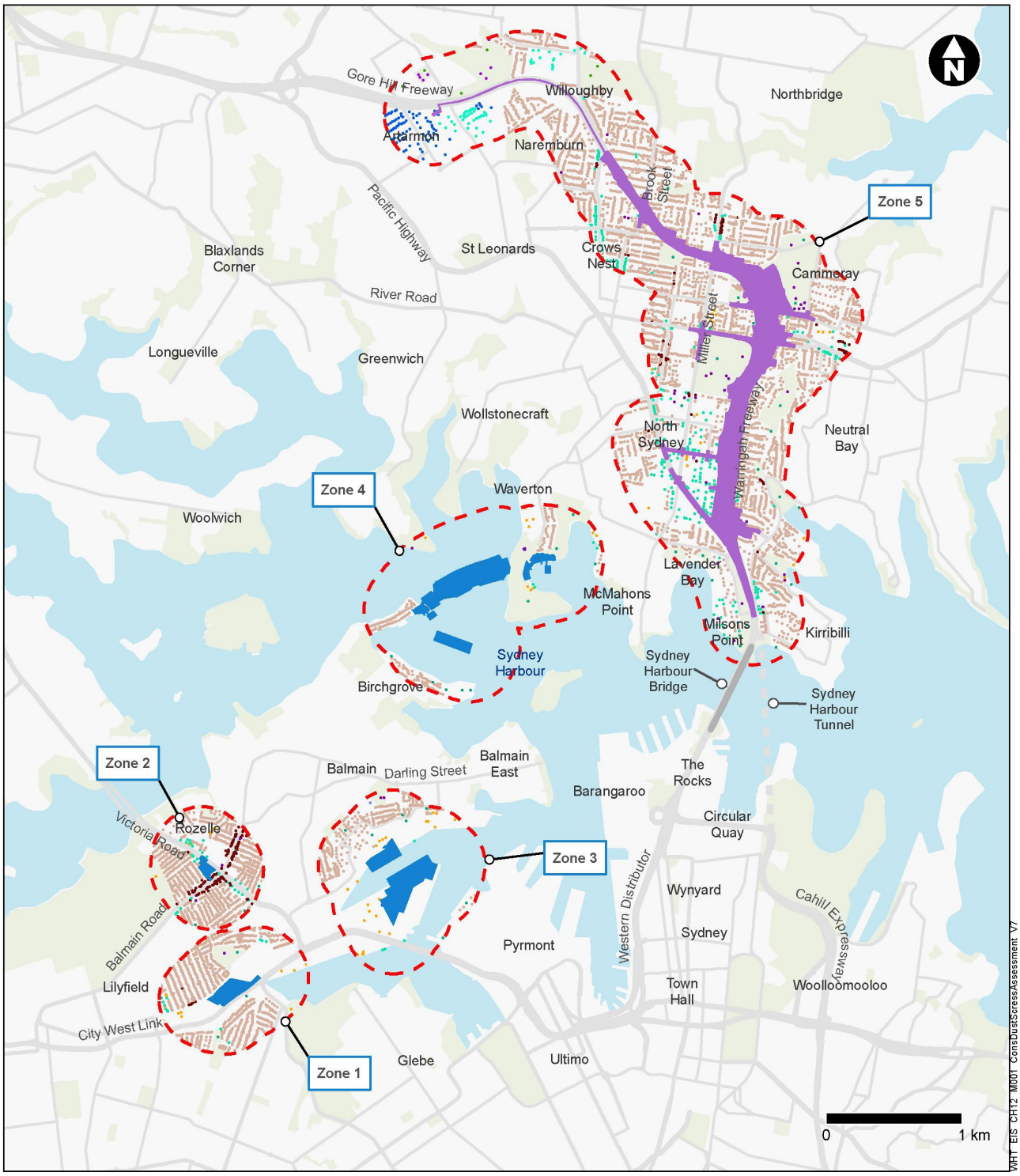
The following sections summarise what is known about existing air quality conditions within and adjacent to the Project, and factors influencing potential air quality impacts.

Data presented within this plan is based on information contained in Section 12.4 of Chapter 12 (Air Quality) and Appendix H (Technical working paper: Air quality) of the EIS.

5.1 EIS dust assessment zones

The construction dust assessment for the EIS considered potential dust impacts across five assessment zones, with the Western Harbour Tunnel cut and cover structure in Rozelle (WHT12) which will be used for access/egress for the Project located within Zone 1. White Bay construction support site (WHT3) is located in Zone 3 (however this site will be solely used for the Project for laydown of construction materials and parking only and so no dust generation is expected).

Receiver type and density of receivers located within 350 metres to the project footprint is shown in Figure 5-1 below. Residential receivers comprise the majority of receiver types in proximity to the project, followed by a number of industrial receivers (particularly around White Bay) as well as commercial receivers with concentrations on arterial roads in Rozelle.



Legend

- Western Harbour Tunnel construction footprint
- Warringah Freeway Upgrade construction footprint
- 350m construction buffer

Receiver type

- Residential
- Commercial
- Community
- Hospital
- Industrial
- Mixed use
- Recreation

(Reference: Western Harbour Tunnel and Warringah Freeway Upgrade Environmental Impact Statement, Figure 12-4)

Figure 5-1 Receiver type and density in proximity to the project used in the EIS - Western Harbour Tunnel cut and cover structure (WHT12) sits within zone 1

Note – For Stage 3A works only Zone 1 is applicable – refer to Section 1.2 and Table 6-1. Appendix E1 contains an updated dust catchment area for Stage 3A.

5.2 Air quality records

Air quality in the vicinity of the Western Harbour Tunnel is expected to be representative of a high density commercial / urban environment. The adjacent arterial roads to the project, namely City West Link and Victoria Road, represent the primary sources of air pollution in the area.

Air quality monitoring relevant to the Project has been undertaken through monitoring at nearby Department of Planning and Environment (DPE) and Transport for NSW monitoring stations. Data from Appendix H (Technical working paper: Air quality) of the EIS showed the following for ambient air quality between 2004 and 2018 at DPE stations (Chullora, Earlwood, Randwick, Rozelle, Lindfield, Liverpool and Prospect) and Transport for NSW M5 East stations (CBMS, T1, U1, X1, F1 and M1):

- Maximum 1-hour and rolling 8-hour mean CO
    - All values were well below the NSW EPA air quality criteria of 30 mg/m^3 (1-hour) and 10 mg/m^3 (8-hour), and concentrations were fairly stable at all stations between 2004 and 2018. In 2016 the maximum 1-hour concentrations were typically between around 2–3 mg/m^3, and the maximum 8-hour concentrations were around 2 mg/m^3.
    - There were general downward trends in maximum concentrations, and these were statistically significant at most stations
- Annual mean NO_2
    - Concentrations at all stations were well below the NSW EPA air quality criterion of 62 µg/m^3 and ranged between around 15 and 25 µg/m^3 (depending on the station) in recent years. Values at the DPE stations exhibited a systematic, and generally significant, downward trend overall. However, in recent years the concentrations at some stations appear to have stabilised
    - The long-term average NO_2 concentrations at the RMS roadside stations (F1 and M1) were 34–37 µg/m^3, and around 10–20 µg/m^3 higher than those at the background stations. Even so, the concentrations at the roadside stations were also well below the criterion.
- Maximum 1-hour NO_2
    - Although variable from year to year, maximum NO_2 concentrations have been fairly stable in the longer term. The values across all stations typically range between 80–120 µg/m^3, and continue to be well below the criterion of 246 µg/m^3
    - The maximum 1-hour mean NO_2 concentrations at the Roads and Maritime roadside stations in 2016 were 144–165 µg/m^3. These values were higher than the highest maximum values for the background stations
- Annual mean PM_{10}
    - Concentrations at the DPE stations showed a downward trend, and this was statistically significant at several stations. In recent years the annual mean concentration at these stations has been between 17–19 µg/m^3, except at Lindfield where the concentration is substantially lower (around 14 µg/m^3). The concentrations at the RMS background stations appear to have stabilised at around 15 µg/m^3. These values can be compared with air quality criterion of 30 µg/m^3 and the standard of 25 µg/m^3 in the recently varied NEPM
- Maximum 24-hour PM_{10}

- Maximum 24-hour PM_{10} concentrations exhibited a slight downward trend overall, but there was a large amount of variation from year to year. In 2016 the concentrations at the various stations were clustered around 40 µg/m^3

- Annual mean $PM_{2.5}$
  - $PM_{2.5}$ has only been measured over several years at three DPE stations in the study area. Concentrations at Chullora and Earlwood showed a similar pattern, with a systematic reduction between 2004 and 2012 being followed by a substantial increase in 2013. The main reason for the increase was a change in the measurement method. The increases meant that background PM2.5 concentrations in the study area during 2016 were already very close to or above the standard in the AAQ NEPM of 8 µg/m^3, and above the long-term goal of 7 µg/m^3
- Maximum 24-hour $PM_{2.5}$
  - There has been no systematic trend in the maximum 24-hour $PM_{2.5}$ concentration. As with the annual mean $PM_{2.5}$ concentration, the maximum 1-hour concentrations were very close to or above the standard in the AAQ NEPM of 25 µg/m^3, and were generally above the long-term goal of 20 µg/m^3.

5.3 Rainfall, soil dryness and wind

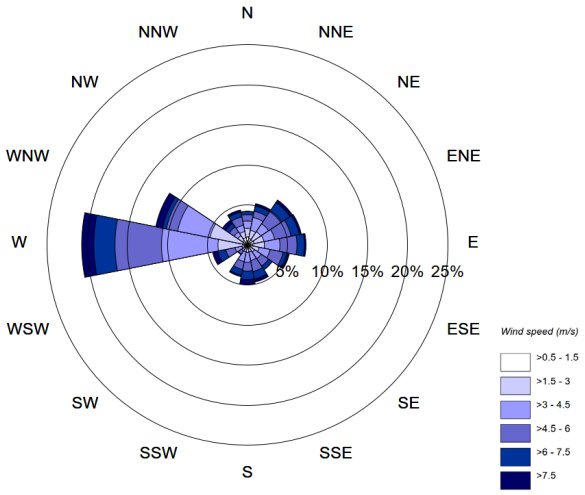
Meteorology conditions along the Project are expected to be representative of coastal areas along the east coast of NSW.

Climatic information for the region representative of the Project was extracted from the BOM data set for the Sydney (Observatory Hill) (site number 066064). A summary of the temperature and rainfall data is shown below in Table 5-1 with a wind rose from the closest BOM station presented in Figure 5-2.

Table 5-1 Environmental management measures relevant to this AQMP

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean daily maximum temperature (ºC)												
26	25.8	24.8	22.5	19.5	17	16.4	17.9	20.1	22.2	23.7	25.2	21.8
Mean daily minimum temperature (ºC)												
18.8	18.8	17.6	14.7	11.6	9.3	8.1	9	11.1	13.6	15.7	17.6	13.8
Mean monthly rainfall (mm)												
101.7	117.5	130.8	128.5	118.6	133.2	96.6	80.7	67.9	76.4	83.6	77.5	1216
Mean rain days per month (number)												
8.6	9	9.8	9	8.6	8.7	7.5	7.2	7.2	7.9	8.4	8	99.9

Source: BoM (2018) Climate averages for Station: 066064; Commenced: 1858 – last record April 2018; Latitude: 33.86°S; Longitude: 151.21 °E



BoM Fort Denison

Figure 5-2 Fort Denison Meteorological Data, 2016

Meteorological patterns in the vicinity of the Western Harbour Tunnel are dominated by typical Sydney harbour coastal sea breeze patterns, with westerly winds dominating with a lesser degree of easterly and north-easterly winds noted at the Fort Denison meteorological station.

From a construction dust perspective, the meteorological data that is most relevant is the wind speed and temperature. As the majority of WHT Stage 3A's works are completed below ground, these works are not susceptible to meteorological conditions that would typically trigger specific protocol for high-risk weather conditions.

6 Environmental aspects and impacts

6.1 Construction activities

Given the scope of WHT Stage 3A is predominantly limited to activities underground and within the established cut and cover structure emissions to the atmosphere during construction are expected to be temporary and relatively short lived. Adverse impacts to air quality from construction activities are typically divided into the following categories:

- Dust and particulates
- Gaseous / odour.

Key construction activities for Stage 3A of the WHT that could result in dust and particulate emissions above ground include:

- Tracking dirt onto roads
- Spoil haulage
- Operation of the ancillary facility (Western Harbour Tunnel cut and cover structure (WHT12)

Key construction activities for Stage 3A of the WHT that could result in gaseous emissions above ground include:

- Vehicle and plant exhaust emissions
- Gases potentially released during:
  - Sealing works
  - Road line marking

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

6.2 Air quality impacts arising from construction

The potential for impacts on air quality will depend on a number of factors. Primarily, impacts will be dependent on the nature, extent and magnitude of construction activities and their interaction with the natural environment.

Generally, impacts attributable to construction of the Project might include:

- Dust deposition, resulting in the soiling of surfaces
- Visible dust plumes
- Elevated PM10 concentrations
- Increased concentrations of airborne particles.

As stated above, the proposed work activities to be completed as part of WHT 3A will be completed primarily underground or within the cut and cover structure, and the potential impacts are expected to be minimal to the surrounding receiving environment.

6.2.1 Factors likely to affect dust generation and impacts

Several environment factors have the potential to affect the likelihood of dust emissions during construction of the Project. These include:

- The nature and location of construction activities
- Wind direction – determines whether dust and suspended particles are transported in the direction of sensitive receivers

- Wind speed – governs the potential suspension and drift resistance of particles
- 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

6.2.2 Dust emissions from surface construction works

Without mitigation, sites and activities that were determined in the EIS to have a high and medium risk of dust impacts included:

- Rozelle Rail Yards construction support site (WHT1) and surrounds: Medium risk (if unmitigated) of dust settlement from, construction and track-out, and to human health from construction
- White Bay construction support site (WHT3): Medium risk (if unmitigated) of dust settlement and to human health from earthworks and track-out

Supplementary construction dust assessment

Ancillary site configurations and locations have been refined since the EIS, with this stage of the WHT being delivered predominantly from within the Western Harbour cut and cover structure at Rozelle (WHT12). Accordingly, a supplementary assessment of potential impacts has been included below and follows the process undertaken in the EIS. Figure 6-1 and Table 6-1 below outline the construction assessment zones and activities occurring for Stage 3A.

Table 6-1 Construction assessment zones

Assessment Zone	Construction support sites within each assessment zone	Constructions works at surface for Stage 3A
Zone 1	Western Harbour Tunnel cut and cover structure (WHT12)	Haulage of material, site deliveries
Zone 3	White Bay construction support site (WHT3)	Light vehicle parking, office operation, laydown area. No dust or odour generating activities to occur at this area for Stage 3A.

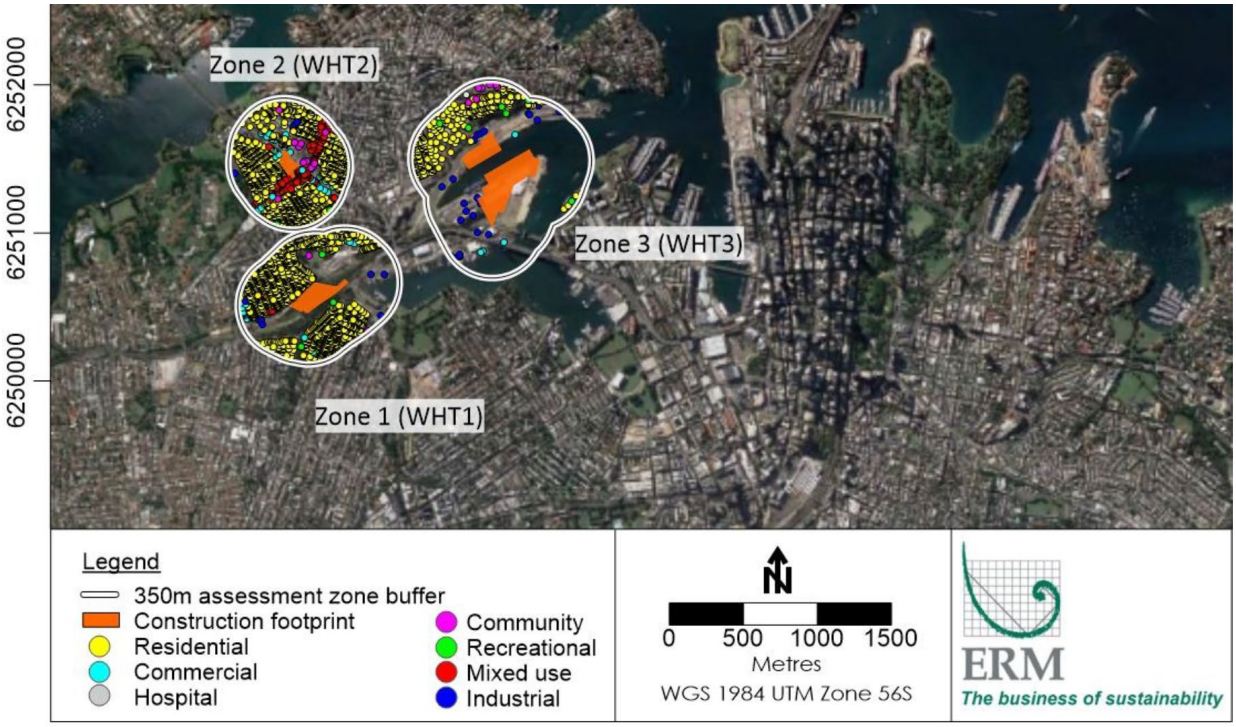


Figure 6-1 Construction assessment zones used in the EIS – Wester Harbour Tunnel cut and cover structure (WHT12) sits within zone 1 WHT cut and cover and WHT1 footprint

Note – For Stage 3A works only Zone 1 is applicable – refer to Section 1.2 and Table 6-1. Appendix E1 contains an updated dust catchment area for Stage 3A.The risk assessment is broken down into steps in accordance with the IAQM 2014 guideline.

Step 1: Screening

The first step in the process involves screening to determine whether further assessment is required. The IAQM guideline notes further assessment is required where there are human receptors within 350 metres of the assessment zone boundary. Western Harbour Tunnel cut and cover structure (WHT12) and White Bay construction support site (WHT3) have multiple human receptors within this buffer zone and therefore further assessment has been undertaken and is outlined below.

Step 2: Risk assessment

In Step 2 the risk of dust arising in sufficient quantities to cause annoyance and/or health effects was determined separately for each zone and each of the four types of guideline activities (demolition, earthworks, construction, and track-out). Risk categories were assigned to the assessment zones based on two factors:

- The scale and nature of the works, which determined the magnitude of potential dust emissions. This was assessed in Step 2A
- The sensitivity of the area, including the proximity of sensitive receptors (that is, the potential for effects). This is assessed in Step 2B.

These factors are combined in Step 2C to provide an estimate of the risk of dust impacts, prior to mitigation. Risks were categorised as low, medium or high for each of the four separate potential activities. Where there was risk of an impact, then site-specific mitigation measures were considered in proportion to the level of risk.

Step 2A: Potential for dust emissions

The criteria for assessing the potential scale of dust emissions based on the scale and nature of the works are provided in Table 6-2.

Table 6-2 Criteria for assessing the potential scale of emissions

Type of activity	Potential emission magnitude		
	Large	Medium	Small
Demolition	Volume >50000 m3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level.	Volume 20000–50000 m3, potentially dusty construction material, demolition activities 10–20 m above ground level.	Volume <20000 m3, construction material with low potential for dust release (e.g. metal cladding, timber), demolition activities <10m above ground and during wetter months.
Earthworks	Site area >10000 m2, potentially dusty soil type (e.g. clay, which would be prone to suspension when dry due to small particle size), >10 heavy earth-moving vehicles active at any one time, formation of bunds>8 m in height, total material moved >100000 tonnes.	Site area 2500–10000 m2, moderately dusty soil type (e.g. silt), 5–10 heavy earth moving vehicles active at any one time, formation of bunds 4–8 m in height, total material moved 20000–100000 tonnes.	Site area <2500 m2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20000 tonnes, earthworks during wetter months.
Construction	Total building volume >100000 m3, piling, on site concrete batching; sandblasting	Building volume 25000–100000 m3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching.	Total building volume <25000 m3, construction material with low potential for dust release (e.g. metal cladding or timber).
Track-out	>50 HDVs (>3.5 tonnes) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m.	10–50 HDVs (>3.5 tonnes) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50–100 m.	<10 HDVs (>3.5 tonnes) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m.

Note: Demolition is defined as any activity that involves the removal of existing structures. This may also be referred to as de-construction, specifically when a building is to be removed a small part at a time.

Earthworks covers the processes of surfacing any excavated material, soil stripping, ground levelling, excavation and landscaping. Earthworks would primarily involve excavating material, haulage, rock breaking, tipping and stockpiling.

Construction is any activity that involves the provision of new structures, modification, or refurbishment. A structure would include a residential dwelling, office building, retail outlet and road.

Track-out involves the potential transport of dust and dirt by HDVs from the work sites onto the public road network, where it may potentially be deposited and then re-suspended by other vehicles. Vehicle numbers are for those vehicles that leave site after moving over unpaved ground.

The categorisation of the construction assessment zones for the project is summarised in Table 6-3. Track-out is relevant for those vehicles accessing the tunnel where surfaces are not paved. Spoil haulage routes, material deliveries to the ancillary site and general operation of the site will generally occur via a network of paved surfaces. There are no proposed activities within the WHT3 site that would trigger further assessment for dust impacts as defined in the IAQM guideline.

Table 6-3 Categorisation of assessment zones for each type of activity

Site category by assessment zone		
	Zone 1 (WHT12)	**Zone 3 (WHT3)**
Demolition	N/A	N/A
Earthworks	N/A	N/A
Construction	N/A	N/A
Track-out	Medium	N/A

Step 2B: Sensitivity of area

The sensitivity of the area takes into account the specific sensitivities of local receptors, the proximity and number of the receptors, and the local background PM10 concentration. The results of the sensitivity assessment conducted for the EIS are no longer reflective of the activities occurring at the construction sites required for Stage 3A. Accordingly, the number of receptors less than 100 meters from the site boundary and along the haulage route has decreased as the tunnel support site has moved underground. The number of assumed receptors for each location type are based on the same approach adopted in Table 7-5 of Appendix H (Technical working paper: Air quality) of the EIS.

Where activities assessed in the EIS are no longer relevant or the number of receptors from the assessment zone boundary has changed, the results in Table 6-4 and Table 6-5 have been updated. Table 6-4 gives an overview of the resulting sensitivities to dust settlement and the approximate number of receptors within the assessment zone.

Table 6-4 Results of sensitivity to dust settlement effects

Zone	**Activity**	**Receptor sensitivity**	**Number of receptors by distance from assessment zone boundary (m)**				**Sensitivity of area**
			<20	**20-50**	**50-100**	**100-350**	
Zone 1 (WHT12)	Demolition	N/A	N/A	N/A	N/A	N/A	N/A
	Earthworks	N/A	N/A	N/A	N/A	N/A	N/A
	Construction	N/A	N/A	N/A	N/A	N/A	N/A
	Track-out	High	0	20	70	N/A	Medium
	Demolition	N/A	N/A	N/A	N/A	N/A	N/A

Zone 3 (WHT3)	Earthworks	N/A	N/A	N/A	N/A	N/A	N/A
	Construction	N/A	N/A	N/A	N/A	N/A	N/A
	Track-out	N/A	N/A	N/A	N/A	N/A	N/A

Based on the IAQM guidance the receptor sensitivity for human health impacts caused by construction dust is assumed to be 'high'. Table 6-5 outlines the approximate number of receptors for each zone and activity and the resulting sensitivity to human health impacts.

Table 6-5 Results of sensitivity of area to health impacts

Zone	Activity	Receptor sensitivity	Annual mean PM_{10} conc. (ug/m^3)	Number of receptors by distance from assessment zone boundary (m)				Sensitivity of area
				<20	20-50	50-100	100-350	
Zone 1 (WHT12)	Demolition	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Earthworks	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Construction	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Track-out	High	15-17.5	0	20	70	N/A	Medium
Zone 3 (WHT3)	Demolition	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Earthworks	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Construction	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Track-out	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Step 2C: Risk of dust impacts

The risk of potential dust impacts, without mitigation, was determined by combining the scale of potential emissions (Step 2A) with the sensitivity of the surrounding area (Step 2B). The risk matrix for Step 2C is provided in Table 6-6 for relevant activities. Table 6-6 provides the risk categories for those activities relevant to Stage 3A as required in the IAQM guideline.

Table 6-6 Risk categories

Type of Activity	Sensitivity of area (from Step 2B)	Potential emission magnitude (from Step 2A)		
		Large	Medium	Small
Track-out	High	High risk	Medium risk	Low risk

Type of Activity	Sensitivity of area (from Step 2B)	Potential emission magnitude (from Step 2A)		
		Large	Medium	Small
	Medium	Medium risk	Low risk	Negligible
	Low	Low risk	Low risk	Negligible

Based on the supplementary assessment outlined above, the risk category for track-out in Zone 1 is considered low for both dust settlement and human health. The impacts from Stage 3A are similar to those identified in the EIS, whereby the effects of airborne dust during construction will be temporary and of relatively short duration. As such, mitigation is considered straightforward because dust suppression measures are routinely employed as 'good practice' at most construction sites. Section 7 of this Plan provides a suite of mitigation measures that will be implemented to avoid or minimise air quality impacts.

However, it should be noted that even with rigorous air quality management in place, it is not possible to guarantee that the mitigation measures implemented to manage any potential dust impacts during construction will be wholly effective all the time. There is still the residual risk that nearby residences and commercial buildings receivers in the vicinity of construction works might experience occasional dust impacts. This does not imply that impacts are likely, or that if they did occur, that they will be frequent or persistent. Overall, construction dust is unlikely to represent a serious ongoing problem with effects being temporary and likely only to arise during dry weather with the wind blowing towards a receiver at a time when dust is being generated and mitigation measures are not fully effective.

These issues will be considered on a site-by-site basis and will be adequately managed through standard air quality mitigation and management measures.

6.2.3 Emissions from plant and equipment

The use of on-site diesel-powered vehicles, generators and construction equipment, and the handling and/or on-site storage of fuel and other chemicals, will potentially result in localised increased concentrations of airborne particle matter, CO, NO_x, sulfur dioxide and volatile organic compounds. The EIS found that minor emissions from these sources will be localised and will be adequately managed with standard environmental management measures.

7 Environmental mitigation and management measures

7.1 Air quality management strategies

Construction associated with the Project has the potential to impact air quality within and adjacent to the construction footprint. In order to avoid, mitigate and/or minimise these potential impacts, a range of environmental requirements and control measures are identified in the various environmental documents, including the EIS and other Transport for NSW guidance documents. Specific measures and requirements to address impacts on air quality are outlined in Table 7-1.

This section has been developed in consideration of the SMART Principles – Specific, Measurable, Achievable, Relevant and Time-based. Risk assessments for the Project, including the development of the REMMs as part of the detailed environmental risk analysis undertaken throughout the development of the EIS and RtS, as well as lessons learnt from previous major projects delivered by Transport for NSW in highly urbanised environments, have contributed to the development of this Plan. On this basis, the measures developed for the Project are considered to be relevant and achievable for the Project and would be monitored against specific, measurable and time-based targets through the Air Quality Monitoring Program (refer Appendix E2).

7.2 Dust catchment areas and sensitive receivers mapping

Dust catchment areas and sensitive receivers mapping is provided in Appendix E2. This mapping will be used by John Holland CPB Contractors (JHCPB) as a reference during construction and inductions. All employees, contractors and utility staff working on site will undergo site induction training relating to air quality impact management issues, as discussed in Section 8.2.

7.3 Management and mitigation measures

Management and mitigation measures relevant to the Project are outlined in Table 7-1. These will be implemented to minimise impacts to air quality and ensure all commitments and requirements of the project approval are met. These specific management and mitigation measures have been developed to address the requirements of applicable legislation, the MCoA and commitments of the REMMs.

Table 7-1 Air Quality impacts management and mitigation measures

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
AQMP1	Reasonable and feasible dust suppression and/or management measures will be implemented during construction, including the use of water carts, dust sweepers, sprinklers, dust screens, site exit controls (eg wheel washing systems and rumble grids). These controls will also be implemented, as applicable, to reduce the emission of dust out of the portal openings of the Western Harbour Tunnel cut and cover structure (WHT12).	Street sweeper, wheel washes, rumble grids, wetting systems (hoses, sprinklers etc), segregation areas	Pre-Construction and Construction	JHCPB Site supervisor JHCPB Project Manager JHCPB Environmental Manager	MCoA E1 REMM AQ1(a)	Environmental inspection checklist records
AQMP2	Appropriate selection of construction equipment and/or materials handling techniques that minimise the potential for dust	Appropriate construction equipment and	Construction	JHCPB Site supervisor JHCPB Project Manager	MCoA E1 REMM AQ1(b)	Environmental inspection checklist records

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	generation will be undertaken	material handling techniques				
AQMP3	Management measures to minimise dust generation during the transfer, handling and on site storage of spoil and construction materials (such as sand, aggregates or fine materials) (eg the covering of vehicle loads) will be implemented	Appropriate construction equipment and material handling techniques	Construction	JHCPB Site supervisor JHCPB Project Manager	MCoA E1 REMM AQ1(c)	Environmental inspection checklist records
AQMP4	Site inspections will be carried out to monitor compliance with implemented air quality measures and to identify any potential sources of unexpected odours.	Site inspections schedule/monitoring and inspection requirements	Construction	JHCPB Site supervisor JHCPB Environmental Manager	MCoA E1 REMM AQ1(h)	Environmental inspection checklist records

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
AQMP5	Generation of construction vehicle emissions will be minimised. All construction vehicles and plant will be inspected regularly and maintained to ensure that they comply with relevant emission standards Engine idling will be minimised when plant is stationary, and plant will be switched off when not in use to reduce emissions	Plant and equipment maintenance as required	Construction	JHCPB Site supervisor JHCPB Project Manager	MCoA E1 Best practice Transport for NSW Specification G36	Plant and equipment records Environmental inspection checklist records
AQMP6	Dust generation from tunnelling activities will be minimised through the implementation of a dust extraction and filtration system	Dust extraction and filtration system	Construction	JHCPB Site supervisor JHCPB Project Manager	Best practice work, health and safety requirements	Environmental inspection checklist records
AQMP7	Internal project communication protocols to ensure dust-generating activities in the same area are coordinated and	Section 3.7.1 of CEMP (Internal communication)	Construction	JHCPB Site supervisor	MCoA E1 REMM AQ1(g)	Internal communication records (as relevant)

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	mitigated (where relevant) to manage cumulative dust impacts of the project					Section 3.7.1 of the CEMP
AQMP8	Dust and air quality complaints will be managed in accordance with the overarching complaints management system for the project. Appropriate corrective actions, if required, will be taken to reduce emissions in a timely manner	Complaints Management System; Community Communication Strategy (Refer Section 3.7.4 of the CEMP)	Construction	JHCPB Site supervisor JHCPB Environmental Manager	MCoA E1 REMM AQ2	Project Communications Register
AQMP9	An Air Quality Monitoring Program will be implemented for the duration of construction	Air Quality Monitoring Program (refer Appendix E2)	Construction	JHCPB Environmental Manager	MCoA 11(a) Transport for NSW Specification G36	Air Quality Monitoring Program (refer Appendix E2)

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
AQMP10	Access roads and all sealed surfaces within Project sites and site accesses will be maintained and managed to reduce dust generation. At the commencement of the establishment. Project ancillary facility, controls such as wheel washing systems and rumble grids will be installed at all site exists to prevent deposition of loose material on sealed surfaces outside the Project site. Sweep (not wash into drains) accumulated sediment from site roads; remove mud from wheels and bodies of haulage plant before they egress from site onto public roads.	Street sweeper Chip seal, concrete and asphalt Wheel washes/baths, rumble grids, wetting systems, segregation (clean/dirty areas)	Pre-construction Construction	JHCPB Project Manager JHCPB Environment and Sustainability Manager JHCPB Supervisors	REMM AQ1 (a)	Environmental inspection checklist records

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
AQMP11	Dust suppression and/or collection techniques will be used during cutting, grinding and sawing activities likely to generate dust.	Engineered dust controls	Construction	JHCPB Supervisors	REMM AQ1 (a)	Environmental inspection checklist records
AQMP12	Areas surrounding portals will be managed dependant on site conditions using measures such as water carts, wetting systems, segregation of clean/dirty areas to minimise dust generation	Water carts Wetting systems Segregation (clean/dirty areas)	Construction	JHCPB Project Manager JHCPB Supervisors	REMM AQ1 (a)	Environmental inspection checklist records
AQMP13	Ensure that Project specific control measures are communicated and documented into work plans	AMS	Construction	JHCPB Project Manager JHCPB Environment and Sustainability Manager	Best practice	AMS

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
AQMP14	All site personnel must report observations of release of dust or unexpected odours from the premises to supervisory staff so that appropriate management measures can be implemented.		Construction	All staff	EPL	Informal site observations Environmental inspection checklist records
AQMP15	All spoil will be stockpiled and loaded into haulage trucks within the cut & cover structure or tunnel network. Handling and storage of chemicals, waste and hazardous goods will occur underground within the cut & cover structure or at Project locations with bunds and spill kits.	Appropriate construction equipment Bunds Spill kits	Construction	JHCPB Project Manager JHCPB Supervisors	Best practice	Environmental inspection checklist records

8 Compliance management

Compliance with this AQMP will be measured against the objectives outlined in Section 2.2 of this Plan through ongoing monitoring throughout the construction of the Project.

8.1 Roles and responsibilities

The Project Team's organisational structure and overall roles and responsibilities as well as the Environmental Representative and required specialists 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 Training

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

- Existence and requirements of this Plan
- Relevant legislation and guidelines
- Roles and responsibilities in relation to air quality management
- Incident response, management and reporting
- Air quality mitigation and management measures
- Community complaints response and reporting
- Specific responsibilities to minimise air quality impacts on sensitive receptors.

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.

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

8.3 Monitoring and inspection

Monitoring and inspection requirements are outlined in Table 8-1 and will occur for the duration of construction as appropriate. Further monitoring requirements are specified in:

- Air Quality Monitoring program (refer Appendix E2 of this Plan)

All monitoring of dust deposition and meteorology will be undertaken in accordance with the NSW DEC *Approved Methods for the Sampling and Analysis of Air Pollutant in NSW*. Additional requirements and responsibilities in relation to inspections are documented in Section 3.9.1 and Section 3.9.2 of the CEMP.

Table 8-1 Monitoring and inspection

Monitoring details	Location	Record	Responsibility	Frequency
Dust deposition monitoring at representative locations as outlined in the Air Quality Monitoring Program (Appendix E2 Section 4.1)	All	Monthly dust deposition rates	JHCPB Environmental Manager	Monthly
Meteorological data including daily rainfall, hourly temperature, relative humidity, wind (direction and speed) and barometric pressure	All	Daily rainfall records from closest BOM or DPE station	JHCPB Environmental Manager	Daily
Monitor the NSW Office of Environment & Heritage (OEH) Air Quality Index (http://www.environment.nsw.gov.au/AQMS/aqi.htm) for the latest air quality forecast in the region of the works or any air quality alerts in place. If required, if air quality in the region is poor, investigate options to avoid, reduce or minimise work activities and sources of dust generation which could contribute to further degradation of regional air quality.	All	Air Quality Concentrations	JHCPB Environmental Manager	Daily
Visual observations during regular site inspections to ascertain the effectiveness of implemented dust and air quality controls, including any observed dust plumes originating from the work site and/or activities observed outside of the Project that may impact on dust levels near sensitive receivers.	All	Complaints records	JHCPB Site Supervisor JHCPB Environmental Manager	Regularly
Weekly site inspections to ascertain the effectiveness of implemented controls, including any observed dust plumes originating from the work site and/or activities observed outside of the Project that may impact on dust levels near sensitive receivers. Weekly inspections would also be used to identify any sources of unexpected odour or track out from the Project. Track out will be monitored on a daily basis (subject to track-out activities occurring) and recorded	All	Weekly inspection record	JHCPB Environmental Manager JHCPB Site Supervisor	Weekly

Monitoring details	Location	Record	Responsibility	Frequency
as part of the weekly environmental inspection by exception if there is an issue.				

8.4 Auditing

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

Audit requirements are detailed in Section 3.9.3 of the CEMP.

8.5 Incidents and Non-compliances

All incidents will be managed in accordance with Section 3.8 of the CEMP.

All non-compliances will be managed in accordance with Section 3.10 of the CEMP.

8.6 Reporting

Reporting requirements and responsibilities are documented in Section 3.9.4 and 3.9.5 of the CEMP.

Air Quality Monitoring Incident response reporting will be carried out in accordance with Section 3.8 of the CEMP.

Specific reports prepared in response to air quality monitoring will include:

- Six monthly air quality monitoring reports prepared for submission to the EPA and DPE within 90 days of the reporting period unless otherwise agreed with DPE.

9 Review and improvement

9.1 Continuous improvement

As outlined in Section 3.12 of the CEMP, management reviews will be undertaken as part of the continual improvement process. The reviews will be initiated by the Environmental Manager and include relevant project team members and stakeholders. Continuous improvement of this plan and of monitoring requirements detailed in Section 8.3 of this Plan will be achieved by the ongoing evaluation of environmental management performance against planning approval requirements, environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance
- Determine the cause or causes of non-conformances and deficiencies
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies
- Verify the effectiveness of the corrective and preventative actions
- Document any changes in procedures resulting from process improvement
- Make comparisons with objectives and targets outlined in Section 2.2 and 2.3 of this Plan.
- Review contractual and legislative requirements

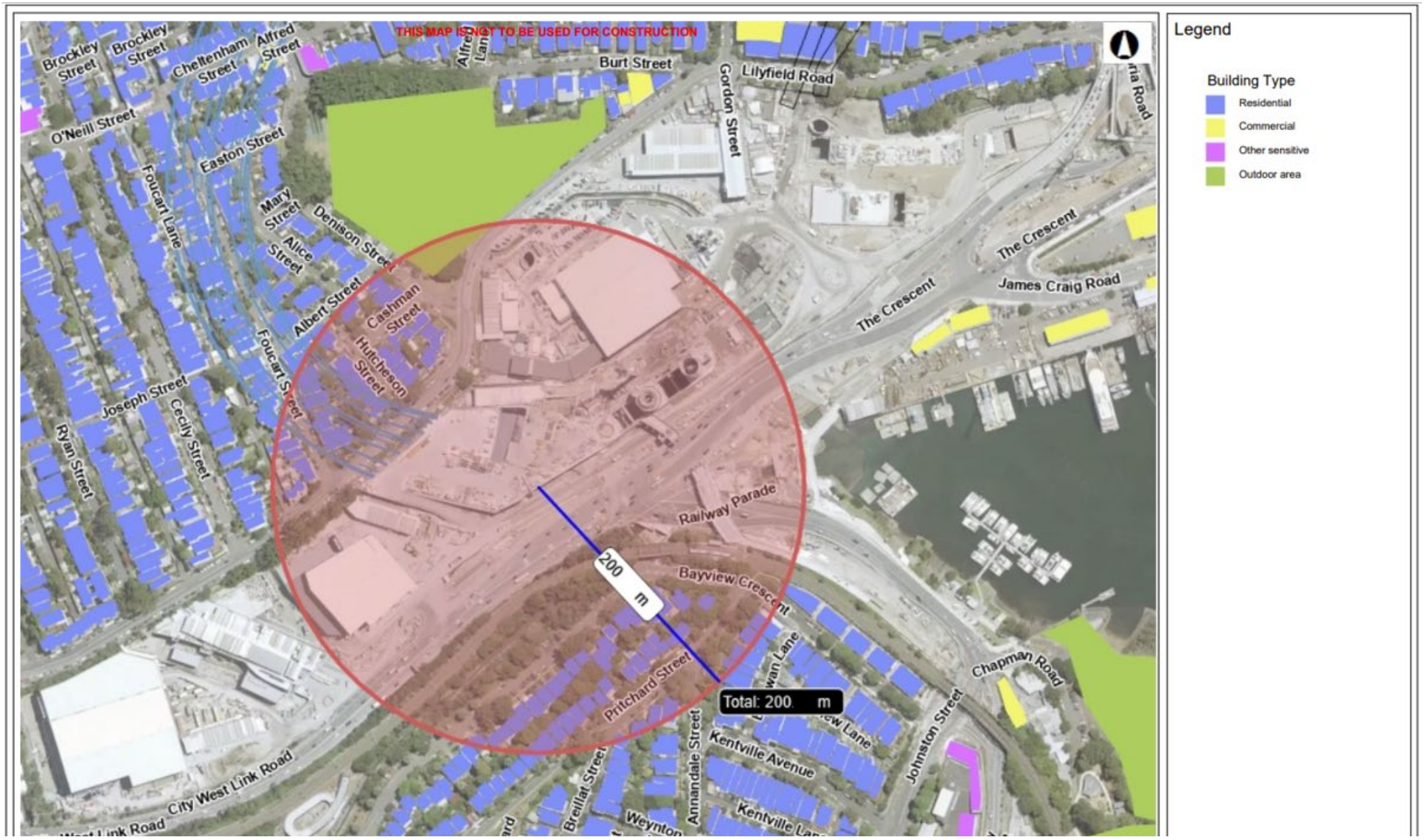
9.2 AQMP update and amendment

The auditing and review processes described in Section 3.9 to Section 3.13 of the CEMP may result in the need to update or revise this Plan. This will occur whenever there is a change to the construction scope or methodology that may increase the potential impacts upon air quality or to address relevant updates to a related Sub-Plan or monitoring program (as identified in Table 1-1).

Only the Environment Manager (or delegate) can amend this AQMP. Any update of this Plan will require endorsement of the Transport for NSW Representative, the Environmental Representative and depending on the change, process outlined in Section 2 of the CEMP must be followed where approval from the Planning Secretary prior to implementation of the update is required.

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

Appendix E1 Dust catchment areas and sensitive receivers



Appendix E2 Air Quality Monitoring Program

Appendix E2

Air Quality Monitoring Program

STW-JHC-PRG-00-AH-002-000001

Western Harbour Tunnel Stage 3A

25 August 2022

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Document control

Revision	Date	Prepared by	Reviewed by	Remarks
A	01/06/2022	Adrian Broger	Kathy Lloyd	Internal review
B	10/06/2022	Adrian Broger	Kathy Lloyd	For ER and TfNSW
C	05/07/2022	Adrian Broger	Kathy Lloyd	External revision
00	25/08/2022	Roger Posgate	Adrian Broger Kathy Lloyd	For ER endorsement

Distribution of controlled copies

This Stage 3A Air Quality Monitoring Program as part of the Stage 3A CEMP is available to all personnel and sub-contractors via the Project document control management system. An electronic copy can be found on the Project website.

The document is uncontrolled when printed.

Contents

Tables

Glossary / Abbreviations

Abbreviation	Expanded text
AQMP	Air Quality Management Sub-Plan
BOM	Australian Government Bureau of Meteorology
CEMP	Construction Environmental Management Plan
DPE	NSW Department of Planning and Environment (formerly the Department of Planning, Industry and Environment)
DPIE	Department of Planning, Industry and Environment (now known as the Department of Planning and Environment)
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EPL	Environmental Protection Licence
JHCPB	John Holland CPB Contractors
MCoA	Minister's Conditions of Approval
OU	Odour Unit
Program	Air Quality and Odour Monitoring Program (this Program)
Project, the	Western Harbour Tunnel Stage 3A
$PM_{2.5}$	Particulate matter less than or equal to 2.5 micrometres in diameter
PM_{10}	Particulate matter less than or equal to 10 micrometres in diameter
REMM	Revised Environmental Management Measure
TfNSW	Transport for NSW (formerly Roads and Maritime)

1 Introduction

1.1 Context

This Air Quality Monitoring Program (or Program) has been prepared for the Design and Construction of the Western Harbour Tunnel Stage 3A Project (the Project). The Program forms Appendix E2 of Air Quality Management Sub-plan (AQMP) of the Stage 3A CEMP (Construction Environmental Management Plan).

The Program addresses the requirements of the Minister's Conditions of Approval (CoA), the Western Harbour Tunnel and Warringah Freeway Upgrade Environmental Impact Statement (EIS), and the Revised Environmental Management Measures (REMMs) listed in the Western Harbour Tunnel and Warringah Freeway Upgrade Response to Submissions Report.

This Program has been developed in consideration of the SMART Principles – Specific, Measurable, Achievable, Relevant and Time-based.

1.2 Scope of Monitoring Program

The scope of this Program is to describe how the Project will monitor dust impacts during construction of the Project.

As outlined in the Staging Report, the Project is not anticipating any odour impacts as described in the EIS. Odour monitoring is not deemed necessary as part of the stage 3A scope of works. The EIS only identifies potential construction related odour impacts that would be generated during the dredging, handling and management of harbour sediments within Sydney Harbour and at the White Bay construction support site (WHT3) which are not relevant to this stage of the WHT.

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

1.3 Implementation of Monitoring Program

As per CoA C18, this Program must be endorsed by the Environmental Representative (ER) and then submitted to the Planning Secretary for approval at least one (1) month prior to commencement of construction.

As per CoA C19, construction on the Project will not commence until the Planning Secretary has approved all required Construction Monitoring Programs, including this Air Quality Monitoring Program.

The Monitoring Program will be implemented for the duration of construction.

2 Purpose and objectives

2.1 Purpose

The purpose of the Air Quality Monitoring Program is to describe how the Project will monitor dust impacts during construction of the Project.

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

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

2.2 Objectives

The key objectives of this Program are to ensure all CoAs, REMMs, and licence/permit requirements relating to construction dust monitoring are described, scheduled, and assigned responsibility as outlined in:

- The revised environmental management measures (REMMs) included in the Submissions Report prepared for Western Harbour Tunnel and Warringah Freeway Upgrade project
- Minister's Conditions of Approval for SSI-8863
- Roads and Maritime specification G36 Environment Protection
- The Project's Environment Protection Licence (EPL)
- Relevant legislation and other requirements described in Section 3 of the AQMP.

2.3 Consultation

This Program will be provided to the NSW Environment Protection Authority (EPA) as part of the AQMP in accordance with CoA C11(b) and as referenced in Section 4 of the AQMP.

Refer to Section 2 of the CEMP for the consultation requirements relating to the CEMP and all subplans.

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

3 Construction Dust Deposition Monitoring

3.1 Baseline Monitoring

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

The EPA criteria of 4g/m2/month as detailed in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (2016) will be used in place of baseline data.

As the proposed monitoring method uses established air quality goals identified following a site specific risk assessment, a separate baseline data collection period is not required.

3.2 Construction monitoring

3.2.1 Overview

The construction dust assessment for the EIS considered potential dust impacts across five assessment zones, with the Western Harbour Tunnel cut and cover structure in Rozelle (WHT12) used for access/egress for the Project located within Zone 1. Stage 3A of the project will be delivered from predominantly within the Western Harbour Tunnel cut and cover structure (WHT12), representing a reduced risk profile from an air quality perspective. Accordingly, a supplementary risk using the *Guidance on the assessment of dust from demolition and construction* (IAQM 2014) was completed and is presented in Section 5 of the AQMP.

Following the supplementary risk assessment, air quality impacts from this stage of the project are considered low after mitigation measures are implemented and monitoring beyond visual inspections is not deemed necessary under the IAQM guideline. Notwithstanding, the Project will adopt a best practice approach and implement a depositional dust monitoring program to monitor for any residual risk.

3.2.2 Performance Criteria

As described in Section 3.2 of the AQOMP, dust deposition criteria provided in the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (NSW EPA, 2017) has been adopted for the construction phase of the Project.

The EPA expresses dust deposition criteria in two ways. Firstly, is in terms of an acceptable increase in dust deposition over the existing background/baseline deposition levels. As background/baseline dust deposition levels are not available this criterion has not currently been adopted. The second criterion is a measure of maximum total dust deposition levels. This criterion has currently been adopted for the Project. The long-term (annual average) EPA criterion for depositional dust that applies to the Project is provided in the table below.

Table 3-1 Long-term impact assessment criterion for deposited dust

Pollutant	Averaging Time	Criteria	Source
Deposited Dust	Annual (max total)	4 g/m^2/month	NSW EPA, 2017

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

The Project is located in an urban environment, and in the absence of background / baseline data, there is a potential that existing deposited dust levels may already be in exceedance of the criterion listed in Table 3-1.

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

4 Dust deposition monitoring methodology/sampling protocol

4.1 Monitoring locations

Monitoring will be undertaken using dust deposition gauges at those Project ancillary facilities where construction activities pose a risk of generating dust. These are outlined in Table 4-1 below.

Table 4-1 Dust deposition gauges proposed location

Ancillary Facility	Description
WHT cut and cover structure (WHT12)	One (1) gauge will be installed in the vicinity of the WHT12 site.

The specific locations for each of the sampling locations will be selected in accordance with AS/NZS 3580.1.1 2016, *Methods for Sampling and analysis of ambient air – Guide to siting air monitoring equipment,* as far as practicable. The requirements for AS/NZS 3580.1.1 2016 are outlined in Table 4-2.

Table 4-2 AS 3580 Locating criteria

Pollutant	Type of monitoring station	Height above ground	Other locating criteria (minimum requirements) *
Deposited matter	Peak, neighbourhood and background	1.8m – 2.2m	• Clear sky angle 120 • Unrestricted airflow of 360 around sample gauge • 10m from nearest object or tree dripline • 5m from road • No boiler of incinerators flues nearby

* As detailed in AS/NZS3580.1.1 2016, these criteria will be followed as far as practicable once site constraints are considered.

4.2 Sample collection and laboratory analysis

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

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

4.3 Quality Assurance and documentation

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

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

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

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

5 Smart Principles

This Program has been developed using the 'SMART' principles.

- **S**pecific: This Program is for WHT Stage 3A monitoring of air quality. Air quality monitoring for other stages and operation of WHT WFU will be detailed in other documents outside of Stage 3A
- **M**easurable: Monitoring criteria or purposes are provided in Section 3
- **A**ctionable: Monitoring actions succinctly are described in section 3
- **R**ealistic: The requirements of Section 3 are realistically achievable, there is a history of implementation of similar actions on previous infrastructure projects.
- **T**imely: Timing for actions is provided in Section 3.

6 Compliance management

6.1 Roles, responsibilities and training

The 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 Section 7 of the AQMP.

All employees, contractors and utility staff working on site will undergo site induction and targeted training relating to air quality control.

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

6.2 Monitoring and inspection

This Program details the monitoring requirements for dust monitoring.

Additional requirements and responsibilities in relation to monitoring and inspections are documented in Section 3.9.1 and Section 3.9.2 of the CEMP and Section 8.3 of the AQMP.

6.3 Data analysis and management response

Results from the construction monitoring program will be compared with the criterion identified in Table 3-1 and with results previously recorded on the project.

Monthly monitoring results for dust deposition will be compared against the criterion and reported in the Dust Deposition Monitoring Reports (Section 6.5). If a trigger is observed (see Section 3.2.2), a review will be initiated to determine the significance of the exceedance(s) and possible causes.

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

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

6.4 Auditing

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

6.5 Reporting

During construction, dust deposition data will be collected, tabulated and assessed against the criterion identified in Table 3-1. Monitoring reports will be submitted to DPE and EPA and Port Authority within 90 days of the reporting period unless otherwise agreed with DPE.

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

Table 6-1 Reporting Requirements

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

7 Review and Improvement

7.1 Continuous Improvement

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

The continuous improvement process will be designed to:

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

7.2 Update and amendment

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

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

A copy of the updated Program and changes will be distributed to all relevant stakeholders in accordance with the Project's document control procedure.