



Transport
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Services

APPENDIX B6

Construction Air Quality Management Sub Plan

WestConnex M4 Widening Major Civil Works



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Glossary / Abbreviations

AFMP	Ancillary Facility Management Sub Plan
AQMP	Construction Air Quality Management Plan
CEMP	Construction Environmental Management Plan
CO	Carbon Monoxide
CoA	Minister's Condition of approval
EPA	Environment Protection Authority
DP&E	NSW Department of Planning and Environment
EIS	Environmental Impact Statement
EP&A Act 1979	<i>Environmental Planning and Assessment Act 1979</i>
EPL	Environmental Protection Licence
ER	Environmental Representative
ESCP	Erosion and Sediment Control Plan
EWMS	Environmental Work Method Statements
KPI	Key Performance Indicator
M4 Widening Major Civil Works	That portion of the M4 Widening project which is the subject of this CEMP.
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter air
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NO^2	Nitrogen Dioxide
PM	Particulate Matter
PM_{10}	Particulate matter 10 micrometers or less in diameter
Project, the	WestConnex – M4 Widening Major Civil Works
Project Team	Members of the M4 Widening Major Civil Works contractor staff including sub-contractors authorised by the Project Manager to work on the M4 Widening Major Civil Works.
POEO Act 1997	Protection of the Environment Operations Act 1997
RCPBJV	Rizzani de Eccher Australia Pty Ltd/CPB Contractors Pty Ltd Joint Venture Formerly Rizzani de Eccher Australia Pty Ltd/Leighton Contractors Pty Ltd Joint Venture (RLJV).
Roads and Maritime	NSW Roads and Maritime Services
Secretary	Secretary of the Department of Planning and Environment
SMC	Sydney Motorway Corporation (formerly WestConnex Delivery Authority)
SSI	State Significant Infrastructure as defined in the Instrument of Approval; <i>Widening and upgrading the M4 Motorway generally between Pitt Street, Parramatta and Holroyd and Homebush Bay Drive, Homebush West, including</i> - <i>Construction of a new two lane viaduct for westbound traffic, on the southern side of the existing viaduct structure between Church Street, Parramatta and Wentworth Street, Granville and reconfiguration of the traffic lanes on the existing viaduct structure</i>

Glossary / Abbreviations

	<p>to four lanes eastbound and two lanes westbound; and a new bridge/viaduct over Duck River at Auburn;</p> <ul style="list-style-type: none"> - Widening of the existing motorway to the south of the westbound carriageway between Wentworth Street, Granville and Duck River, Auburn; and within the existing motorway corridor between Junction Street, Auburn and Homebush Bay Drive, Homebush to provide four traffic lanes westbound and four traffic lanes eastbound; - Construction of a new westbound G-loop on-ramp to the M4 Motorway from Homebush Bay Drive, Homebush and a new eastbound on-ramp to the M4 Motorway from Hill Road, Lidcombe; - Widening and/or lengthening of existing ramps at Church Street, James Ruse Drive, Silverwater Road, Hill Road and Homebush Bay Drive; - Provision of Intelligent Transport Systems (ITS) infrastructure for motorway operations; - Provision of road infrastructure and complementary technology services to support the future implementation of smart motorway operations. - Provision of tolling infrastructure such as gantries and control systems; - Provision of new and modified noise barriers and new asphalt wearing surface to the existing M4 Motorway.
SSI boundary	The boundary of the SSI as defined in the documents referred to in condition A2 of the CoA.
SSI footprint	That area within the SSI boundary physically impacted by construction activities.
SWMP	Construction Soil and Water Management Plan
TSP	Total Suspended Particulate
WCX	WestConnex M4 Co subsidiary of SMC delivering M4 Widening
WEMP	Construction Waste and Energy Management Plan

I Introduction

I.1 Context

The Construction Air Quality Management Sub Plan (AQMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for WestConnex M4W Major Civil Works (the Project).

The AQMP has been prepared to address the requirements of the Conditions of Approval (CoA), the mitigation measures listed in the WestConnex M4 Widening Environmental Impact Statement (EIS) and all applicable legislation.

I.2 Background

The M4 Widening EIS, August 2014 assessed the impacts of construction and operation of the Project on air quality, within chapter 8.9 and Appendix L Air Quality Assessment (*Air Quality Assessment Westconnex M4 Widening*, Todoroski Air Sciences Pty Ltd, July 2014).

The total amount of dust generated from the proposed construction earthworks activities would be comparable to a modest quarry operation, however, impacts would be less as construction activities would occur over 7.5 kilometres (i.e the length of the M4 Motorway that will be upgraded). Potential sources (activities) of dust associated with the project include general earthworks, demolition activities, vegetation clearing, topsoil / material handling including stockpiling, material loading and material haulage, vehicular movements over unpaved surface (including unsealed access roads), wind erosion of exposed areas, temporary stockpiles and tracking of dirt onto roads.

The Total Suspended Particulate (TSP) emission calculations provided in the EIS for construction activities assume that all reasonable construction dust controls would be implemented and that the site is managed via a construction dust management plan. Emissions associated with construction activities would occur intermittently over the length of the project. This would also limit the potential for any significant off-site impacts. Mitigation measures as defined in the EIS to be employed include minimising the area of exposed surfaces, minimising stockpiling of material, barriers, covering or temporary rehabilitation to be used where appropriate, watering of exposed surfaces and rehabilitation of completed sections to be undertaken soon as practicable.

The overall Environmental Management System for the Project is described in the Section 4 of the CEMP.

The AQMP is part of the Rizzani de Eccher Pty Ltd/CPB Contractors Pty Ltd Joint Venture (RCPBJV) environmental management framework for the Project, as described in Section 4.1 of the CEMP.

Management measures identified in this Plan will be incorporated into site or activity specific Environmental Work Method Statements (EWMS).

EWMS will be developed and signed off by environment and management representatives prior to associated works and construction personnel will be required to undertake works in accordance with the identified mitigation and management measures.

Used together, the CEMP, strategies, procedures and EWMS form management guides that clearly identify required environmental management actions for reference by RCPBJV personnel and contractors.

The review and document control processes for this Plan are described in Section 9 and 10 of the CEMP.

2 Purpose and objectives

2.1 Purpose

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

2.2 Objectives

The key objective of the AQMP is to ensure that air quality impacts are minimised and managed in accordance with CoA D32 (g) and the Project Environmental Protection Licence (EPL). To achieve this objective, RCPBJV will undertake the following:

- Ensure appropriate controls and procedures are implemented during construction activities to avoid or minimise air quality impacts and potential adverse impacts to sensitive receivers along the Project corridor.
- Ensure appropriate measures are implemented to address the relevant CoA outlined in Table 3.1 and the mitigation measures detailed in the EIS.
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in Section 3.1 of this Plan.

Refer to Appendix B7 Construction Waste and Energy Management Plan for measures to reduce greenhouse gas emissions during construction.

3 Environmental requirements

3.1 Relevant legislation and guidelines

3.1.1 Legislation

Legislation relevant to air quality management includes:

- *Environmental Planning and Assessment Act 1979* (EP&A Act).
- *Protection of the Environment Operations Act 1997* (POEO Act).
- *National Greenhouse and Energy Reporting Act 2007*.

Relevant provisions of the above legislation are explained in the register of legal and other requirements included in Appendix A1 of the CEMP. Matters relating to the *National Greenhouse and Energy Reporting Act 2007* are addressed in the Construction Waste and Energy Management Sub Plan.

3.1.2 Guidelines and standards

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

- National Environment Protection Council's (NEPC) – NEPM for Ambient Air Quality Guidelines.
- Protection of the Environment Operations (Clean Air) Regulation, 2002.
- AS 2922 Ambient Air Guide for Citing of Sampling Equipment.
- AS 3580.10.1-1991 Methods of Sampling Analysis of Ambient Air.
- Action for Air 1998 (NSW DEC).
- Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW (DEC 2005).

3.2 Minister's Conditions of Approval

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

Table 3-1 Conditions of Approval relevant to the AQMSP

CoA No.	Condition Requirements	Document Reference
D14	The SSI shall be constructed in a manner that minimises dust emissions from the site, including wind-blown and traffic-generated dust and tracking of material onto public roads. All activities on the site shall be undertaken with the objective of preventing visible emissions of dust from the site. Should such visible dust emissions occur at any time, the Proponent shall identify and implement all feasible and reasonable dust mitigation measures, including cessation of relevant works, as appropriate, such that emissions of visible dust cease.	Section 6
D32 (g)	a Construction Air Quality Management Plan to detail how construction impacts on air quality will be minimised and managed. The Plan shall be developed in consultation with the EPA and shall include, but not	

CoA No.	Condition Requirements	Document Reference
	necessarily be limited to:	
	I. the identification of potential sources of dust and other emissions;	
	II. key performance indicators;	Section 5
	III. measures to monitor and manage dust emissions, including dust from stockpiles, and materials tracking from construction sites onto public roads;	Section 6.2 Section 6.3
	IV. strategies to minimise air emissions from off road diesel equipment, including but not limited to graders, bulldozers and loaders;	
	V. mitigation measures to be implemented, including measures during weather conditions where high level dust episodes are probable (such as strong winds in dry weather);	Section 6.3 Section 6.3
	VI. mechanisms and procedures to be implemented in the event that adverse air quality impacts arise;	
	VII. record keeping procedures;	
	VIII. methods for assessing compliance against the identified key performance indicators;	Section 7.3
	IX. mechanisms for reporting against key performance indicators; and	Section 7.8
	X. mechanism for the monitoring, review and amendment of this plan.	Section 7.5 Section 7.5
		Section 8

3.3 Management measures from EIS and/or Submissions Report

Relevant management measures are listed in Table 3-2. This includes reference to required outcomes, the timing of when the commitment applies, relevant documents or sections of the environmental impact statement influencing the outcome and implementation. The resources required, including construction personnel responsible for implementation of the management measure are detail in Section 6.

Table 3-2 Management measures from EIS and/or Submissions Report

Outcome	EIS Ref #	Management Measure	Timing	Reference Document	AQMP Reference
Emissions from general construction activities	AQ-1	<ul style="list-style-type: none"> - Activities will be assessed during adverse weather conditions and modified as required (for example, activities will cease where reasonable levels of dust cannot be maintained using available means). - Dust monitoring will be undertaken during construction at appropriate locations near sensitive receivers for the project in accordance with Approved Methods for Sampling and Analysis of Air Pollutants in NSW. - Construction vehicles will meet compliance with relevant and current emission standards as prescribed in Australian Design Rules for heavy duty engines and vehicles. Strategies for minimising air emissions from off road diesel equipment will be adopted including but not limited to, graders, bulldozers and loaders - Engines of on-site vehicles and plant will be switched off when not in use. - Where practicable, vehicles will be fitted with pollution reduction devices. - Vehicles will be maintained and serviced according to manufacturer's specifications. - Use lower vibration generating items of excavation plant and equipment eg smaller capacity rockbreaker hammers. - All off road diesel equipment will meet best available diesel emissions standards or be fitted with an appropriate diesel exhaust treatment device where possible. 	Construction	EIS Section 8.9.4/ Submissions Report	Section 6
Dust emissions from exposed areas and stockpiles	AQ-2	<ul style="list-style-type: none"> - Minimise the area of exposed surfaces. - Employ appropriate measures to prevent/minimise wind-blown dust from leaving the site (eg water carts). - Minimise stockpiling of material. - Stockpiles will be located away from sensitive receivers where practicable. - Apply barriers, covering or temporary rehabilitation. - Rehabilitation of completed sections will be undertaken soon as practicable. 	Construction	EIS Section 8.9.4	Section 6
Dust emissions from hauling activities	AQ-3	<ul style="list-style-type: none"> - Watering of haul roads (fixed or mobile). - Roads or accesses with long term or heavy use will be sealed where required. - Sealed haul roads will be cleaned regularly. - Vehicle traffic will be restricted to designated routes which can be managed by regular watering and with appropriate speed limits. - Wheel wash or grids will be located near exit points to minimise mud/ dirt track out. - Street cleaning will be undertaken to remove dirt tracked onto sealed roads. - Vehicle loads will be covered when transporting material off site. 	Construction	EIS Section 8.9.4	Section 6

Outcome	EIS Ref #	Management Measure	Timing	Reference Document	AQMP Reference
Dust emissions from cutting, grinding or sawing equipment	AQ-4	- Dust suppression activities will be undertaken for concrete cutting, grinding or sawing (e.g. water sprays)	Construction	EIS Section 8.9.4	Section 6
General	n/a	- Activities to be assessed during adverse weather conditions and modified as required (e.g. cease activity where reasonable levels of dust cannot be maintained using the available means) - Engines of on-site vehicles and plant switched off when not in use - Vehicles fitted with pollution reduction devices [where reasonable & feasible] - Maintain and service vehicles according to manufacturer's specifications	Construction	EIS Appendix L Table 7-2	Section 6
Exposed areas and stockpiles	n/a	- Minimise area of exposed surfaces - Water suppression on exposed areas and stockpiles - Minimise amount of stockpiled material [where reasonable & feasible] - Locate stockpiles away from sensitive receivers where possible - Apply barriers, covering or temporary rehabilitation - Progressive staging of construction activities - Rehabilitation of completed sections as soon as practicable - Keep ancillary vehicles off exposed areas	Construction	EIS Appendix L Table 7-2	Section 6
Material handling	n/a	- Reduce drop heights from loading and handling equipment	Construction	EIS Appendix L Table 7-2	Section 6
Hauling activities		- Watering of haul roads (fixed or mobile) - Sealing of long term / heavy use roads - Sealed haul roads to be cleaned regularly - Restrict vehicle traffic to designated routes, that can be managed by regular watering - Impose speed limits - Wheel wash or grids near exit points to minimise mud/ dirt track out - Street cleaning to remove dirt tracked onto sealed roads - Covering vehicle loads when transporting material off- site	Construction	EIS Appendix L Table 7-2	Section 6
Cutting, grinding or sawing equipment	n/a	- Dust suppression (e.g. water sprays for concrete cutting)	Construction	EIS Appendix L Table 7-2	Section 6

4 Existing Environment

The following sections summarise what is known about factors influencing air quality within and adjacent to the Project corridor. The key reference document is Section 8.9 of the EIS.

4.1 Air quality records

Sources of air pollution in the wider area of the M4 Widening project include emissions from local anthropogenic activities such as motor vehicle exhaust, domestic wood heaters and various commercial and industrial activities, and natural emissions from wind erosion, dust storms, pollens and bushfires.

The nearest and most representative ambient air quality monitoring data for the M4 Widening project site are available from the EPA monitoring sites at Rozelle, Chullora and Prospect. The background monitoring data collected at these sites includes data for NO₂, CO (Rozelle and Chullora) and PM₁₀.

PM₁₀

The data show that all annual average PM₁₀ concentrations at the monitoring sites were below the 30 $\mu\text{g}/\text{m}^3$ annual average criterion for all years. All of the monitoring stations recorded 24-hour average PM₁₀ levels above 50 $\mu\text{g}/\text{m}^3$ with notable elevated readings during spring 2013. These elevated levels were primarily caused by bush fire activity in the surrounding area (Bureau of Meteorology 2013b).

NO₂

A summary of the NO₂ monitoring data collected from the EPA monitoring sites at Rozelle, Chullora and Prospect from 2010 to 2013 shows that all annual average NO₂ concentrations at the monitoring sites were below the 62 $\mu\text{g}/\text{m}^3$ annual average criterion for all years. The daily maximum 1-hour average NO₂ data show that all of the monitoring sites recorded levels below the 1-hour average NO₂ criterion of 246 $\mu\text{g}/\text{m}^3$ at all times.

CO

The daily maximum 8-hour average CO data show that all of the monitoring sites recorded levels below the 8-hour average CO criterion of 10 mg/m^3 at all times.

Table 4-1 Air quality monitoring results - Rozelle, Chullora and Prospect

Pollutant	Averaging period	NEPM goals		Monitoring results Average recorded concentration
		Maximum concentration	10-year goal(max allowable exceedence)	
National standards and goals for ambient air quality				
Carbon monoxide	8hr	10 mg/m ³	1 day a year	1.6 – 2.6 mg/m ³)
Nitrogen dioxide	1 hr	0.12 ppm (246 µg/m ³)	1 day a year	19.5 – 21.7µg/m ³) ¹
Particles as PM ₁₀	1 day	50 µg/m ³	5 days a year	81.8 ² µg/m ³

4.2 Rainfall, soil dryness and wind

Long-term climatic data from the Bureau of Meteorology weather station at Sydney Olympic Park (Site No. 066195) is used to characterise the local climate in the proximity of the project. The Sydney Olympic Park station is located approximately 400m north of the M4 Widening project,

Maximum wind speeds during the warmer months have a greater variation between the 9:00 am and 3:00 pm conditions compared to the colder months. Mean 9:00 am wind speeds range from 8.4km/h in March to 11.9km/h in September and mean 3:00 pm wind speeds range from 12.5km/h in June to 19.4km/h in December.

Table 4-2 present a summary of data from Sydney Olympic Park collected over an approximate 16 year period.

Table 4-2 Monthly climate statistics summary – Sydney Olympic Park

Summary of climatic conditions from 1995 to present													
	Summer / Autumn						Winter / Spring						
	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Year
Mean rainfall (mm)	58	84.4	109.8	66.0	89.2	88.2	75.8	63.5	56.7	52.7	64.9	76.2	884.0
Mean rain days	6.8	7.6	7.7	7.6	6.9	7.7	6.9	6.3	4.4	5.5	7.1	7.8	82.3
Mean wind speed (km/h)	10	9.6	9.3	8.4	9.5	10.5	10.9	11	11.6	11.9	11.1	11.4	10.4
Mean temp (°C)	19.4	26.3	26.1	24.9	22.4	19.5	17.3	16.6	18.1	20.6	22.1	23.2	23.6 Max 13.9 Min

Table 4-2 provides a consideration of typical climatic factors that contribute to the proliferation of dust particulates. In addition to the exposure of unconsolidated material during construction e.g. earthworks, climatic factors such as prolonged dry weather, combined with high winds, can increase the likelihood of dust particulate emissions.

¹ Annual averages from Prospect from 2010 – 2013.

² Max 24-hour average from Prospect from 2010 – 2013.

It can be seen from the table that rainfall is typically higher during summer and autumn. Winter and spring are typically drier periods during the year.

4.3 Soil characteristics

Four main soil landscapes have been identified within the project area in accordance with Soil Landscapes of Sydney, (Soil Conservation Service of NSW 1989). These are described in Table 4-3, with an indication of the potential for wind erosion resulting in dust emissions.

Table 4-3 Soil type and characteristics

Chainage	Soil type	Characteristics	Dust emission risk
1500-2200 5700-5900 7600-8300	Birrong (bg) fluvial soil landscape	Landscape: level to gently undulating alluvial floodplain draining Wianamatta Group shales. Local relief to five metres, slopes less than three per cent. Broad valley flats. Extensively cleared tall open-forest and woodland. Soils: deep (>250 centimetres) yellow podzolic soils and yellow solodic soils on older alluvial (terraces); deep (>250 centimetres) solodic soils and yellow solonetzic soils on current floodplain. Limitations: flooding, high soil erosion hazard, saline subsoils, seasonal water logging, very low soil fertility.	Moderate
3300-5700 5900-7600	Blacktown (bt) residual soil landscape:	Landscape: gently undulating rises on Wianamatta Group shales and Hawkesbury shale. Local relief to 30 metres, slopes are usually less than five per cent. Broad rounded crests and ridges with gently inclined slopes. Cleared woodland and tall open-forest. Soils: shallow to moderately deep (<100 centimetres) red and brown podzolic soils on crests, upper slopes and well drained area; deep (150-300 centimetres) yellow podzolic soils and soloths on lower slopes and in areas of poor drainage. Limitations: moderately reactive highly plastic subsoil, low soil fertility, poor soil drainage.	Moderate
0-1500	Glenorie (gn) erosional soil landscape:	Landscape: undulating to rolling low hills on Wianamatta Group shales. Local relief 50-80 metres, slopes ranging from five to 20 per cent. Narrow ridges, hill crests and valleys. Extensively cleared tall open-forest. Soils: shallow to moderately deep (<100 centimetres) red and brown podzolic soils on crests, upper slopes and well drained area; deep (150-300 centimetres) yellow podzolic soils and soloths on lower slopes and in areas of poor drainage. Limitations: moderately reactive highly plastic subsoil, low soil fertility, poor soil drainage.	Low
2200-3300	Disturbed terrain (X4), greater than four metres elevation	Disturbed terrain may include filled areas, which often occur during reclamation of low lying swamps for urban development. Other disturbed terrain includes areas which have been mined or dredged, or have undergone heavy ground disturbance through general urban development or construction of dams or levees.	Low

4.4 Sensitive receivers

The construction of the Project will interact with a number of sensitive receivers and natural environments. The lands surrounding the Project have been considered for potential sensitivity to dust and air quality impacts. Potential sensitive receivers include:

- Residences within 50m of where earthworks and ancillary sites that will be used for stockpiling are located;
- Hospitals, childcare facilities and educational facilities;
- Native vegetation;
- Sensitive commercial or industry users;
- Road users; and
- Watercourses.

The location of the above receivers will be documented on an Environmentally Sensitive Area Map (refer to CEMP Appendix A6) for the area and/or the location detailed within the EWMS.

5 Environmental aspects and impacts

5.1 Construction activities

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

- Dust and particulates.
- Gaseous.

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

- General earthworks particularly during site establishment.
- Demolition activities
- Vegetation clearing.
- Bulk earthworks.
- Operating, crushing and screening.
- Operation of concrete / asphalt batching plants.
- Topsoil / material handling including stockpiling, material loading and material haulage.
- Vehicular movements over unpaved surface (including unsealed access roads).
- Wind erosion of exposed areas and temporary stockpiles.
- Tracking of dirt onto roads.

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

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

5.2 Factors likely to affect dust generation

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

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

- Adjacent land uses and activities that may create dust resulting in a cumulative impact on air quality.

5.3 Impacts

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

- Deposition of dust on surfaces where it may cause damage and/or lead to a need for increased cleaning or repair.
- Aesthetic effects that arise from visible airborne dust plumes and from deposits of dust on surfaces.
- Need for increased maintenance of air filtering systems (e.g. air conditioners etc).
- Potential adverse health effects including eye, nose and throat irritation from excessive inhalation of fine particles.
- Impacts on water quality and/or vegetation health from dust deposition.
- Impacts on residential sensitive receivers, including impacts on living areas, swimming pools and general amenities.
- Complaints from the public relating to dust or odours.

Some impacts on air quality attributable to the Project are anticipated and have been described in the EIS. Chapter 6 provides a suite of mitigation measures that will be implemented to avoid or minimise those impacts.

6 Air Quality Management

6.1 Air Quality Goals

Construction emissions are primarily comprised of dust in the form of TSP, particulate matter (PM) PM10 and deposited dust, and will be controlled on a daily basis through good management processes. (Source: *Air Quality Assessment Westconnex M4 Widening*, Todoroski Air Sciences Pty Ltd, July 2014).

The NEPC sets goals for ambient air quality. Table 6-1 outlines relevant air quality goals for the Project.

Table 6-1 Relevant Air Quality Goals

Pollutant	Averaging period	Maximum concentration	NEPM goals
			10-year goal (max allowable exceedence)
National standards and goals for ambient air quality			
Carbon monoxide	8hr	10 mg/m ³	1 day a year
Nitrogen dioxide	1 hr	0.12 ppm (246 µg/m ³)	1 day a year
Particles as PM ₁₀	1 day	50 µg/m ³	5 days a year
Total Suspended Particulates (TSP)	Annual	90 µg/m ³	N/a

Visual monitoring of dust emissions will be carried out on a continual basis along the project alignment. Should visual monitoring observe dust emissions that have the potential to disperse outside of the project boundary, construction activities will be reviewed and mitigation measures will be implemented.

Real time monitoring (TSP and PM10) will be carried out if visual monitoring observes offsite dispersal and in response to complaints for the purpose of refining construction methods / techniques aimed at minimising dust emissions.

6.2 Air Quality Key Performance Indicators

Key Performance Indicators (KPI) have been established as required by CoA D32(g) (ii) to measure the performance of the project in relation to air quality management. The KPI's set for the Project are provided in Table 6-2 including the documentation requirements. Section 7 details compliance and reporting requirements.

Table 6-2 Air Quality KPIs

Aspect	KPI	Documentation
Community Management	No dust related complaints	Consultation Manager Database
Plant and Equipment	All plant and equipment is maintained in accordance with manufacturers requirements	Plant and equipment log books
Exposed surface	Areas with no scheduled work for two	Environmental inspection checklist

Aspect	KPI	Documentation
treatment	weeks will be treated to manage dust	Program
Stockpile management	Stockpiles that will be in place for 4 weeks or more will be treated (e.g. cover crop)	Environmental inspection checklist Program
Vehicle movements	Spillage or tracking onto public roadways will be removed within 24hrs	Environmental inspection checklist Site Diary

6.3 Environmental control measures

A range of environmental requirements and control measures are identified in the various environmental documents, including the EIS, Submission Report, CoA, Roads and Maritime documents, and from recent experience on similar road projects. Specific measures and requirements to address impacts on air quality are outlined in Table 6-3.

Table 6-3 Air quality management and mitigation measures

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
GENERAL					
AQ1	Training will be provided to all project personnel, including relevant sub-contractors on sound air quality control practices and the requirements from this plan through inductions, toolboxes and targeted training.	Project Induction Pre-starts & Toolbox talks This AQMP	Pre-construction Construction	Construction Manager Environmental Manager	G38/G36, Good practice
AQ2	Air quality control measures from this plan will be included in relevant EWMS and/or Erosion and Sediment Control Plans (ESCP).	AQMP EWMS ESCP	Pre-construction / Construction	Site Engineer Environmental Coordinator	Good practice
AQ3	Vegetation clearing will be staged where possible to minimise the area and time that surfaces are exposed. Minimise stockpiling of material. Stockpiles will be located away from sensitive receivers where practicable.	EWMS ESCP SWMP	Construction	Site Engineer	G36
AQ4	Exposed surfaces with no scheduled work for two weeks will be treated to minimise dust generation. Exposed surfaces will be stabilised progressively using the most practical site specific methods, including watering and geo-fabrics for short term exposure and emulsion spray, spray grass, soil compaction and revegetation for longer term exposed areas or final finishes.	ESCP Environmental Inspection Checklist	Construction	Foreman Environmental Coordinator	G36
AQ5	Construction activities will be modified, reduced or controlled during high or unfavourable wind conditions if they have a potential to increase off-site dust generation.	Environmental Inspection Checklist Site diary	Construction	Foreman Environmental Coordinator	G36
AQ6	Control measures including water carts, sprinklers, sprays, dust screens or the application of geo-binding agents will be utilised where applicable to control dust emissions. The frequency of use will be modified to accommodate prevailing conditions. Vehicle traffic will be restricted to designated routes which can be managed by regular watering and with appropriate speed limits.	Environmental Inspection Checklist Site diary	Construction	Foreman Environmental Coordinator	G36

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
AQ7	Erosion control structures will be checked regularly for build up of silt and other materials to ensure deposits do not become a dust source.	ESCP Environmental Inspection Checklist Site diary	Construction	Foreman Environmental Coordinator	Good practice
AQ8	Waste will be segregated and collected on a regular basis to ensure odours associated with waste do not become an issue.	WEMP	Construction	Foreman	Good practice
AQ9	The application of pesticides will be modified, reduced or controlled during high or unfavourable wind conditions where wind can carry pesticides outside of the defined treatment area.	FFMP EWMS	Construction	Foreman Environmental Coordinator	G36
AQ10	Stockpiles will be located in accordance with the criteria established in Appendix B8 of the CEMP - Compound and Ancillary Facilities Management Plan. A suitable cover crop or provision of other covering over topsoil stockpiles that will be established where stockpiles prone to wind erosion are in place for longer than 4 weeks.	ESCP AFMP FFMP EWMS	Construction	Site Engineer / Foreman Environmental Coordinator	G36
AQ11	There will be no burning off of waste.	Induction WEMP	Construction	Foreman	G36
VEHICLE MOVEMENT AND MATERIAL STORAGE					
AQ12	Areas of disturbed material and access roads will be stabilised where possible by methods such as compaction. Compounds, ancillary facilities, administration access roads and standing areas will be hard surfaced.	ESCP SWMP AFMP	Construction	Superintendent	G36
AQ13	Measures implemented to minimise dust, soil or mud from being deposited vehicles on public roads. This will be achieved by implementing mitigation measures such as stabilised site access (rumble grids, concrete and/or large aggregate) at entry/exit points. Manual cleaning will also be carried out where appropriate. In the event of any spillage or tracking, the spilt material will be removed within 24 hours.	ESCP Environmental Inspection Checklist Site Diary	Construction	Superintendent Environmental Coordinator	G36
AQ14	Hardstand areas and surrounding public roads will be cleaned, as required, using methods including brooms, bobcat attachments or street sweepers.	ESCP Environmental Inspection Checklist Site Diary	Construction	Foreman Environmental Coordinator	Good practice

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
AQ15	Vehicle movement will be confined to designated haul roads and areas. These roads will have speed limits of 40km/h in order to reduce dust generation. Reduced speed limit may be implemented where dust generation persists	Induction Toolbox talk Site signage	Construction	Superintendent	G36
AQ16	All loaded haulage trucks will be covered where there is a risk of release of dust or other materials and at all times on public roads.	Induction Toolbox talk	Construction	Foreman	G36
PLANT AND EQUIPMENT					
AQ17	Haul trucks and plant equipment will be switched off when not in operation. Where practical lower vibration generating items of excavation plant and equipment shall be used.	Induction Toolbox talk Pre-start Environmental Inspection Checklist	Construction	Foreman Operators Environmental Coordinator	G36
AQ18	Engines of plant parked next to residents will be switched off when not in operation.	Induction Toolbox talk Pre-start	Construction	Foreman Operators	Good practice
AQ19	Exhaust systems of construction plant, vehicles and machinery will be maintained in accordance with manufacturer's specifications to ensure that emissions do not exceed EPA regulations and compliance with Australian Design Rules for heavy duty engines and vehicles. Strategies for minimising air emissions from off road diesel equipment will be adopted including but not limited to, graders, bulldozers and loaders. Off road diesel equipment will meet best available diesel emissions standards or be fitted with an appropriate diesel exhaust treatment device where possible. Periodic visual checks will be undertaken to ensure ongoing compliance, typically weekly. Where practicable, vehicles will be fitted with pollution reduction devices.	Maintenance log book Environmental Inspection checklist	Construction	Foreman Plant yard manager Operators	G36
CRUSHING					
AQ20	Crushers will be positioned in protected areas, where practical, to reduce wind dispersion of dust particles (eg within cuts). Water spraying will be utilised if necessary.	EWMS	Construction	Foreman	Good practice

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
INSPECTION, MONITORING AND RECORDS					
AQ21	Public roads will be inspected each day at main entry and exit points to and from areas where construction activities are taking place and compound. Material tracked onto the road pavement will be removed in accordance with AQ13.	Site Diary	Construction	Foreman	G36
AQ22	Visual monitoring of dust emissions shall be carried out on a continual basis along the project alignment. Should visual monitoring observe dust emissions that have the potential to disperse outside of the project boundary mitigation measures shall be implemented immediately. Real time monitoring (Particles as PM10) will be carried out in response to complaints for the purpose of refining construction methods / techniques aimed at minimising dust emissions.	Site Diary Environmental Inspection Checklist	Pre-construction / Construction	Foreman Environmental Coordinator	G36
AQ23	Weather forecast will be reviewed on a daily basis and appropriate measures implemented where unfavourable weather conditions (dry weather, strong winds) are anticipated. Activities will cease where reasonable levels of dust cannot be maintained using available means.	Site Diary	Construction	Environmental Manager Foreman	Good practice
AQ24	Rainfall must be measured and recorded in millimetres per 24 hour period at the same time each day from the time that the site office associated with the Project is established. Rainfall records shall be taken from the nearest Australian Bureau of Meteorology Weather Station's: <ul style="list-style-type: none"> • Sydney Olympic Park • Parramatta. 	AQMP Weather station register	Pre-construction / Construction	Environmental Manager	EPL M3.1, M3.2
AQ25	Dust control and operational procedures will be reviewed and modified if results exceed the air quality criteria and are attributable to construction activities.	AQMP	Construction	Environmental Manager Foreman	Good practice

7 Compliance management

7.1 Roles and responsibilities

The RCPBJV Project Team's organisational structure and overall roles and responsibilities are outlined in *Section 4.2* of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in *Section 6* of this Plan.

7.2 Training

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

- Existence and requirements of this sub-plan.
- Relevant legislation.
- Roles and responsibilities for air quality management.
- Air quality mitigation and management measures.
- Procedure to be implemented in the event of an incident (e.g. release of dust or gaseous emissions from site).

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

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

Further details regarding staff induction and training are outlined in Chapter 5 of the CEMP.

7.3 Monitoring and inspection

Regular monitoring and inspections will be undertaken during construction. Monitoring and inspections will include, but not be limited to:

- Visual monitoring of dust emissions on a continual basis along the project alignment by the Foreman. Should visual monitoring observe dust emissions that have the potential to disperse outside of the project boundary, mitigation measures shall be implemented immediately. Mitigation measures may include;
 - Increased use of water carts;
 - Review of construction methodology;
 - Ceasing works temporarily; and/or
 - Early permanent stabilisation or temporary stabilisation measures implemented
- The Environmental Coordinator will review dust generating activities during routine inspections and record observations on the environmental inspection checklist.
- Plant and equipment maintenance logs will be reviewed by the Environmental Coordinator on a monthly basis.
- Real time monitoring (Particles as PM10) will be carried out in response to complaints for the purpose of refining construction methods / techniques aimed at minimising dust emissions.

Results from the PM10 monitoring and analysis will be included in the monthly environmental report.

- Weather data at from the nearest Australian Bureau of Meteorology Weather Station's (Sydney Olympic Park and Parramatta), including rainfall measured and recorded in millimetres per 24-hour period at the same time each day from the time that the site office is established.
- Complaints relating to air quality that are reported to the Community Liaison Team will be notified to the Foreman and corrective actions implemented. Details will be recorded in the Consultation Manager database and included in the monthly environmental report.

Additional requirements and responsibilities in relation to inspections are documented in Section 8.2 of the CEMP.

7.4 Licenses and permits

An EPL will be obtained for the scheduled activity “road construction”. Any air quality parameters required by the EPL will be included in Section 6.1 and applicable resources implemented to meet this requirement.

Any other relevant licenses or permits will be obtained in the lead up to and during construction as required.

7.5 Assessment of KPI's

Reporting against the KPI's included in Section 6.2 will be done on a monthly basis internally by the Environmental Manager. Compliance against the KPIs will be included in the Monthly Environment Report. Where indicators are not being met, the Environmental Manager will review work methods in association with the construction team to determine where modifications can be implemented.

7.6 Auditing

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

Audit requirements and scheduling are included in Section 8 of the CEMP. This includes management of non-conformance and corrective actions.

7.7 Reporting

Reporting requirements and responsibilities are documented in the Sections 8.4 and 8.5 of the CEMP.

The compliance tracking program will be updated with air quality compliance data on a quarterly basis and provided to WCX and DP&E.

7.8 Records

The documents referred to in Table 6-3, will be referenced to manage air quality and record observations during construction activities so that applicable corrective and preventative action can be implemented. The CEMP, Section 10, provides record control requirements.

8 Review and improvement

8.1 Continuous improvement

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

The continuous improvement process will be designed to:

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

8.2 AQMP update and amendment

The processes described in Section 8 and Section 9 of the CEMP may result in the need to update or revise this Plan. This will occur as needed.

Only the Environment Manager, or delegate, has the authority to change any of the environmental management documentation.

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 10.2 of the CEMP.