

APPENDIX B6

Construction Air Quality Management Sub-Plan

Windsor Bridge Replacement Project

Document control

File name	WBR_CEMP_ Appendix B6 Construction AQMP_Rev 2.docx
Report name	Windsor Bridge Replacement construction environmental management plan
Revision number	2

Plan approved by:

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Revision history

Revision	Date	Description	Approval
2	31/8/20	Annual Review	
1	23/10/19	Annual review	
0	14/09/18	For construction	GS
D	31/07/18	DPE & ER review	GS
С	4/07/18	RMS review	GS
В	19/06/18	RMS review	GS
А	28/05/18	For review	GS

Distribution of controlled copies

Copy no.	Issued to	Version	
1	Georgiou	0	
2	Roads and Maritime Services	0	
3	Environmental Representative	0	
4	RMS, ER, DPIE	1	

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Appendices

Appendix A Residential Sensitive Receivers

Glossary / Abbreviations

CAQMP	Construction Air Quality Management Sub-Plan
CEMP	Construction Environmental Management Plan
CoA	Condition of Approval
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DLWC	Department of Land and Water Conservation
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
EPL	Environmental Protection Licence
ERSED	Erosion and sedimentation
EWMS	Environmental Work Method Statements
FM Act	Fisheries Management Act 1994
GMS	Georgiou Management System
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measures
NOW	NSW Office of Water
OEH	Office of Environment and Heritage
ESCP	Erosion and Sediment Control Plan
Secretary	Secretary of the Department of Planning and Environment
SPIR	Submissions / Preferred Infrastructure Report
SWMP	Construction Soil and Quality Management Plan
TfNSW	Transport for New South Wales
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1 Introduction

1.1 Context

This Construction Air Quality Management Sub-Plan (CAQMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the Windsor Bridge Replacement (the Project).

This sub-plan has been prepared to describe how Georgiou Group (Georgiou) proposes to manage and protect air quality and address the requirements of the Transport for New South Wales (TfNSW) standard specification G36 (TfNSWG36) and the mitigation and management measures listed in the Environmental Impact Statement (EIS), submissions / preferred infrastructure report (SPIR), project CoAs, the modification Report (submitted to DPIE in September 2019) and all applicable legislation.

This CAQMP has been written to comply with the requirements of the *Protection of the Environment Operations Act 1997* (POEO Act) and any conditions of licences, notifications, approvals or permits in relation to maximum air pollutant levels.

1.2 Environmental management systems overview

The overall Environmental Management System for the Project is described in the Construction Environmental Management Plan (CEMP).

The CAQMP is part of the Georgiou 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 Georgiou personnel and contractors.

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

2 Objectives and Targets

2.1 Objectives

The key objective of the CAQMP is to ensure that impacts air quality are minimised and within the scope permitted by the Project conditions of approval. To achieve this objective, Georgiou 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 mitigation measures detailed in the EIS, SPIR, CoAs and Roads and Maritime's standard specification G36 (TFNSWG36).
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in Section 3.1 of this Plan.

2.2 Targets

Targets have been established for the management of air quality impacts during the Project to ensure:

- Full compliance with the relevant legislative requirements and Roads and Maritime's G36.
- Zero air quality complaints from the community and stakeholders.

3 Environmental requirements

3.1 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.

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, 2010.
- 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 2009 Update (NSW DEC).
- Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW (DEC 2005).
- Air Quality Monitoring Criteria for Deposited Dust (DEC Guideline), Refer to Table 4-1.

3.2 Minister's Conditions of Approval

The CoA relevant to this Plan are listed table 3-2 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 air quality

CoA no.	Requirement	Reference
C6	The Applicant shall carry out all reasonable and feasible measures to minimise dust generated by the SSI, including windblown and traffic-generated dust.	This Plan
C7	During construction, the Applicant shall ensure that:	This plan,

CoA no.	 Requirement a) all vehicles on site do not exceed a speed limit of 30 kilometres per hour; b) all loaded vehicles entering or leaving the site have their loads covered; and c) all loaded vehicles leaving the site are cleaned of dirt, sand 	Reference Construction traffic management sub plan (CEMP
	and other materials before they leave the site, to avoid tracking these materials on public roads.	Appendix B1)
		Table 6-1
D4 (e)(i)	The Applicant shall prepare and (following approval) implement a Construction Environmental Management Plan for the project.	This plan,
	The Plan shall outline the environmental management practices and procedures that are to be followed during construction, and shall be prepared in consultation with the relevant agencies and in accordance with the Guideline for the Preparation of Environmental Management Plans (Department of Infrastructure, Planning and Natural Resources, 2004). The Plan shall include, but not necessarily be limited to: e) an environmental risk analysis to identify the key environmental performance issues associated with the construction phase and details of how environmental performance would be monitored and managed to meet acceptable outcomes including what actions will be taken to address identified potential adverse environmental impacts. In particular, the following environmental performance	Appendix F - Stockpile Management Protocol (CEMP Appendix B4)
	issues shall be addressed in the Plan:	
	 measures to monitor and manage dust emissions including dust from stockpiles, blasting, traffic on unsealed public roads and materials tracking from construction sites onto public roads; 	

4 Existing environment

4.1 Ambient Air Quality

To assess potential air quality impacts it is necessary to have information of the existing levels of pollutants in the area.

Background regional air quality data from the region of Windsor in 2011 is assessed against EPA air quality criteria in 4-1 below.

Air quality monitoring carried out in 2011 for the EIS found there were no exceedances of the recorded carbon monoxide (8-hour average concentration of 10 mg/m $_3$ with an 8-hourmaximum of 1.9 mg/m $_3$ (OEH, 2011). Both the maximum 1-hour average and annual average nitrogen dioxide concentration recorded at Richmond are well below the EPA criteria of 62 µg/m $_3$ and 246 µg/m $_3$ respectively (OEH, 2011). The maximum 24-hour particulate matter concentration of 40 µg/m $_3$ is below the relevant criterion. The annual average particulate matter concentration for 2011 is well below the EPA criterion of 30 µg/m $_3$ (OEH, 2011).

Table 4-1 Background air quality compared against relevant EPA air quality criteria

Pollutant	Averaging time	Recorded concentration	EPA criterion
Carbon monoxide	Maximum 1-hour average	1.9 mg/m ³	30 mg/m ³
	Maximum 8-hour average	1.9 mg/m ³	10 mg/m ³
Nitrogen dioxide	Maximum 1-hour average	54 μg/m ³	246 µg/m ³
	Annual average	9 μg/m ³	62 μg/m ³
Particulate matter	Maximum 24-hour average	40 μg/m ³	50 μg/m ³
	Annual average	13 μg/m ³	30 μg/m ³

Overall the regional air quality of the project area is considered to be good as there were no exceedances of relevant air quality criteria in the 2011 data.

4.2 Sensitive receivers

The land use in the study area towards the south of the Hawkesbury River is comprised mainly of commercial and residential premises while to the north the primary land use is rural residential and agricultural. The area also includes a number of parks and open space areas, such as Thompson Square parkland within Windsor Town Centre and Macquarie Park on the north side of the river.

Sensitive receivers for potential air quality issues include low density residential properties, and commercial properties such as motels located to the east of Bridge Street. To the west of Bridge Street, sensitive receivers are largely local businesses such as hotels and eateries. Sensitive receivers on Freemans Reach Road and Wilberforce Road include rural residential properties and a turf farm.

The potentially affected sensitive receivers are shown in Appendix A.

5 Environmental aspects and impacts

5.1 Construction Activities

Construction activities that have the potential to cause impacts to air quality include:

- General earthworks particularly during site establishment.
- Vegetation clearing.
- Bulk earthworks.
- Application of lime during acid sulfate soil treatment.
- 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:
 - o Excavations of organic or contaminated materials.
 - During sealing works.
 - o Construction amenities ablution facilities, waste storage, etc.

No blasting will occur as part of this project

5.2 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.

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.

6 Environmental control measures

A range of environmental requirements and control measures are identified in the various environmental documents, including the EIS, Submission and preferred project report, supplementary assessments and TfNSWdocuments, and from recent experience on similar road projects. Specific measures and requirements to address impacts on air quality are outlined in Table 6-2.

Table 6-2 Air quality management and mitigation measures

Ref	Measure / Requirement	Resource 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.	Induction	Pre-construction/ Construction	Construction Manager / ESR	G36 Good practice
AQ2	Air quality control measures from this plan will be included in relevant Work Method Statements (WMS) and/or Progressive Erosion and Sediment Control Plans (ESCP).	This plan	Pre-construction/ Construction	Construction Manager / ESR	Good practice
AQ3	Worker amenities located in a suitable location that would not expose local residential properties or commercial premises to bad odour, minimising omission of smoke and odours from worker amenities	Ancillary Facilities Assessment	Pre-construction/ Construction	Construction Manager	
	Vegetation, Clearing and Grubbing				
AQ4	Vegetation clearing will be staged where possible to minimise the area and time that surfaces are exposed.	FFMP Appendix A Clearing and Grubbing Sub- plan	Construction	Construction Manager	Good practice G40
AQ5	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.	Progressive ESCPs	Construction	Superintendent	CoA C6 G36 Cl 4.4.1 EIS Table 10-1 AQ1
AQ6	Clearing activities will be modified, reduced, controlled or ceased during high or unfavourable wind conditions if they have a potential to increase off-site dust generation.	FFMP Appendix A Clearing and Grubbing Sub- plan	Construction	Superintendent	Good practice G40 CoA C6
AQ7	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 Appendix E Weed and pathogen management protocol	Construction	Superintendent	G36 4.12
AQ8	There will be no burning off of waste.	CEMP Appendix B7 - Waste	Construction	Superintendent	CoA C6 G36

Ref	Measure / Requirement	Resource needed Management Sub	When to implement	Responsibility	Reference
AQ9	Areas of disturbed material and access roads will be stabilised where possible by methods such as compaction.	Plan Progressive ESCPs	Construction	Superintendent	G36 4.4.1
	Vehicle Movement, Material Storage and Earth Works				
AQ10	Areas of disturbed material and access roads will be stabilised where	Progressive	Construction	Superintendent	CoA C6
	possible by methods such as compaction. Compounds, ancillary facilities, administration access roads and standing areas will be hard surfaced.	ESCPs			EIS Table 10-1 AQ1
AQ11	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 rumble grids and large aggregate at entry/exit points. Manual cleaning will also be carried out where appropriate.	Progressive ESCPs	Construction	Superintendent	CoA C7 G36 Cl 4.4.1 EIS Table 10-1 AQ1
AQ12	All vehicles on site are not to exceed a speed limit of 30 kilometres per hour.		Construction	Superintendent	CoA C7
AQ13	All loaded vehicles entering or leaving the site have their loads covered		Construction	Superintendent	CoA C7
AQ14	Securing tailgates and covering loads that are to be carried on public roads to prevent spillage and loss of construction materials or waste and to prevent emission of odours		Construction	Superintendent	CoA C7
AQ15	All loaded vehicles leaving the site are cleaned of dirt, sand and other materials before they leave the site, to avoid tracking these materials on public roads.		Construction	Superintendent	CoA C7
AQ16	In the event of any spillage or tracking on public roads, the spilt material will be removed within 24 hours.		Construction	Superintendent	CoA C6
AQ17	Rock hammering works to be dampened to reduce dust generation.		Construction	Superintendent	CoA C6
AQ18	Control measures including water carts, sprinklers, sprays, dust screens or		Construction	Superintendent	G36 CI 4.4.1
	the application of geo-binding agents will be utilised where applicable to control dust emissions. The frequency of use will be modified				CoA C6
	accommodate prevailing conditions.				EIS Table 10-1 AQ1
AQ19	Erosion control structures will be checked regularly for build-up of silt and other materials to ensure deposits do not become a dust source.	Weekly environmental inspection	Construction	ESR/ Site Engineer/ Superintendent	CoA C6

Ref	Measure / Requirement	Resource needed	When to implement	Responsibility	Reference
AQ20	Waste will be segregated and collected on a regular basis to ensure odours associated with waste do not become an issue.	CEMP Appendix B7 - Waste Management Sub Plan	Construction	Site Engineer/ Superintendent	G36 CI 4.11
AQ21	Stockpiles will be located in accordance with specification TFNSWG38, including the establishment of a suitable cover crop or provision of other covering within 7 days of completion of the stockpile	SWMP Appendix F – Stockpile Management Protocol	Construction	Site Engineer/ Superintendent	G36 CI 3.1, 4.4.1 EIS Table 10-1 AQ1 TFNSWG38
AQ22	During the treatment of Acid Sulfate Soils, the application of lime will be avoided in windy conditions (>15 knots) or where the lime dust is visibly leaving the work area should be avoided for safety and efficiency.	CEMP Appendix B10 Construction Acid Sulfate Materials Management Plan	Construction	ESR, Engineer, Foreman	Good practice
	Operation of Plant and Equipment				
AQ23	Haul trucks and plant equipment will be switched off when not in operation for periods of more than 30 minutes.		Construction	Superintendent/ Operators	G36 4.4.1
AQ24	Engines of plant parked next to residents will be switched off when not in operation.		Construction	Superintendent/ Operators	G36 CI 4.4.1
AQ25	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. Periodic visual checks will be undertaken to ensure ongoing compliance, typically weekly.	Manufacturers Specifications	Construction	Superintendent	Good practice
AQ26	Mud and debris will be removed from wheels and bodies of haulage equipment before it enters public roads or other sealed pavements by means of facilities such as truck wash downs and wheel washes.	Progressive ESCP	Construction	Superintendent	CoA C7 EIS Table 10-1 AQ1
AQ27	Dust generating activities will cease in the event that wind speeds reach a		Construction	Construction Manager/ ESR/ Superintendent	G36 4.4.1
	level where dust cannot be adequately controlled by water or other means until the dust hazard is eliminated or has been reduced to an acceptable level.				EIS Table 10-1 AQ1
	Demolition of Existing Bridge				

Ref	Measure / Requirement	Resource needed	When to implement	Responsibility	Reference
AQ28	 Structures of the exiting bridge containing lead based paints will be demolished in accordance with the following Australian Standard AS 4361.1 – 1995 - Guide to lead paint management, Part 1: Industrial applications. Australian Standard AS 4361.2 – 1998 - Guide to lead paint management, Part 2: Residential and commercial buildings. Australian Standard AS 2601 – 2001 - The demolition of structures. 	Australian Standards relating to lead paint and demolition listed in measures	Construction	Construction / ESR/ Superintendent	EIS Table 10-1 AQ2
AQ29	The work area will be contained and procedures will be implemented to prevent dust and debris spreading beyond the immediate work area	EWMS for Bridge Demolition	Construction	Construction Manager/ Site Engineers/ ESR	EIS Table 10-1 AQ4
	Inspection, Monitoring and Records				
AQ30	Visual monitoring of air quality will be undertaken to verify the effectiveness of controls and enable early intervention. Including: • Superintendent will continually monitor the dust emissions from construction activities on a daily basis to ensure controls are adequate	CEMP section 8	Construction	Superintendent/ ESR	G36 4.4.1
		Inspections,			EIS Table 10-1 AQ1
		monitoring			
	 to supress and minimise dust and prevent dust leaving site. Where dust is seen to be leaving site or controls inadequate, works will cease until controls are reassessed and improved. 	and auditing			
AQ31	Weather forecast will be reviewed on a daily basis and appropriate measures implemented where unfavourable weather conditions (dry weather, strong winds) are anticipated.	BOM website -	Construction	ESR/	G36 4.4.1
		weather forecasts		Superintendent	EIS Table 10-1 AQ1
AQ32	Dust control and operational procedures will be reviewed and modified if		Construction	ESR/	G36 4.4.1
	controls are deemed ineffective and are attributable to construction activities or where complaints are received from the local community.			Superintendent	EIS Table 10-1 AQ1

7 Compliance management

7.1 Roles and responsibilities

The 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 Chapter 7 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:

- Roles and responsibilities for air quality management.
- Air quality mitigation and management measures.
- TfNSWIncident Reporting Procedure (Appendix A5 CEMP) to be implemented in the event of an incident.

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 air quality to verify the effectiveness of controls and enable early intervention;
- 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.
- Weather data at the premises, 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.
- Monitoring the BOM website for any adverse weather conditions forecast.

If air/dust monitoring indicates that mitigation measures are not fully effective or if dust complaints are received during construction, additional air/dust mitigation controls may be implemented. This CAQMP will be amended accordingly.

7.4 Auditing

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

Audit requirements are detailed in Section 8.3 of the CEMP.

7.5 Reporting

Reporting requirements and responsibilities are documented in the Sections 8.3 and 8.5 of the CEMP.

8 Review and improvement

8.1 Continuous improvement

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

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance.
- Determine the cause or causes of non-conformances and deficiencies.
- Develop and implement a plan of corrective and preventative action to address any nonconformances 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 CAQMP 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 site representative, 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.

Appendix AAir Quality Sensitive Receivers



