



Newcastle Inner City Bypass – Rankin Park to Jesmond

Air Quality Construction Monitoring Program

Contents

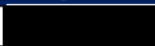



Glossary	4
Acronyms.....	6
1 Introduction.....	7
1.1 The Project.....	7
1.2 Background.....	7
1.3 Objectives	7
1.4 Scope of this monitoring program	7
2 Legislative context	9
2.1 Legislation.....	9
2.2 Guidelines and standards	9
2.3 Conditions of approval	10
2.4 Consultation	11
3.1 Air quality pollutants.....	13
3.2 Meteorological parameters.....	13
4 Project assessment criteria.....	14
4.1 Ambient air quality criteria	14
4.2 Odour	14
5 Air quality impact assessment	15
6 Local background air quality and meteorology	16
6.1 Introduction	16
6.2 Local ambient air quality	16
6.3 Local meteorology (wind fields).....	17
7 Ambient air quality monitoring program	19
7.1 Introduction	19
7.2 Key air quality considerations	19
7.2.1 Sensitive receptors.....	19
7.2.2 Construction compounds	19
7.3 Location of ambient air quality monitoring stations	20
7.4 Routine visual inspections.....	22
7.5 Ambient air quality monitoring	22
7.5.1 Compliance monitoring	22
7.5.2 Complaint's monitoring.....	22
7.6 Monitoring frequency	23
7.5.3 Routine boundary inspections	24
7.7 Meteorological monitoring	24
8 Quality control / quality assurance	25
8.1 Operation and maintenance	25
8.2 Quality assurance.....	25
9 Dust management protocols	26
9.1 Routine protocols	26
9.1.1 Inductions and training	26
9.1.2 Dust controls	26
10 Compliance management.....	28
10.1 Complaints management	28
10.2 Non-compliances	28
10.3 Corrective and preventative action.....	28
10.4 Inspections and auditing.....	29


10.5 Communications	29
10.6 Reporting	30
10.7 Program review	30

Revision history

Revision	Description	Date
A	First Draft – Transport review	23 September 2021
B	Second Draft – Transport review	22 October 2021
C	Third Draft – Transport review	10 November 2021
D	Fourth Draft – ER review	18 November 2021
E	Fifth Draft – Addition of Section 2.4	30 November 2021
F	Updated with agency comments	22 April 2022
G	Updated to address DPE comments	10 June 2022

Approval and authorisation

Program reviewed by:	Program endorsed by:
	
Senior Environment and Sustainability Officer	Environmental Representative
26/04/2022 	 29/04/2022

Author: , Senior Principal (Air Quality)

Date: June 2022

Version: G

Glossary

TERM	DESCRIPTION
Project terms	
Construction	<p>Includes all works required to construct the SSI, including commissioning trials of equipment and temporary use of any part of the SSI, but excluding the following low impact work which is completed prior to approval of the CEMP:</p> <ul style="list-style-type: none"> (a) survey works including carrying out general alignment survey, installing survey controls (including installation of global positioning systems (GPS)), installing repeater stations, carrying out surveys of existing and future utilities and building and road dilapidation surveys (b) investigations including investigative drilling, contamination investigations and excavation (c) operation of ancillary facilities if the ER has determined the operational activities will have minimal impact on the environment and community (d) minor clearing and relocation of native vegetation, as identified in the documents listed in Condition A1 (e) installation of mitigation measures including erosion and sediment controls, exclusion fencing, hoardings and temporary or at property acoustic treatments (f) property acquisition adjustment works including installation of property fencing, and relocation and adjustments of utilities to property including water supply and electricity (g) relocation and connection of utilities where the relocation or connection has a minor impact to the environment and sensitive receivers as determined by the ER (h) archaeological testing under the Code of practice for archaeological investigation of Aboriginal objects in NSW (DECCW, 2010) or archaeological monitoring undertaken in association with (a)-(g) and (i) to ensure that there is no impact on Aboriginal artefacts or objects, and archaeological salvage works in accordance with A1, E17 and E18 (i) other activities determined by the ER to have minimal environmental impact which may include construction of minor access roads, temporary relocation of pedestrian and cycle paths and the provision of property access (j) maintenance of existing buildings and structures required to facilitate the carrying out of the SSI. <p>However, where heritage items or threatened species or threatened ecological communities (within the meaning of the NSW Threatened Species Conservation Act 1995 or Commonwealth Environment Protection and Biodiversity Conservation Act 1999) are affected or potentially affected by any low impact work, that work is construction, unless otherwise determined by the Planning Secretary in consultation with the relevant heritage authority, OEH or DPI Fisheries (in the case of impact upon fish, aquatic invertebrates or marine vegetation).</p>

TERM	DESCRIPTION
Environmental Representative (ER)	A suitably qualified and experienced person independent of project design and construction personnel employed for the duration of Construction. The principal point of advice in relation to all questions and complaints concerning environmental performance.
The Project	Rankin Park to Jesmond Bypass
Project approval	The Infrastructure Approval for Newcastle Inner City Bypass, Rankin Park to Jesmond, issued by the New South Wales Government on 15 February 2019
Works	All physical activities to construct or facilitate the construction of the SSI, including environmental management measures and utility works. However, does not include work that informs or enables the detailed design of the SSI and generates noise that is no more than 5 dB(A) above the rating background level at any residence.
Air Quality Terms	
Deposited dust	Dust that is no longer in the air and which has settled onto a surface.
Air NEPM	National Environment Protection (Ambient Air Quality) Measure 2021

Acronyms

Acronym	Description
AAQMS	Ambient Air Quality Monitoring Station
AHD	Australian Height Datum
AS	Australian Standard
AQCMP	Air Quality Construction Monitoring Program
CAQMP	Construction Air Quality Management Plan
CBD	Central business district
CEMP	Construction Environmental Management Plan
CoA	Conditions of Approval
DPE	Department of Planning and Environment
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
ER	Environmental representative
ISO	International Organisation for Standardisation
JHH	John Hunter Hospital
JSA	Job safety analysis
LGA	Local Government Area
NATA	National Association of Testing Authorities
NSW	New South Wales
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
RP2J	Rankin Park to Jesmond Bypass
SPIR	Submissions and Preferred Infrastructure Report submitted to the Planning Secretary of the DPE under the EP&A Act
SSI	State Significant Infrastructure
Transport	Transport for NSW

1 Introduction

1.1 The Project

The Newcastle Inner City Bypass is part of Roads and Maritime Services long-term strategy to provide an orbital road within Newcastle's road network to connect the Pacific Highway at Bennett's Green with the Pacific Highway at Sandgate (the Project) and would provide improved traffic flows across the western suburbs of Newcastle and connect key regional destinations such as Bennett's Green, Charlestown and Jesmond shopping centres, John Hunter Hospital precinct, the University of Newcastle and the Pacific Highway.

The Project involves the construction of 3.4 kilometres (km) of a new four lane divided road between Lookout Road at New Lambton Heights and Newcastle Road at Jesmond. The project is located in the Newcastle local government area (LGA), about 11 km west of the Newcastle central business district (CBD).

Figure 1-1 shows the location of the Project including construction compounds.

This Air Quality Construction Monitoring Program (AQCMP) has been prepared to address the requirements of the Minister's Infrastructure Approvals (SSI 6888) and all applicable guidance and legislation.

1.2 Background

An environmental impact statement (EIS) was prepared by Transport for NSW (Transport) in November 2016 (Newcastle Inner City Bypass – Rankin Park to Jesmond Environmental Impact Statement) to assess the potential impacts of the Project. Following public exhibition of the EIS, Transport prepared the Newcastle Inner City Bypass – Rankin Park to Jesmond Submissions and Preferred Infrastructure Report (SPIR), to respond to submissions and describe project design refinements.

Approval for the project was granted on 15 February 2019 by the Minister for Planning (application number SSI 6888) and was subject to several conditions of approval. A modification report (Newcastle Inner City Bypass – Rankin Park to Jesmond Modification report: additional construction compounds, May 2021) to include additional construction compounds was prepared in May 2021 and was approved on 7 February 2022. The approval included three additional construction compound site, see Figure 1.1. The Project is no longer proposing to use the Peatties Road compound site. This program will be updated in the event that the Peatties Road compound site is used.

1.3 Objectives

The objectives of this AQCMP are to monitor air emissions generated by the Project during construction and to ensure they are minimised and comply with the Project assessment criteria.

1.4 Scope of this monitoring program

The AQCMP describes how the Contractor will conduct ambient air monitoring during the construction of the project. Monitoring will be carried out to assess compliance with assessment criteria, in response to complaints and for equipment spot checks. This program will be implemented for the entirety of the construction period.

2 Legislative context

2.1 Legislation

Legislation relevant to air quality management includes:

- Protection of the Environment Operations Act 1997 (POEO Act) [NSW]
- Protection of the Environment Operations (Clean Air) Regulations 2010 (NSW)
- National Environment Protection Council Act 1994 (Commonwealth)

2.2 Guidelines and standards

The main guidelines, standards, and policy documents relevant to this AQCMP include:

- National Environment Protection (Ambient Air Quality) Measure 2021
- Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales, 2022
- Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales, 2016 (Approved Methods)
- Australian/New Zealand Standard AS/NZS 3580.1.1 – 2007 ‘Methods for Sampling and Analysis of Ambient Air – Guide to Siting Air Monitoring Equipment’
- Australian/New Zealand Standard AS/NZS: 3580.9.6 – 2015 ‘Methods for Sampling and Analysis of Ambient Air – Determination of suspended particulate matter – PM₁₀ – High volume sampler with size selective inlet – gravimetric method’
- Australian/New Zealand Standard AS/NZS: 3580.9.9 – 2017 ‘Methods for Sampling and Analysis of Ambient Air – Determination of suspended particulate matter – PM₁₀ – Low volume sampler – gravimetric method’
- Australian/New Zealand Standard AS/NZS: 3580.10.1 – 2016 ‘Methods for Sampling and Analysis of Ambient Air – Determination of particulate matter – Deposited matter – Gravimetric method’
- Australian/New Zealand Standard AS/NZS: 2724.5 – 1987 ‘Ambient air – Particulate matter – Part 5: Determination of impinged matter expressed as directional dirtiness, background dirtiness and/or area dirtiness (directional dust gauge method)’
- German Standard, VDI 3940: 2010, Measurement of Odour Impact by Field Inspection- Determination of Odour Intensity and Hedonic Odour Tone.
- Australian/New Zealand Standard AS/NZS 4323.3 – 2001 ‘Stationary source emissions, Part 3: Determination of odour concentration by dynamic olfactometry’.
- Air Quality Management Guideline, Version 6.0, Transport for NSW, July 2021.

2.3 Conditions of approval

The conditions of approval outlined in the NSW Government Department of Planning and Environment Conditions of Approval for Newcastle Inner City Bypass Rankin Park to Jesmond (SSI 6888) relevant to this AQCMP and where they are addressed in the report are listed in Table 2.1.

Table 2.1 Conditions of approval relevant to the AQCMP for Newcastle Inner City Bypass Rankin Park to Jesmond

Condition number	Condition description	Where addressed in report
C10	Each Construction Monitoring Program must provide:	
	a) details of baseline data available	Section 6
	b) details of the baseline data to be obtained and when	Section 6.2
	c) the parameters of the project to be monitored	Section 3
	d) the frequency of monitoring to be undertaken	Section 7.5
	e) the location of monitoring	Section 7.3
	f) the reporting of monitoring results	Section 10.6
	g) procedures to identify and implement additional or alternative mitigation measures where results of monitoring are unsatisfactory	Section 10
	h) any consultation to be undertaken in relation to the monitoring programs.	Section 2.4
C11	The Construction Monitoring Programs must be developed in consultation with the relevant public authorities specified in Table 4. Where an authority's request(s) has not been included in the Monitoring Program, the Proponent must provide justification to the Planning Secretary as to why it was not included. Details of all information requested by an authority including copies of all correspondence from those authorities, must be provided with the relevant Construction Monitoring Program.	Section 2.4, Appendix A
C12	The Construction Monitoring Programs must be endorsed by the ER and then submitted to the Planning Secretary for approval at least one (1) month before the commencement of construction.	Approval and authorisation table, page 3, Section 2.4, Appendix A
C13	Construction must not commence until the Planning Secretary has approved, or as otherwise agreed by the Planning Secretary, all the required Construction Monitoring Programs, and all relevant baseline data for the specific construction activity has been collected.	Approval and authorisation table, page 3, Section 2.4, Appendix A
C14	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 2.4, Section 10.6, Section 10.7, Appendix A

Condition number	Condition description	Where addressed in report
C15	<p>The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, and relevant public authorities for information, in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.</p> <p>Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.</p>	Section 10.6 Appendix A

Additionally, Condition of Approval (CoA) E1, states:

'In addition to the performance outcomes, commitments and mitigation measures specified in the documents listed in Condition A1, all reasonably practicable measures must be implemented to minimise the emissions of dust and other air pollutants during the construction of the SSF.'

2.4 Consultation

In accordance with CoA C9 and CoA C11, this air quality construction monitoring program has been prepared in consultation with:

- City of Newcastle
- Lake Macquarie City Council
- Health Administration Corporation

A copy of the draft program was provided to the above agencies on 23 February 2022 for review and comment. Table 2.2 provides a summary of issues raised and where in this monitoring program they are addressed, where relevant.

Table 2.2 Consultation summary

ID	Summary of issue	Comments	Section
City of Newcastle			
1	<i>No comments or issues raised</i>	N/A	N/A
Lake Macquarie City Council			
2	<i>Section 7.4 details requirements to be observed during routine visual inspections. A proforma should be developed that can be completed to capture these observations. The proforma should be included as an appendix to the AQCMP and also be included in the list of records outlined in Section 10.5 to be captured in the environmental register</i>	This will be captured within the CEMP and included within the relevant inspection checklist.	Section 7.4
3	<i>Section 7.5.2 outlines the complaint monitoring and Section 10.1 outlines complaint management. In Section 10.1 it states that "The CEMP contains detail of the complaints handling process". The CEMP was not available for review. Please ensure it includes the following:</i> <ul style="list-style-type: none"> • <i>The date and time of the complaint</i> • <i>The method by which the complaint was made</i> • <i>Any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect</i> 	Noted, the CEMP will address this information.	Section 7.5.2

	<ul style="list-style-type: none"> • The nature of the complaint including a description of the odour or dust and the location where the odour or dust was detected • The meteorological conditions at the time the complaint was reported • The action taken in relation to the complaint, including any follow-up contact with the complainant • If no action was taken, the reason why no action was taken. 		
4	The results of the routine boundary inspections outlined in Section 7.5.3 should be captured in the environmental register as detailed in Section 10.5.	Section 10.5 amended to include routine boundary inspections.	Section 10.5
5	Section 10.2 outlines that non compliances will be managed in accordance with the CEMP and Transports Environmental Incident Procedure. These documents were not available for review. Please ensure it includes the following details and is captured in the environmental register as detailed in Section 10.5: <ul style="list-style-type: none"> • The nature of the non-compliance • The meteorological conditions at the time of the non-compliance • Details of what works were being undertaken at the time of the non-compliance • The action taken in relation to the non-compliance • If no action was taken, the reason why no action was taken. 	Noted, the CEMP will address this information.	Section 10.2

Health Administration Corporation

6	Construction Compound A still identified. To be removed or repositioned.	Figures 1-1 and 7-1 have been updated to reflect this.	Section 1.4
7	Trail behind Ronald McDonald House still identified. Understand this is no longer proposed to be used by TfNSW.	Figures 1-1 and 7-1 have been updated to remove Compound A.	Section 1.4 and 7.3
8	TfNSW to confirm this will apply for known as well as unexpected contaminated material? With RP2J Unexpected Finds Protocol to align with these requirements.	Confirmed	Section 3.1
9	Updated location of Compound A to be shown in Figure 1-1.	Figures 1-1 and 7-1 have been updated to remove Compound A.	Section 7.2.2
10	Appears reasonable based on info within report. Noting Section 7.3 above noting location can change based on nature of construction. Further coordination should be noted within the RP2J/JHHIP Construction Interface Meetings.	Further coordination will be carried out during RP2J/JHHIP Interface Meetings.	Section 7.3
11	Complaints to be shared between RP2J/JHHIP established processes should combined corrective actions be needed.	To be referenced in the CEMP.	Section 10.1

3 Air quality indicators and meteorological parameters

3.1 Air quality pollutants

Construction of the Project may generate the following air quality pollutants:

- deposited dust (standard and/or directional)
- odour

Deposited dust will be monitored for the duration of the construction program.

Site boundary odour screening will be conducted on a daily basis during excavation in areas of known or unexpected contaminated material.

3.2 Meteorological parameters

The following meteorological parameters will be continuously monitored for the duration of the construction program:

- temperature (degrees Celsius)
- dew point (degrees Celsius)
- relative humidity (per cent)
- wind speed (metres per second)
- wind direction (degrees)
- rainfall (millimetres)

4 Project assessment criteria

4.1 Ambient air quality criteria

The site boundary air quality assessment criteria for the Project are summarised in Table 4.1.

Table 4.1 Project assessment criteria

Location	Indicator	Units	Criterion	Averaging period
Site boundary / nearest sensitive receptor	Deposited dust	g/m ² /month	4	Month
	Odour	Odour intensity ¹	No offensive odour at boundary or sensitive receptor	NA

(1) Odour intensity scale (0 to 6) as presented in Table 4.2

4.2 Odour

Odour may be generated during excavations works at locations where contaminated material is encountered. Odour will be screened during excavation of contaminated material only in areas of known and unexpected odour generating contamination.

Odour intensity is the perceived strength of an odour above its threshold (i.e., detection). The odour intensity scale has a seven-point scale ranging from 0 to 6 and is based on the German Standard VDI 3940:2010. The odour intensity scale is presented in Table 4.2.

Table 4.2 Odour intensity scale

Intensity ¹	Description
0	Not detectable
1	Very weak
2	Weak
3	Distinct
4	Strong
5	Very strong
6	Extremely strong

(1) An intensity scale of 3 (Distinct) is likely to be offensive

The odour intensity will be monitored ('sniffed') by trained personnel in accordance with procedures detailed in AS/NZS 4323.3 – 2001 'Stationary source emissions, Part 3: Determination of odour concentration by dynamic olfactometry'.

5 Air quality impact assessment

An air quality impact assessment was undertaken for the Project in 2016 (Newcastle Inner City Bypass – Rankin to Jesmond, Environmental impact statement – Volume 1, November 2016) to address the Secretary’s Environmental Assessment Requirement for the purpose of seeking project approval for state significant infrastructure under Part 5.1 of the *Environmental Planning and Assessment Act 1979*.

A qualitative assessment of potential air quality impacts on the receiving environment during construction was carried out. Chapter 17 (Air quality) of the Environmental Impact Statement (EIS) indicated primary construction activities that would generate dust include:

- clearing of vegetation and topsoil
- excavation and levelling of soil
- earthworks for cut and fill areas
- movement of soil and fill by dump trucks and scrapers
- wind erosion from unsealed surfaces and stockpiles
- vehicle (exhaust) emissions from construction equipment
- wheel-induced dust from construction vehicles travelling on unsealed areas
- rock crushing and screening
- concrete and asphalt batching

The potential for exposure to dust emissions can depend on the type of construction work, duration and frequency of the activity, the prevailing wind speed and direction and the proximity of sensitive receptors. The annual wind roses for the period 2012 to 2017 at the Bureau of Meteorology Nobby’s Head station indicates the dominant winds in the study area are from the south and north-west indicating the potential for adverse dust impacts at sensitive receptors to the north and south-east of the construction footprint. Table 17-9 of Chapter 17 of the EIS proposes management measures to minimise impacts on the receiving environment including the implementation of a monitoring program to assess compliance with identified objectives.

A Submissions and Preferred Infrastructure Report (SPIR) was prepared for the Project in 2018 responding to public submissions on the Project and presenting several design refinements to the Project. There were no additional considerations of air quality impacts during construction.

A modification to the approval was granted on 7 February 2022, approving the use of three additional construction compounds. The proposed compounds are located at Peattie’s Road, Cardiff Road and Lookout Road. The Peatties Road compound site is no longer proposed for use. This program will be updated in the event that the Peatties Road compound site is used.

6 Local background air quality and meteorology

6.1 Introduction

Baseline ambient air quality or meteorological monitoring has not been undertaken at the Project to date. The nearest Environment Protection Authority (EPA) managed ambient air quality monitoring station (AAQMS) to the Project is located at the swimming pool in Wallsend, approximately 2.3 km to the north-west at height of 8 metres (m) Australian Height Datum (AHD). The Wallsend AAQMS is a NEPM performance AAQMS and monitoring is undertaken in accordance with relevant Australian Standard methods. The AAQMS was commissioned in 1992 and monitors for a range of air quality and meteorological parameters including PM₁₀, PM_{2.5}, wind speed and wind direction. These parameters have been analysed in further detail for the years 2016 to 2020 and are summarised in sections 6.2 and 6.3. This analysis has been conducted for the Project prior to construction and satisfies the requirement to complete baseline monitoring.

6.2 Local ambient air quality

During construction works particulate matter (dust) of varying size fractions is expected to be the key pollutant of concern with the potential to have an adverse impact on the receiving environment.

PM₁₀ and PM_{2.5} data collected at the Wallsend AAQMS for the years 2016 to 2020 is summarised in Table 6.1 as follows:

- except for 2017, there were multiple exceedances of the 24-hour PM₁₀ Air NEPM standard for all years with a maximum of 21 exceedances in 2019 due to bushfire smoke
- except for 2017 and 2018, there were multiple exceedances of the 24-hour PM_{2.5} Air NEPM standard for all years with a maximum of 19 exceedances in 2019 due to bushfire smoke
- there were no exceedances of the annual PM₁₀ Air NEPM standard
- except for 2019, there were no exceedances of the annual PM_{2.5} Air NEPM standard. The exceedance in 2019 was largely due to bushfire smoke in November and December.

Notwithstanding the elevated 24-hour PM₁₀ and PM_{2.5} concentrations recorded at the Wallsend AAQMS during November and December of 2019 and January and February 2020 due to bushfires, the existing air quality at the Project is expected to be of similar magnitude.

Table 6.1 Ambient air quality monitoring data at Wallsend AAQMS (2016 – 2020)¹

Year	Annual average (µgm ³)		Maximum 24-hour average (µgm ³)		Number and dates of exceedances
	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}	
2016	16.6	8.0	65.5	50.7	PM ₁₀ : 1 (maximum on 7 November) PM _{2.5} : 1 (maximum on 7 November)
2017	17.4	7.3	47.9	20.4	PM ₁₀ : 0 PM _{2.5} : 0
2018	19.4	7.5	136.5	20.2	PM ₁₀ : 5 (maximum on 22 November) PM _{2.5} : 0

2019	22.8	10.4	127.9	108.3	PM ₁₀ : 21 (maximum on 5 December) PM _{2.5} : 19 (maximum on 5 December)
Year	Annual average (µgm ³)		Maximum 24-hour average (µgm ³)		
	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}	Number and dates of exceedances
2020	17.7	7.3	77.9	56.8	PM ₁₀ : 6 (maximum on 8 January) PM _{2.5} : 5 (maximum on 8 January)
Air NEPM standard	25	8	50	25	

(1) Monitoring data from 2016 to 2020 was downloaded from <https://www.dpie.nsw.gov.au/air-quality/air-quality-data-services/data-download-facility>

6.3 Local meteorology (wind fields)

The wind direction and wind speed, during construction activities, can influence the extent and magnitude of particulate matter impacts. Adverse impacts can occur in any direction from a construction site. They are, however, more likely to occur downwind of the prevailing wind direction and in proximity to the Project.

Figure 6-1 presents the annual and seasonal wind roses at the Wallsend AAQMS illustrating the strength and direction of the winds for the years 2016 to 2020.

The wind roses indicate the typical wind fields at Wallsend AAQMS are:

- most frequently from a south-easterly and south-westerly direction during summer with a calm (winds with a speed of less than 0.5 m/s) wind frequency of 9.1% and an average wind speed of 2.3 m/s
- most frequently from a south-westerly direction during autumn with a calm wind frequency of 21% and an average wind speed of 1.6 m/s
- most frequently from a north-westerly and then south-westerly direction during winter with a calm wind frequency of 23.6% and an average wind speed of 1.5 m/s
- most frequently from a south-westerly direction during spring with a calm wind frequency of 15.4% and an average wind speed of 2.0 m/s
- most frequently from a south-westerly direction over the 5 years with a calm wind frequency of 17.3% and an average wind speed of 1.8 m/s.

Overall, the Wallsend AAQMS experiences relatively high calm conditions and low wind speeds especially during winter. Similar meteorological conditions are likely to be experienced at the Project site with differences likely due to varying local topography and surrounding vegetation.

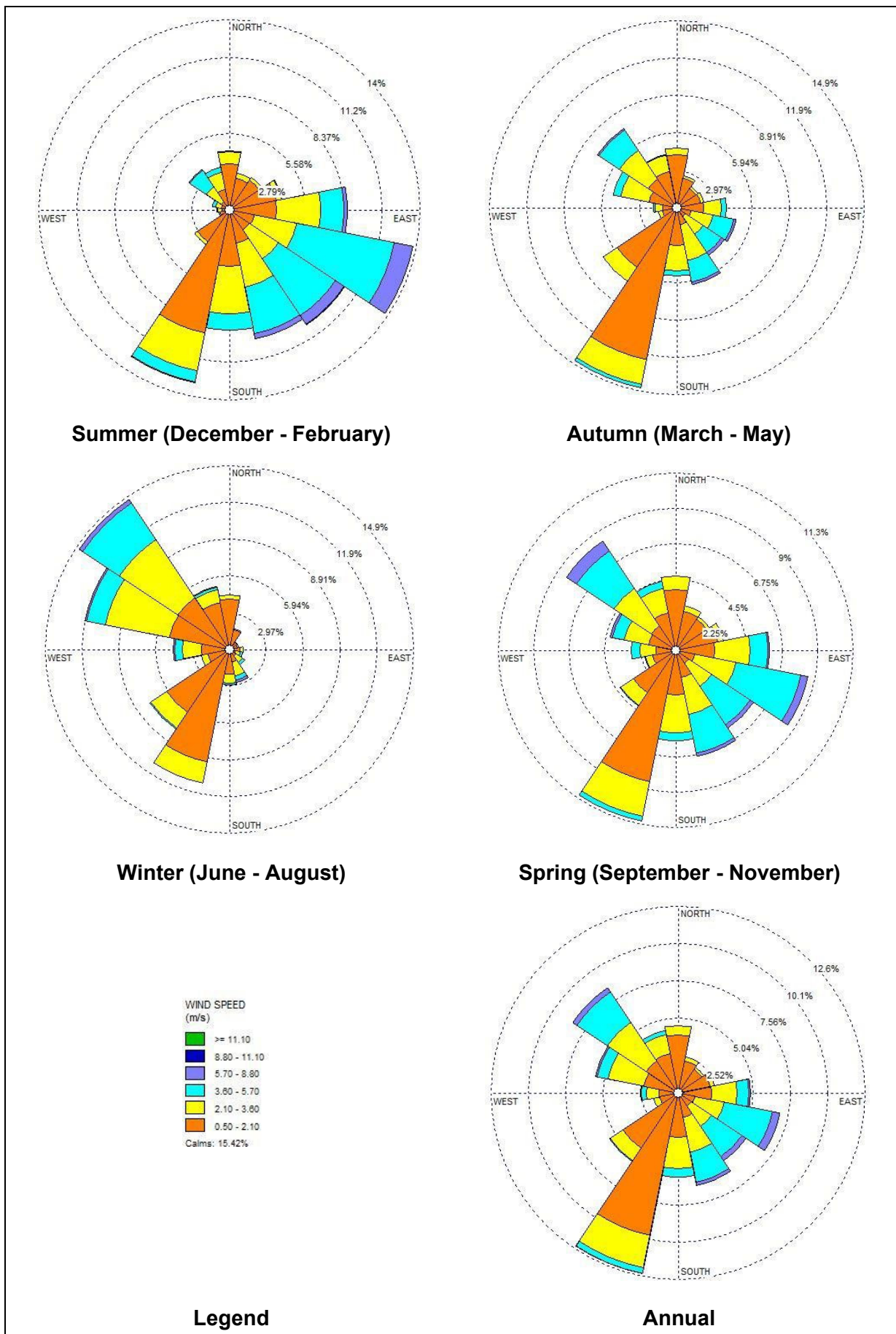


Figure 6-1 Seasonal and annual wind roses at Wallsend AAQMS (2016 – 2020)

7 Ambient air quality monitoring program

7.1 Introduction

To ensure that ambient air quality levels do not exceed Project assessment criteria detailed in section 4 and to effectively manage any complaints received by the Project, it is important that a robust and detailed management plan for the project is established and maintained. This AQCMP addresses the air quality considerations for the Project, ambient air quality monitoring and complaints investigation.

7.2 Key air quality considerations

7.2.1 Sensitive receptors

Sensitive receptors in the vicinity of the Project include residences, recreational areas (e.g., Jesmond Park and bushland areas), educational establishments, childcare facilities, churches, the John Hunter Hospital (JHH) precinct, community facilities and, commercial and industrial properties.

Residential properties are located to the north, west and east of the Project in Jesmond, Wallsend, Elermore Vale, Rankin Park, New Lambton Heights, Lambton, North Lambton, and New Lambton. The nearest residential suburb to the south is Kotara.

At the Peattie's Road construction compound, the nearest residential properties are located to the north-west in the Garden Suburb with residences further away to the north and east.

Sensitive receptors located in proximity to construction activities have the potential to be affected by air emissions including the JHH precinct.

7.2.2 Construction compounds

Five construction compounds have been assessed and are proposed for use during the main construction phase of the Project as follows:

- construction compound B – located on the eastern site of the northern interchange.
- construction compound C – located on the western site of the northern interchange.
- construction compound F – located at the intersection of McCaffrey Drive and Lookout Drive. This compound is located on the Project alignment and as such is not likely to be in use for the full duration of main work construction.
- Lookout Road – located to the north of the water tower, north of Grandview Avenue
- Cardiff Road – located on the western side of Marshall Street, south of Cardiff Road

All these compounds are located in the vicinity of residential areas and given the typical, ongoing nature of activities at construction compounds, monitoring may need to consider air quality impacts at these locations.

If the Peatties Road compound site is proposed to be used (as per Modification 1) then this program will be updated accordingly.

7.3 Location of ambient air quality monitoring stations

Air quality monitoring will be conducted at the following indicative locations as shown in Table 7.1 and Figure 7-1.

Table 7.1 Indicative ambient air quality monitoring locations

Monitoring location ID	Location
AQM1	Coles Street, Jesmond
AQM2	John Hunter Hospital
AQM3	Lookout Road, New Lambton Heights
AQM4	Dangerfield Drive, Rankin Park

It is noted that these locations may change depending upon the nature and location of the construction activities each month. Additional locations will also be considered in response to air quality complaints.

These locations are subject to ease of access and where appropriate acceptance from the landowner that monitoring can occur on or at the boundary of their property. If a resident does not wish monitoring to occur, an equivalent nearby alternative location will be selected.

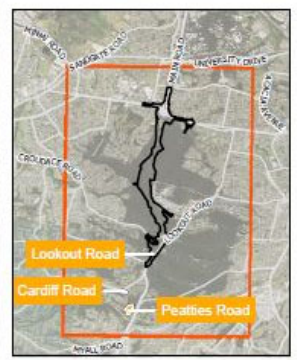
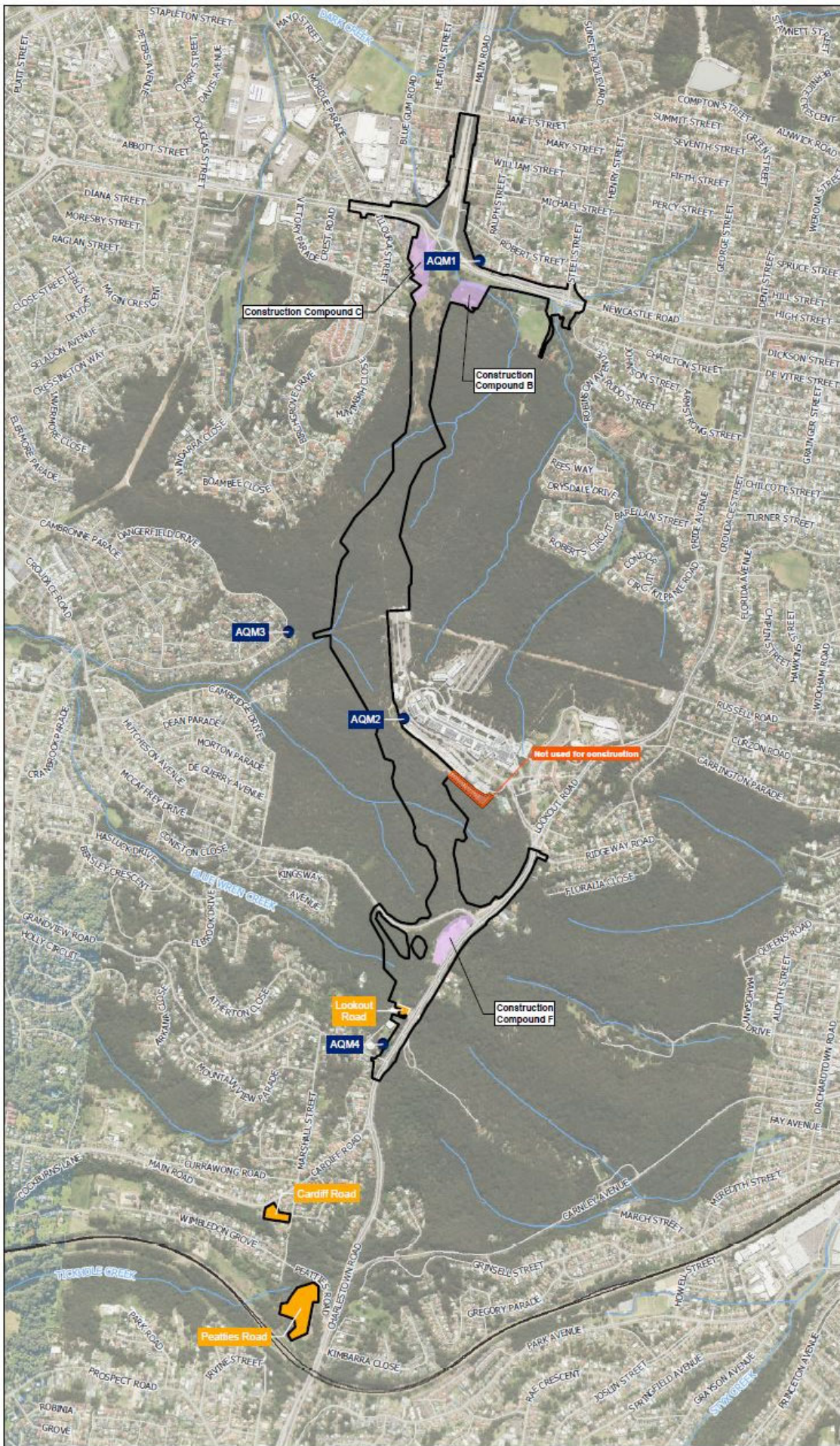
Supplementary site boundary monitoring may be required in the following instances:

- as requested by the regulatory authority, Transport, or the on-site Environmental Manager
- where further investigation of dust emissions is required, such as, following receipt of a complaint or the observation of fugitive dust emissions off-site
- in the event that dust management is deemed to be ineffective
- in the event of a complaint, monitoring will also be required to be carried out at the location of where the complaint was received (e.g., a nearby residence).

Figure 7-1
Ambient Air Quality
Monitoring Stations

Legend

- Ambient Air Quality Monitoring Station
- Roads
- Named Watercourse
- ▭ Project Boundary
- ▨ Area not used for construction
- Proposed Construction Compounds
- Construction Compound



0 50 100
Kilometres

Coordinate system: GDA 1994 MGA Zone 56
Scale ratio correct when printed at A3
1:14,000 Date: 26/05/2022

Data sources: - DMRV, TMR, Translink, Geoscience Australia
© WSP Australia Pty Ltd (WSP) Copyright in the drawings, information and data contained in this information is the property of WSP. The contained and the information are hereby for the use of the recipient. No part of this document may be used, copied or reproduced in any form or by any means other than that which is expressly permitted by WSP. WSP makes no representation, warranty or any other statement as to the accuracy or reliability of any data or information contained in this document. WSP Australia Pty Ltd is not responsible for any loss or damage of any kind arising from the use of this information. WSP Australia Pty Ltd is not responsible for any loss or damage of any kind arising from the use of this information. WSP Australia Pty Ltd is not responsible for any loss or damage of any kind arising from the use of this information.

C:\Users\AUEB504167\WSP 0365\AU-WNG - Geospatial - A18 - Projects\F8125894_RP2\Map01_AirQuality\F8125894_A701_AmbientAirQualityMonitoringStations_r14.mxd

Figure 7-1 Indicative ambient air quality monitoring locations

7.4 Routine visual inspections

Routine visual inspections will be conducted by the Contractor on a weekly basis or daily during dust generating activities. Inspections must include, but not be limited to:

- record observed meteorological conditions and areas with the potential for dust generation
- provide notification to site personnel on the potential for adverse weather conditions
- note and comment on the active site works for the day
- note and comment on the dust management measures in place and their suitability e.g., water cart deployment during dry conditions
- inspect vehicles for load coverage
- inspect vehicles for spillage from side rails, tail gates and draws bars prior to departure from site
- check public roads for track out i.e., dirt tracked out by truck leaving the sites
- record any observations of fugitive dust emissions together with activities and meteorological conditions at the time
- inspect site boundaries for release of visible dust
- inspect construction compounds for release of visible dust
- inspect adjacent sites/locations for dust deposition.

7.5 Ambient air quality monitoring

7.5.1 Compliance monitoring

Conduct ambient air monitoring at site boundary locations for particulate matter (deposited dust) in accordance with the NSW EPA Approved Methods.

- monthly dust deposition samples at 4 locations (AQM1 to AQM4) in accordance with Australian Standard AS 3580.9.6
- collection of meteorological parameters from the on-site meteorological station
- odour screening along the site boundary by on-site trained screening personnel as per Australian Standard AS 4323.3 and the odour intensity scale based on the German Standard VDI 3940:2010. Site boundary odour screening will be conducted on a daily basis only during excavation works of contaminated material at areas of known and unexpected contaminated material.

7.5.2 Complaint's monitoring

In the event that a complaint is made from a member of the public about dust, monitoring will be undertaken to determine the veracity of the complaint. A High-Volume Sampler (HVS) will be used in accordance with Australian Standard AS 3580.9.3. If power is not available, then a solar low powered sampler (LVS) will be used, and sampling conducted in accordance with AS/NZS: 3580.9.9.

Where possible, the sampler would be sited in accordance with Australian Standard

AS 3580.1.1 - 2007 “Methods for the Sampling and Analysis of Ambient Air – Guide to Siting Air Monitoring Equipment” at the complainant’s location.

Where a complaint is made from a member of the public about odour, details of the odour occurrence would be collected from the complainant including time, date, location, duration, intensity, offensiveness and meteorological conditions. If the complaint occurred during excavation of contaminated material, regular (hourly) odour sniffing would be undertaken in accordance with the relevant standards. Where the complaint took place during the excavation of uncontaminated material or other construction works, the presence of other on-site sources would be investigated in addition to potential off-site local odour sources.

7.6 Monitoring frequency

Monitoring types and their respective frequency will be in accordance with Table 8.1.

Table 8.1 Monitoring Frequency

Monitoring Type	Frequency*	Location	Comments
Depositional dust	Monthly	Depositional dust gauges as per Section 7.3	Analysed by NATA accredited laboratory
Meteorological conditions	Continuous	Project Automatic Weather Station	Averaged over a 5-minute period (rolling calculation for rainfall intensity)
Odour	Daily during excavation of contaminated material	Location of contamination	Conducted by trained personnel
Visual inspections	Weekly or daily during dust generating activities	As per Section 7.4	Conducted by trained personnel

*Frequency may be increased in the event of a complaint.

7.5.3 Routine boundary inspections

Routine site boundary inspection for odour will be conducted on a daily basis by the Contractor during excavation of odour generating contaminated material.

Site boundary inspections will be conducted by trained personnel.

7.7 Meteorological monitoring

The Contractor will establish a meteorological station at Peattie's Road (or alternate location) as agreed with Transport.

The meteorological station will be operated and maintained by the Contractor for the duration of works with consideration of the AS/NZS 3580.1.1 standard. Given the proximity of dense vegetation to the construction footprint, it may not be possible to achieve these siting requirements.

The meteorological station will have a web portal and collect the following information:

- (a) temperature
- (b) relative humidity
- (c) dew point
- (d) wind speed
- (e) wind direction
- (f) rainfall including:
 - (i) 24-hour rainfall to 9am
 - (ii) rainfall since 9am
 - (iii) rainfall in the last hour
- (g) battery voltage
- (h) solar voltage

In the event of a breakdown of the on-site meteorological station, data collected at the nearest meteorological station will be used.

Wind speed and direction will be used to assist with the management of offsite impacts. Reference to the on-site meteorological conditions will be made to:

- assess the suitability of conditions (e.g., wind speed and direction) prior to commencing activities with the potential to cause significant dust emissions
- provide supporting information for the reporting on measured and observed dust and assist in the determination of potential impacts such as the direction of off-site migration of dust
- assist with complaints investigation.

8 Quality control / quality assurance

8.1 Operation and maintenance

Equipment calibration and maintenance must be conducted by the Contractor in accordance with the NSW EPA *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW*, NATA requirements and relevant test method requirements

The data will be made available electronically to Transport on a monthly basis or as requested.

8.2 Quality assurance

The Contractor or Contractor representative must hold National Association of Testing Authorities (NATA) accreditation for the conduct of the methods used to monitor the air quality indicators listed in section 3.1 and operate within a documented management system.

The management systems will include the following protocols:

- code of conduct
- project management
- project planning and allocation of resources
- project documentation and control
- financial and schedule management
- scope change management
- product quality including senior technical review
- document retention and information management.

9 Dust management protocols

To effectively manage dust during routine operations and in the event of a measured exceedance, various protocols and procedures will be implemented.

9.1 Routine protocols

9.1.1 Inductions and training

The requirements of the AQCMP will be included in the site induction for all workers associated with construction activities or activities that have the potential to generate dust emissions. Induction protocols associated with the AQCMP must include:

- staff awareness of activities and the risks associated with excessive dust emissions
- presence and location of on and off-site sensitive receptors
- definition of roles and responsibilities for the management of dust
- dust control measures and their effective implementation.

Where the Contractor identifies those activities that have the potential to generate dust emissions, the sources, risks, and suitable controls are to be communicated to the relevant staff prior to the commencement of the activity by means of pre-start meetings or toolbox talks.

Training matrices will be developed, and training undertaken to ensure staff are competent for their level of responsibility. Records of inductions and training must be maintained and accessible when requested by the regulatory authorities or the client.

9.1.2 Dust controls

Dust controls must be implemented as far as practicable to mitigate potential dust emissions. The dust controls are included in section 17.4 (Environmental management measures) of the Newcastle Inner City Bypass – Rankin Road to Jesmond EIS and will be included in the CAQMP. Examples of mitigation measures identified in the CAQMP include:

- Exposed areas to be minimised through site planning and programming
- Stockpiled material to be located away from sensitive receivers
- Stockpiles to be designed, established, operated and decommissioned in accordance with Roads and Maritime Stockpile Site Management Guideline (Roads and Maritime, 2011c)
- Dust suppression measures, such as the use of water carts or soil binders, will be used on any unsealed surfaces and other exposed areas
- Sealed roads at access points will be watered-down regularly to minimise the re-suspension of dust on sealed roads
- Speed limits and designating specific routes will be imposed for haulage and access
- Construction activities which would generate dust would be avoided or

modified during high wind periods where possible

- All trucks will be covered when transporting materials to and from the site
- All construction equipment will be maintained and operated in accordance with manufacturer specifications.

Continual monitoring on the effectiveness of these mitigation measures will be carried out in accordance with the monitoring identified in Section 7 of this monitoring program and the CAQMP. Additional measures may also be implemented in the event of an exceedance as per Section 10.2.

Controls will be identified in the work method statements, risk assessments and discussed at pre-start meetings and toolbox talks.

10 Compliance management

10.1 Complaints management

Air quality complaints will be taken seriously and dealt with expeditiously. Each complaint will be investigated and where air quality levels exceed criteria, appropriate management measures put in place to mitigate future occurrences. Complaints will generally be managed in accordance with the project Complaints Management System with air quality complaints being lodged via post, email, and phone. The CEMP contains detail of the complaints handling process.

10.2 Non-compliances

All results of the ambient air monitoring will be recorded and reviewed by the Environmental Manager. Issues of concern or non-compliance will be documented and discussed with the project manager with the view of resolving the issue or determining a way forward. The relevant authority will be informed of all non-compliances i.e., exceedances of the assessment criteria prescribed in the *Approved Methods*.

Where monitoring indicates that air quality consistently exceeds relevant criteria, then additional mitigation measures will be applied to reduce air quality concentrations to below acceptable levels. Additional mitigation measures will be detailed within the CAQMP and may be increased in response to air quality complaints. Examples of these measures include:

- Use of deoderisers
- Remove and/or cover odorous or dust generating materials
- Targeted inspections
- Increased monitoring
- Management measure and work methodology reviews
- Additional dust suppression (e.g. water cart usage)

Where identified exceedances impact the safety of people or property, work at the concerned site must cease immediately.

Non compliances will be managed in accordance with the CEMP and Transport's Environmental Incident Procedure.

10.3 Corrective and preventative action

Procedures for corrective and preventative action will be prepared by the Contractor for various phases of the construction phase e.g., enabling works, excavations to effectively manage potential or actual non-conformance(s). The procedures must define:

- a process for timely identifying and correcting exceedances and to manage their environmental impacts
- a process to investigate the causes (root cause analysis) of exceedances
- a process to develop and evaluate measures to avoid a recurrence of exceedances
- requirements for recording corrective actions and assessing their effectiveness

Corrective action must be appropriate to the exceedance and the associated impacts. All documentation will be updated following amendments to any written procedures incorporating the corrective or preventative actions and a record of revisions maintained.

10.4 Inspections and auditing

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

10.5 Communications

Records relating to air quality on the project must be maintained in the site Environmental Register or equivalent. These records will include details relating to air quality management, including:

- Training / inductions records
- Equipment inspections
- Air quality monitoring reports
- Audit or reviews
- Communication regarding air quality management
- Details of complaints
- Results of routine boundary inspections

10.6 Reporting

The meteorological and ambient air quality monitoring data will be presented at the regular Environmental Review Group meetings.

An Annual Construction Air quality Monitoring Report will be prepared and submitted to the Planning Secretary and relevant public authorities for their information. The report will include analysis of the results within the reporting timeframe against data collected prior to construction (as per Section 6). If relevant, commentary will also be included comparing exceedances against the following:

- Previous exceedances
- Local ambient air quality (as per the relevant weather station)
- Baseline data (as per Section 6)
- Qualitative assessments undertaken within the EIS

10.7 Program review

Continual improvement of this AQCMP will be achieved by on-going evaluation of environmental management performance against proposed control measures, environmental policies, objectives, and targets for the purpose of identifying opportunities for improvement.

The continual improvement process will be designed to:

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

Minor amendments can be approved by the ER. Any other changes must be endorsed by the ER, consulted with the relevant agencies, and approved by DPE in line with condition C12 of the Conditions of Approval. Changes will be documented in the document control section for each revision. A copy of the updated AQCMP and changes will be distributed to all relevant stakeholders