APPENDIX B6

Construction Air Quality Management Plan

Additional Crossing of the Clarence River at Grafton Project

AUGUST 2016

Document control

File name	CAQMP_Grafton_Rev3 150816
Report name	Additional Crossing of the Clarence River at Grafton Construction Air Quality Management Plan
Revision number	Rev3

Plan approved by:

[signed]	[signed]	[signed]
Name Brendon Johnson 15/9/2016	Name SAM LEIGH 15.9.2016.	Name Greg Nash 15/9/16
Contractor PM	Contractor EM	RMS representative

Revision history

Revision	Date	Description	Approval
0	14/06/16	Draft for RMS and ER review	
1	05/07/16	Revised in response to comments from RMS and the ER	
2	26/07/16	Revised in response to comments from RMS. No further comments from the ER.	
3	15/08/16	Revised Section 6.1.2 in response to comment from DP&E. No change required with respect to comments from EPA and CVC. Also updated the tense of the text provided in Section 4 *Consultation*.	

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Glossary / Abbreviations

CAQMP	Construction Air Quality Management Plan
CEMP	Construction Environmental Management Plan
CWEMP	Construction Waste and Energy Management Plan
BoM	Bureau of Meteorology
CoA	Condition of Approval
DEC	NSW Department of Environment and Conservation
DECC	NSW Department of Environment and Climate Change
DECCW	The Department of Environment, Climate Change and Water
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPL	Environment Protection Licence
EWMS	Environmental Work Method Statements
NEPC	National Environment Protection Council
NERDDC	National Energy Research, Development and Demonstration Council
PESCP	Progressive Erosion and Sediment Control Plan
POEO Act	*Protection of the Environment Operations act 1997*
Project, the	Additional Crossing of the Clarence River at Grafton
RMS	Roads and Maritime Services
SSI	The state significant infrastructure as generally described in Schedule 1 (SSI-6103) of the Infrastructure Approval.
TSP	Total Suspended Particulates

1 Introduction

1.1 Context

This Construction Air Quality Management Plan (CAQMP) forms part of the Construction Environmental Management Plan (CEMP) for the Additional Crossing of the Clarence River at Grafton Project (the Project).

This CAQMP has been prepared to address the requirements of:

- the Infrastructure Approval;
- the environmental measures listed in the *Additional Crossing of the Clarence River at Grafton Environmental Impact Statement* (EIS) (ARUP, 2014) and *Additional Crossing of the Clarence River at Grafton Submissions Report* (RMS, 2014); and
- all applicable legislation.

1.2 Background

Section 8.12 of the Additional Crossing of the Clarence River at Grafton EIS (ARUP, 2014) provides an assessment of the Project's potential air quality impacts and proposed mitigation measures for construction, to address the Director-General's requirements of the Project, issued by the Department of Planning and Environment.

The implementation of the management and mitigation measures in this CAQMP will assist to reduce emissions and minimise potential impacts on sensitive receivers.

1.3 Environmental management document system

The Project Environmental Management System is described in Section 4.1 of the CEMP. The CAQMP is part of Fulton Hogan's environmental management framework for the Project.

Management measures identified in this CAQMP will be incorporated into site or activity specific Environmental Work Method Statements (EWMS). EWMSs will be developed and signed off by environment and management representatives prior to the commencement of the associated works. Construction personnel will be required to undertake works in accordance with the mitigation and management measures identified in the EWMS.

The combination of the CEMP, issue-specific plans, strategies, procedures and EWMS identify the required environmental management actions for implementation by Fulton Hogan's personnel and contractors.

The review and document control processes for this CAQMP are described in Chapter 10 of the CEMP.

2 Purpose and objectives

2.1 Purpose

The purpose of this CAQMP is to describe how Fulton Hogan proposes to manage and protect air quality during construction of the Project.

2.2 Objectives

The key objective of the CAQMP is to ensure that Project impacts on air quality are minimised and within the scope permitted by the Infrastructure Approval.

To achieve this objective, Fulton Hogan 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 3-2 and the mitigation measures detailed in the EIS; and
- ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in Section 3.1 of this CAQMP.

Refer to the Construction Waste and Energy Management Plan (CWEMP) for measures to reduce greenhouse gas emissions during construction.

2.3 Targets

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

- minimise and manage potential air quality / dust impacts from the construction of the Project in accordance with the Infrastructure Approval;
- control dust and exhaust emissions of plant and equipment from construction activities;
- minimise adverse impacts on existing air quality;
- no environmental complaints, fines or prosecutions relating to dust and air emissions.
- ensure compliance with the relevant legislative requirements and CoA;
- implement feasible and reasonable air quality control measures with the aim of constructing the Project in a manner that minimises dust emissions from the site; and
- complaints from the community and stakeholders are minimised and managed.

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); and*
- *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 Plan (CWEMP).

3.1.2 Guidelines and standards

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

- *Managing Urban Stormwater: Soils and Construction.* Landcom, (4th Edition) March 2004 (reprinted 2006) (the "Blue Book"). Volume 1 and Volume 2
- National Environment Protection Council's (NEPC) – *National Environment Protection Measure (NEPM) for Ambient Air Quality Guidelines;*
- *Protection of the Environment Operations (Clean Air) Regulation* 2010;
- *AS 3580.1.1-2007 Methods of Sampling Analysis of Ambient Air. Part 1.1 Guide to Siting Air Monitoring Equipment*
- *AS 3580.10.1-2003 Methods of Sampling Analysis of Ambient Air Determination of Particulate matter – Deposited Matter – Gravimetric Method*;
- *Action for Air 2009* (NSW DECCW);
- *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW* (DECC 2005);
- *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (DEC 2007);
- *Air Quality Monitoring Criteria for Deposited Dust* (DEC Guideline); and
- *Local Government Air Quality Toolkit, Module 3: Guidance note – Construction sites* (NSW EPA 2007).

3.2 Construction air quality goals

The EPA specifies ground-level concentration criteria for pollutants within *'Approved Methods for the Modelling and Assessment of Air Pollutants in NSW'* (DEC, 2005). The relevant construction goal which will be adopted for the Project is provided in Table 3-1.

Table 3-1: Construction air quality goals

Pollutant	Averaging period	Goal	Source
Deposited dust[b]	Annual	2 g/m^2/month[c] 4 g/m^2/month[d]	NERDDC[e] (1998)[a]

Notes:

a. Adapted from Approved Methods for the *Modelling and Assessment of Air Pollutants in New South Wales* (DECCW 2005).

b. Dust is assessed as insoluble solids as defined by AS 3580.10.1-2003 (AM-19).
c. Maximum increase in deposited dust level.
d. Maximum total deposited dust level.
e. NERDDC – National Energy Research, Development and Demonstration Council

3.3 Minister's Conditions of Approval

The CoAs relevant to this CAQMP are listed in Table 3-2 below. A cross reference is also included to indicate where the condition is addressed in this Plan or other project / environmental management documents.

Table 3-2: Conditions of Approval relevant to the CAQMP

CoA No.	Condition Requirements	Reference
D29	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.	Annexure A Air Quality Monitoring Plan Section 7 environmental management measure ID AQ1-AQ9, AQ13-AQ24.
D45(d)	(ii) measures to monitor and manage dust emissions including dust from stockpiles, traffic on unsealed roads and from materials tracking;	Annexure A Air Quality Monitoring Plan Section 7 environmental management measure ID AQ1-AQ9, AQ13-AQ24.
	(iii) measures to minimise emissions from construction vehicles, plant and equipment;	Section 7 environmental management measure ID AQ10-AQ12, AQ25.

4 Consultation

In accordance with CoA D45, this CAQMP has been developed in consultation with relevant agencies and Council. There is deemed to be one relevant agency - the Environment Protection Authority (EPA).

A summary of consultation undertaken during the preparation of this CAQMP is provided in Appendix A2 of the CEMP.

5 Existing environment

5.1 Climate Data

Local meteorology and wind conditions affect air quality and the dispersion of any air pollutants, due to:

- 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;
- rainfall– rainfall that wets the surface of the soil and reduces the risk of dust generation.

5.1.1 Wind conditions

Figure 5-1 provides representative wind roses for Grafton (Grafton Airport weather station - station number 058161), which indicates that the predominant wind directions are from the south (21% southerly, and 20% south-south-westerly).

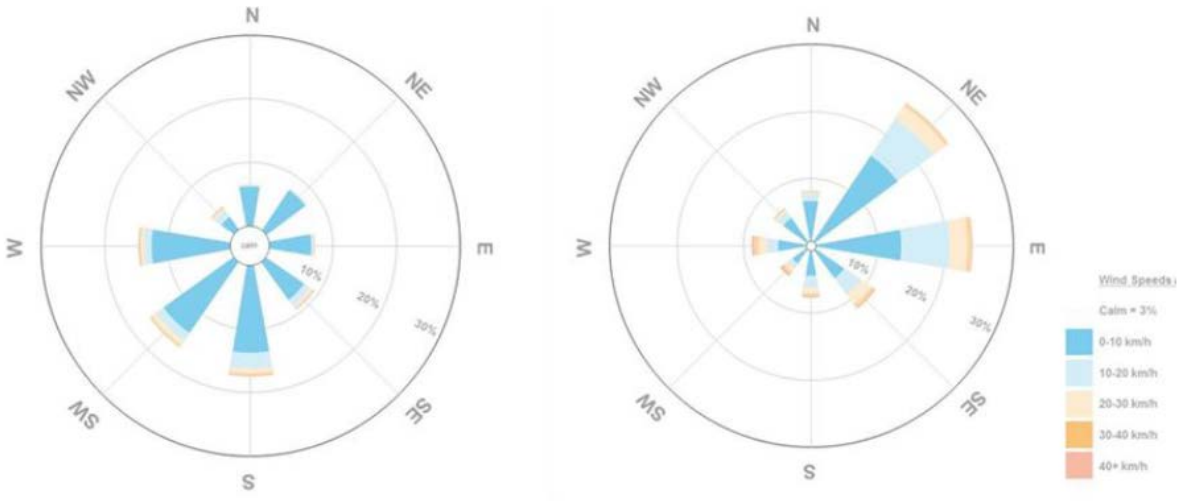

Figure 5-1: Wind roses at Grafton airport weather station in 2011 (left 9am, right 3pm)

The majority of wind speeds are below 4.5 m/s (43% are below 8 km/h, and 41% are below 16 km/h), based on 2011 data from the Bureau of Meteorology (BoM). On average, across three years of data (2010–2013), average annual wind speeds are between 7.6 and 8.6 km/h, which is designated as “moderate”.

5.1.2 Rainfall and Temperature

Meteorological data for the BoM Grafton Research Station weather station (BoM 058077), which is located about 11 km from the Grafton Bridge, are considered representative of the conditions at Grafton. The relevant statistics are summarised in Table 5-1.

Table 5-1: BoM climate data for the Grafton Research Station

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg Annual
Mean rainfall (mm)	135.7	132.2	120.9	80.8	72.6	70.9	51.9	39.8	43.5	60.9	81.7	101.4	993.3

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg Annual
Mean Max Temp (°C)	30.1	29.7	27.8	25.6	22.8	20.5	20.1	21.7	25.1	27.2	28.5	29.8	25.7
Min Max Temp (°C)	18.8	18.8	17.4	14.4	10.3	8	6.5	7.1	10.3	13.2	15.9	17.9	13.2

The rainfall statistics in Table 5-1 are for the period 1917 to 2015, and the temperature statistics are for the period 2002 to 2015. The data indicates that the wettest months are between December and March, and the driest are between July to September. Dust is more likely to be an issue in the drier months.

5.2 Existing Air Quality

There is limited information on existing air quality at Grafton as regional areas generally do not have access to local air quality monitoring stations (pollutants do not generally occur in high enough concentrations to cause adverse health impacts, so air quality monitoring is not required in regional areas).

Air quality monitoring has not been carried out specifically for this Project however, Roads and Maritime has previously monitored air quality at a site beside the Pacific Highway at Korora between Korora Public School and the Korora Rural Fire Brigade, north of Coffs Harbour. This site is one of the most trafficked sections of the Pacific Highway and is located about 65 km from Grafton Bridge.

Average daily traffic on the Pacific Highway is around 19,700 vehicles, which is above the maximum daily traffic of 17,000 vehicles at Grafton Bridge. Therefore, the use of this data provides a conservative or worst-case indication of existing air quality in Grafton. The existing air quality at this location is summarised in Table 5-2.

Table 5-2: Existing air quality

Nitrogen dioxide (NO_2)	Carbon monoxide (CO)	Fine particles (PM_{10})
74 µg/m^3	1.2 mg/m^3 per cubic	38 µg/m^3
(max 1-hour average)	(max 1-hour average)	(max 24-hour average)

(based on air quality monitoring data at Korora, October 2005

5.3 Sensitive receivers

During construction, sensitive receivers include residential homes, local educational facilities, retail or public areas, or pedestrians who are close to construction activities associated with the new bridge and roads.

Twelve sensitive receivers, as shown on Figure 5-2, were adopted in the EIS as indicative locations within the Project area to understand the change in air quality during operation of the Project. These sensitive receivers were selected on the basis that they are close to or adjacent to major roads or the existing and future bridge. These locations may also provide a guide to sensitive receivers during construction.

Figure 5-2: Location of sensitive receivers in the vicinity of the Project

6 Environmental aspects and impacts

6.1 Predicted Impacts

The main potential impacts on air quality during construction are the generation of dust and construction vehicle emissions.

6.1.1 Construction Activities

Earthworks, road construction activities and the concrete batching plant (if deemed required) would generate dust or particulate emissions, which may impact nearby sensitive receivers

Dust and particulates pose a potential health risk, particularly for children, the elderly or people with respiratory issues. Dust and particulates can also affect local amenity and cause nuisance for nearby receivers. The extent of these impacts would depend on the size and nature of the construction activities and the wind direction.

Primary sources of Total Suspended Particulates (TSP) emissions associated with construction activities include:

- clearing of vegetation and topsoil by bulldozers and/or backhoes;
- excavation and levelling of soil by bulldozers, backhoes and/or excavators;
- movement of soil and fill by dump trucks and scrapers;
- wind erosion from unsealed surfaces and stockpiles; and
- vehicles travelling along unsealed areas.

Emissions from construction vehicles and machinery would be predominantly from diesel engines. These engines would emit particulate matter (in the form of soot), and other gaseous emissions such as carbon monoxide, sulphur oxides and nitrogen oxides. Specific types of plant and equipment anticipated to be used in the construction of the Project include excavators, graders, vibratory rollers, haul trucks, backhoes, bitumen and asphalt spraying plants, line-marking equipment, water carts and bulldozers.

Impacts are likely to be short-term and can be effectively minimised by implementing mitigation measures. Impacts from vehicle emissions are likely to be lower than the impacts from vehicle emissions during operation of the bridge, as construction traffic volumes will be significantly lower than the traffic volumes forecast for the new bridge.

During windy conditions there is potential for dust to become airborne from any exposed surfaces and stockpiles. Potential dust impacts are likely to be short-term and can be controlled through the application of mitigation measures.

Odours may be generated during the application of asphalt and line marking. However, the construction period will be short term and there will be no long-term odour impacts for nearby receivers.

6.1.2 Demolition Activities

Due to the age of most dwellings in Grafton, there is a risk of asbestos being present and fibres being released during any demolition. Any demolition material containing asbestos will be handled in accordance with the *Fulton Hogan Work Health Safety Management Plan*. In this regard, SafeWork NSW licensed asbestos removalists will be engaged to monitor air quality during demolition, handle, manage and remove the waste containing asbestos.

Material containing asbestos will be managed in accordance with the mitigation measures outlined in Table 7-1 and Table 7-2 of the Construction Waste and Energy Management

Plan. In addition, all material containing asbestos will be disposed of at an appropriately licensed waste facility in accordance with Table 6-1 and Annexure A of the Construction Waste and Energy Management Plan.

6.1.3 Concrete Batching Plant

A concrete batching plant may be located on the western side of the South Grafton construction work zone. This plant has the potential to affect local ambient air quality and nearby sensitive receivers.

Emissions from concrete batching plants are predominantly in the form of total suspended particulates (TSP) and particles with an aerodynamic diameter less than 10 microns (PM_{10}). Relatively small quantities of combustion pollutants (carbon monoxide, oxides of nitrogen, oxides of sulphur and hydrocarbons) can also be emitted.

If a batching plant is required, it would operate at a capacity of around 840 tonnes per day (peak demand) between 7am to 6pm Monday to Friday and 8am to 1pm on Saturdays, in accordance with CoA D2. Any out of hours works will comply with the requirements of CoA D3 and D4. Typically, concrete batching plants operate at maximum capacity only during the morning hours. Later in the day many of the processes usually cease.

6.1.4 Summary of Construction activities with potential air quality impacts

A summary of the types of construction activities and the corresponding potential air quality impacts that may result from these activities is provided in Table 6-1. For additional detail, also refer to the relevant aspects and impacts considered in the risk assessment contained in Appendix A3 of the CEMP.

Table 6-1: Construction activities with potential impacts on air quality

Construction Activity	Intensity of Activity	Aspect	Impact description
Construction machinery use	Sporadically over 3 years	Vegetation and land clearing	Generation of dust or particulates
		Soil excavation	Generation of dust or particulates
		Bridge construction	Generation of dust or particulates
Stockpiling	During construction phase (2 years)	Uncovered stockpiles, or non-managed stockpiles particularly for solid wastes, debris or other materials	Generation of dust
Construction Machinery and vehicle movements	Sporadically over 2 years	Uncovered vehicle loads during transportation of soil and fill	Generation of dust and particulates
	Daily over 2 years	Vehicle exhaust emissions	Diesel exhaust emissions from vehicle movements to and from construction site. These emissions are considered insignificant compared to existing traffic volumes.

Construction Activity	Intensity of Activity	Aspect	Impact description
Concrete batching plant	During construction phase (2 years)	Cement dust emissions	Cement dust generated from the batching process.

7 Environmental control measures

A range of environmental requirements and control measures are identified in the EIS, Submissions Report, Conditions of Approval and RMS documents. Measures to address impacts on air quality by the Project are provided in Table 7-1.

Table 7-1: Environmental management measures for air quality impacts

ID	Measure / Requirement	Reference	When to implement	Responsibility	Where Addressed
AIR QUALITY					
Dust generation during construction					
AQ1	An air quality management plan will be developed as part of the construction environmental management plan to manage any increased dust impacts from construction activities. The plan will consider and describe construction activity processes such as: handling of spoil, management of stockpiles, operation of machinery, and traffic management. The plan will have regard to the measures outlined in the *Local Government Air Quality Toolkit, Module 3: Guidance note – Construction sites* (NSW EPA 2007) and include the following:	EIS Section 810 Submissions Report	Pre-construction	Fulton Hogan	This Plan
	• a plan showing the locations of all potentially affected properties and residences on a map ;				Section 5.3 Sensitive Area Plan CEMP App A6
	• details of potential sources and impacts of dust;				Section 6
	• air and dust management objectives consistent with EPA guidelines;				Section 3.2
	• details of air quality control measures to be implemented during construction;				Section 7
	• a monitoring program to assess compliance with the identified objectives;				Annexure A -Air Quality Monitoring Plan
	• details of mitigation measures to be implemented during weather conditions where high dust episodes are likely (such as strong winds in dry weather);				Section 7

ID	Measure / Requirement	Reference	When to implement	Responsibility	Where Addressed
	• a progressive stabilisation/rehabilitation strategy for disturbed surfaces with the aim of minimising exposed surfaces;				UDLMP - Permanent Revegetation Strategy CFFMP & CSWQMP – for temporary stabilisation during the construction phase
	• contingency plans to be implemented in the event of non-compliances and/or complaints about dust; and				CEMP Section 6.3 CEMP Section 8.6
	• procedures for regularly reviewing the effectiveness of the air quality/dust management plan.				Section 9.2
Concrete batching plant					
AQ2	If a concrete batching plant is required, dust control measures would be incorporated into the design of the concrete batching plant. These could include the following:	EIS Section 810 Submissions Report G36	Pre-construction, Construction	Fulton Hogan	
	• A partially enclosed load hopper (on three sides) when truck loading/delivery is in progress;				This management measure.
	• Continual wetting operations to reduce emissions during all materials handling;				This management measure.
	• Bulk cement would be stored in silos with filter components on the vents;				This management measure.
	• A dry batch dust collector to extract dust during the transfer of the concrete product to the trucks and any emissions from the loading of the weigh hoppers (this system has a dust extraction efficiency of 99.9% for all particulates greater than 5 microns);				This management measure.
	• A fully enclosed conveyor;				This management measure.
	• Surface wetting along all exposed surfaces and stockpiles during unfavourable meteorological conditions (i.e. windy and dry conditions); and				This management measure.
	• Use of water carts along haul roads and access points as				This management

ID	Measure / Requirement	Reference	When to implement	Responsibility	Where Addressed
	required to minimise generation of dust.				measure.
Impacts on local air quality during construction					
AQ3	Areas of exposed surfaces are to be minimised through construction site planning and programming, to reduce the area of potential construction dust emission sources.	RMS Template	Construction	Construction Manager	This management measure.
AQ4	Control measures, such as compaction stabilisation or covering, will be implemented in order to minimise dust from stockpile sites.	RMS Template	Construction	Foreman	This management measure.
AQ5	Dust suppression measures, such as the use of water carts or soil binders, will be used in any unsealed surfaces and other exposed areas.	RMS Template G36	Construction	Foreman	This management measure.
AQ6	All trucks will be covered when transporting materials to and from the site.	RMS Template	Construction	Foreman	This management measure.
AQ7	Construction activities that generate dust will be avoided during high wind periods.	RMS Template	Construction	Foreman Site Engineer	This management measure.
AQ8	Work activities will be reviewed if the dust suppression measures are not adequately restricting dust generation.	RMS Template	Construction	Foreman Site Engineer	This management measure.
AQ9	Rehabilitation of completed sections will be progressively undertaken.	RMS Template G36	Construction	Foreman Project Engineer	This management measure. UDLMP - Permanent Revegetation Strategy CFFMP & CSWQMP – for temporary stabilisation during the construction phase
Exhaust emissions					
AQ10	Construction plant and equipment will be maintained in good working condition in order to limit impacts on air quality.	RMS Template G36	Construction	Foreman Site Engineer	This management measure.
AQ11	Where practicable, vehicles will be fitted with pollution reduction devices.	RMS Template	Construction	Foreman Contracts Manager	This management measure.

ID	Measure / Requirement	Reference	When to implement	Responsibility	Where Addressed
AQ12	Turn machinery and vehicles off when not in use.	G36	Construction	Foreman Site Engineer	This management measure.
Additional air quality management measures					
AQ13	Remove mud and debris from the 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 rumble grids, gravel sections and sealing of roads.	G36	Construction	Foreman Site Engineer	This management measure.
AQ14	Remove mud spilt by construction traffic from public roads as immediately.	G36	Construction	Foreman	This management measure.
AQ15	Locate stockpiles in non-dust-sensitive areas plus establish a suitable cover crop or provide other covering over topsoil stockpiles that will be in place for longer than 4 weeks.	G36	Construction	Foreman Project Engineer	This management measure.
AQ16	Erect dust screens around and / or spray stockpiles with suitable stabilising agents (e.g. Gluon polymer emulsion).	G36	Construction	Foreman Project Engineer	This management measure.
AQ17	Locate dust generating activities in non dust-sensitive areas , taking advantage of wind direction and stopping dust generating activities which cannot be adequately controlled by water or other means until the dust hazard is eliminated or has been reduced to an acceptable level.	G36	Construction	Foreman Site Engineer	This management measure.
AQ18	Provide and maintain dust control equipment so that this equipment is available when required, including periods of dust generating activities or high wind speed.	G36	Construction	Foreman	This management measure.
AQ19	Where no activities are scheduled to occur in stripped areas within two weeks, treat areas to prevent dust generation.	G36	Construction	Foreman	This management measure.
AQ20	Ensure dust sweeping operations minimise dust emissions.	G36	Construction	Foreman	This management measure.
AQ21	Construct earthworks and unbound pavements in dust-sensitive areas as quickly as practicable.	G36	Construction	Construction Manager	This management measure.

ID	Measure / Requirement	Reference	When to implement	Responsibility	Where Addressed
AQ22	Reduce vehicle speeds on unsealed roads and haulage routes.	G36	Construction	Foreman	This management measure.
AQ23	Secure tailgates and cover loads that are to be carried on public roads or near residential areas (prior to transportation) to suppress dust generation, prevent spillage, loss of construction materials or waste and to prevent emission of odours.	G36	Construction	Foreman	
AQ24	No burning off of waste.	G36	Construction	Foreman	This management measure.
AQ25	Locate worker amenities 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.	G36	Construction	Construction Manager	This management measure.
AQ26	Install all erosion and sediment controls in accordance with the *Erosion and sediment control plan* (ESCP) included in Annexure A of the CSWQMP to minimise dust emissions.	G36	Construction	Environmental Manager Project Engineers Foreman	This management measure.

8 Compliance management

8.1 Roles and responsibilities

Fulton Hogan's Project Team 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 CAQMP.

8.2 Training

All employees, sub-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 CAQMP;
- relevant legislation;
- roles and responsibilities for air quality management;
- air quality mitigation and management measures and
- 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; and
- 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.

8.3 Monitoring and inspection

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

- daily visual monitoring of dust levels and work activities which have the potential to generate dust will be undertaken by the Site Supervisors and/or the Environmental Manager (EM);
- regular dust monitoring in accordance with the DEC's *Approved Method for the Sampling* and Analysis of Air Pollutants in NSW guidelines; and
- meteorological monitoring including daily rainfall, temperature, relative humidity, wind (direction and speed) and barometric pressure relying on the latest weather observations from the BoM Grafton Research Station at the link: http://www.bom.gov.au/products/IDN60801/IDN60801.95571.shtml.

The proposed air quality monitoring regime is documented in Fulton Hogan*'s* Air Quality Monitoring Plan (Annexure A).

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

8.4 Licenses and permits

An EPL will be obtained for the scheduled activity “railway systems activities” in approximately 2018 before these activities are undertaken.

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

8.5 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this CAQMP, CoA and other relevant approvals, licenses and guidelines. Audit requirements are detailed in Section 8.4 of the CEMP.

8.6 Reporting

The results of the dust monitoring will be reported by the Contractor to the RMS in the Contractor’s quarterly compliance report.

Where dust monitoring results indicate an exceedance of the goals identified in Section 3.2 as a result of construction activities, the Environmental Manager will notify the RMS verbally and in writing. The written report will detail the incident, the actions taken to remedy the problem and the timing of such actions. A final report with proposed measures to prevent the occurrence of a similar incident will be submitted to the RMS.

General reporting requirements and responsibilities are documented in the Section 8.5 of the CEMP.

9 Review and improvement

9.1 Continuous improvement

Continuous improvement of this CAQMP 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; and
- make comparisons with objectives and targets.

9.2 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 CAQMP. This will occur as needed.

Any revisions to this Plan will be in accordance with the process outlined in Section 1.6 of the CEMP and as required, be provided to RMS, ER and other relevant stakeholders for review and comment and forwarded to the Secretary of DP&E for approval.

A copy of the updated CAQMP and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure – refer to Section 10.2 of the CEMP.

Annexure A
Air Quality Monitoring Plan

Air quality monitoring plan

Regular monitoring and inspections will be undertaken during construction in accordance with Table A-1.

Table A-1 Monitoring and inspections

Monitoring details	Area	Record	Responsibility	Frequency
Dust deposition monitoring	Dust Monitoring Gauge Sites (Refer to Table A-2 for locations)	Laboratory results and Monthly Environmental Reports	Environmental Officer	Monthly
Meteorological data including daily rainfall, temperature, relative humidity, wind (direction and speed) and barometric pressure	All	Written correspondence (e.g. email) to project personnel relying on the latest weather observations from the BoM Grafton Research Station at the link: http://www.bom.gov.au/products/IDN60801/IDN60801.95571.shtml.	Environmental Manager (or delegate)	Daily
Visual observations during daily site inspections, including activities observed outside of the Project that may impact on dust levels captured in DMG.	All	Noted in site diary as required	Foreman Environmental Officer	Daily
Asbestos fibre monitoring (if friable asbestos is located)	All	As required in Monthly Environmental Report	Safety Manager	As required

9.2.1 Dust monitoring gauges

Dust will be monitored monthly during construction using gravimetric Dust Monitoring Gauges (DMG) to assess compliance with the criteria detailed in Table 3-1.

Additional DMG(s) may be installed along the alignment on an as-needs basis when there is evidence that current dust mitigation measures are not effective, or in response to complaints.

9.2.2 Background dust monitoring

Dust monitoring will begin in July 2016, at least three months prior to the commencement of construction of the bridge works, to determine existing background dust levels. Dust monitoring will continue during construction of the Project until all disturbed areas in the subject area have been stabilised (refer to G36 Clause 4.4).

9.2.3 Dust monitoring locations

Three DMG locations have been selected near potential dust sensitive receivers and potentially high dust generating activities. One additional DMG location has been selected as a ‘control’. This is located away from the influence of Project related activities for the purposes of monitoring and evaluating meteorological and other non-project related variances in ambient dust levels.

Refer to Table A-2 for the proposed location and rationale for all DMGs associated with the Project. These DMGs are also shown in Figure A-1. The location of sensitive receivers and DMGs are also shown on the Sensitive Area Plans included in Appendix A6 of the CEMP.

The precise location (eastings and northings) of the DMGs will be determined during the detailed design stage of the project, subject to agreement with landowners where relevant.

All DMGs will be sited in the field in accordance with *AS 3580.1.1:2007 Methods for sampling and analysis of ambient air: Part 1.1: Guide to siting air monitoring equipment.*

Table A-2 Indicative dust monitoring gauge locations

DMG No.	Location	Reason
DMG1	Adjacent to houses and near the Gummayaney Pre-School at 30 Pound Street Grafton	To monitor potential dust impacts on residential houses and Gummayaney Pre-School from construction activities e.g. earthworks and activities at ancillary facilities and Pound Street.
DMG2	Within the ancillary facility in South Grafton.	To monitor potential dust impacts on residential houses and aged care facilities from construction activities e.g. earthworks and activities at ancillary facilities.
DMG3	Adjacent to Bunnings on Through Street	To monitor potential dust impacts on Bunnings from construction activities e.g. activities at the ancillary facility. This dust monitoring gauge location was suggested by the EPA during a face-to-face meeting on 16 November 2015.
DMG CONTROL	To the east of the Project, outside the project boundary	Control - away from the influence of the project

Figure A-1 Map showing indicative locations of dust monitoring gauges