



Transport
Roads & Maritime
Services

APPENDIX B6

Construction Air Quality Management Plan

Woolgoolga to Halfway Creek Pacific Highway Upgrade

MAY 2015



Document control

File name	AQMP_W2HC 180515.doc
Report name	Woolgoolga to Halfway Creek Construction Air Quality Management Plan
Revision number	5

Plan approved by:



Contractor PM



Contractor EM



RMS Authorised Delegate

Revision history

Revision	Date	Description	Approval
1	3/02/15	Issued to RMS for review	
2	16/02/15	Issued to agencies for comments	
3	2/03/15	Issued to RMS for final review	
4	16/03/15	Reissued to RMS & Agencies for closing out comments	
5	18/05/2015	Inclusion of DoP comments	

Distribution of controlled copies

Copy no.	Issued to	Version
1		
2		
3		
4		
5		

Contents

1	Introduction.....	1
1.1	Context.....	1
1.2	Background	1
1.3	Environmental management systems overview	1
2	Purpose and objectives.....	2
2.1	Purpose	2
2.2	Objectives.....	2
3	Environmental requirements	4
3.1	Relevant legislation and guidelines.....	4
3.2	Minister’s Conditions of Approval.....	4
4	Existing environment.....	9
4.1	Air quality records.....	9
4.2	Rainfall, soil dryness and wind.....	9
4.3	Soil characteristics	10
4.4	Sensitive receivers	11
5	Air quality criteria	12
6	Environmental aspects and impacts	13
6.1	Construction activities.....	13
6.2	Factors likely to affect dust generation and impacts.....	13
6.3	Impacts.....	14
7	Environmental control measures	15
8	Compliance management	21
8.1	Roles and responsibilities.....	21
8.2	Training	21
8.3	Monitoring and inspection	21
8.4	Licenses and permits.....	22
8.5	Auditing.....	22
8.6	Reporting.....	23
9	Review and improvement.....	24
9.1	Continuous improvement.....	24
9.2	AQMP update and amendment	24

Tables

Table 3-1	Conditions of Approval relevant to the AQMP	4
Table 4-1	Korora air quality monitoring results	9

Table 4-2 Summary of rainfall records	10
Table 4-3 Soil type and characteristics.....	10
Table 5-1 Air quality monitoring criteria for deposited dust ^a	12
Table 7-1 Air quality management and mitigation measures	16

Appendices

Appendix A Dust catchment areas and sensitive receivers
Appendix B Dust deposition gauge procedure
Appendix C Dust deposition gauge sampling field sheet
Appendix D Location of dust deposition gauges

Glossary / Abbreviations

AQMP	Air Quality Management Plan
CEMP	Construction Environmental Management Plan
CoA	Condition of Approval
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DECC	Former Department of Environment and Climate Change (NSW) now NSW Office of Environment and Heritage.
DP&E	NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries
DLWC	NSW Department of Land and Water Conservation
DoE	Commonwealth Department of the Environment
EIS	Woolgoolga to Ballina Pacific Highway Upgrade Environmental Impact Statement (December, 2012)
ERG	Environmental Review Group
EPA	NSW Environment Protection Authority
EP&A Act	<i>NSW Environmental Planning and Assessment Act 1979</i>
EPL	NSW Environment Protection Licence under the <i>Protection of the Environment Operations Act 1997</i> .
ERSED	Erosion and sedimentation
ESCP	Erosion and Sediment Control Plan
EWMS	Environmental Work Method Statements
Minister, the	NSW Minister for Planning
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measures
NOW	NSW Office of Water
OEH	NSW Office of Environment and Heritage
PoEO Act	<i>NSW Protection of the Environment Operations Act 1997</i>
Project, the	Woolgoolga to Halfway Creek
RMS, Roads and Maritime Services	NSW Roads and Maritime
Secretary	Secretary of the Department of Planning and Environment
SPIR	Woolgoolga to Ballina Pacific Highway Upgrade Submissions Preferred Infrastructure Report (November, 2013)
OHL Y	OHL York Joint Venture
W2HC	Woolgoolga to Halfway Creek

1 Introduction

1.1 Context

This Construction Air Quality Management Plan (AQMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the upgrade of the Pacific Highway between Woolgoolga and Halfway Creek (the Project).

This AQMP has been prepared to address the requirements of the Minister's Conditions of Approval (CoA) and the updated mitigation measures listed in the Pacific Highway Upgrade Woolgoolga to Ballina Submissions / Preferred Infrastructure Report (SPIR) (November 2013) and all applicable legislation.

1.2 Background

The Pacific Highway Upgrade Woolgoolga to Ballina Environmental Impact Statement (EIS) (December 2012) assessed the impacts of construction and operation of the Project on air quality, within Chapter 18.

The EIS identified the potential for minor impacts on air quality during construction typically associated with dust. However, it concluded any potential impacts could be managed by standard mitigation and management measures.

The EIS management measures were subsequently updated within the Woolgoolga to Ballina SPIR, with applicable management measures from that report included as part of this AQMP, which are applicable to the Woolgoolga to Halfway Creek section.

1.3 Environmental management systems overview

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

The AQMP is part of the OHLY 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 OHLY personnel and contractors.

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

2 Purpose and objectives

2.1 Purpose

The purpose of this Plan is to describe how the OHLY 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 impacts on air quality are minimised and within the scope permitted by the infrastructure approval. To achieve this objective, OHLY 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.

2.3 Key Issues

Particulate matter will be the main source of air pollution during construction of the Project, and so air quality management measures for the Project will focus primarily on particulate matter generated during construction.

Some emissions, such as those generated by vehicle exhausts are not considered to present a significant risk to the environment and community. However all vehicles, plant and equipment will be maintained to comply with the manufacturer's specifications, along with relevant standards and legislative requirements. Measures to reduce the potential impact of these emissions from vehicle and other sources are included in Table 7-1.

Vegetation clearing and excavation activities have the potential to affect air quality if not properly managed. Dust has the potential to be generated from earthworks associated with the upgrade. The total amount of dust generated depends on the silt and moisture content of the soil and the type of activities being carried out. Construction activities that have the potential to generate dust and other emissions that may have environmental impacts include the following and are addressed in Section 6.1:

- clearing & grubbing of vegetation
- excavations and earthworks (including demolition & removal of the existing structures)
- uncovered loads being transported to and from site
- use of site compounds during construction
- vehicle movements on site (excessive vehicle speed on unsealed roads and tracks and site machinery)
- wind erosion of spoil and/or material stockpiles
- wind erosion of cleared areas with bare earth (no vegetation or ground cover) or unsealed surfaces

- emissions associated with a batch plant operations
- blasting or processing of rock
- fire
- inadequate equipment maintenance
- storage of fuel and refuelling activities
- odour from uncovered wastes
- herbicide, spray drift.
- paving activities
- liming operations

Weather conditions such as wind direction, wind speed, soil moisture and rainfall or dew will substantially influence the day to day potential for dust generation and suspension. Accordingly, these factors are to be considered by the Construction Manager, in consultation with the Environment Manager to make sure appropriate mitigation measures are adopted

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*.
- *Protection of the Environment (Clean Air) Regulation 2010*.
- *Protection of the Environment (General) Regulation 2009*

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 (Appendix B7).

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 3580.1.1:2007 Methods for Sampling and Analysis of Ambient Air – Guide to Siting Air Quality Monitoring Equipment.
- AS 3580.10.1-2003 Methods of Sampling Analysis of Ambient Air.
- Action for Air 2009 (NSW DEC).
- Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (DEC 2005).
- Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (DEC 2007)
- Air Quality Monitoring Criteria for Deposited Dust (DEC Guideline), Refer to Table 5-1.

3.2 Minister's Conditions of Approval

The CoA relevant to this Plan are listed Table 3-1. 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 CAQMP

CoA No.	Condition Requirements	Document Reference
B35	Where available, and of appropriate chemical and biological quality, stormwater, recycled water or other water sources shall be used, where feasible and reasonable, in preference to potable water for construction activities,	Table 7-1

CoA No.	Condition Requirements	Document Reference
	including concrete mixing and dust control.	
B66	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 Applicant 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.	Table 7-1
B80	The Applicant shall ensure that all plant and equipment used at the site is: (a) maintained in a proper and efficient condition; and (b) operated in a proper and efficient manner.	Table 7-1
C1	Prior to the commencement of construction or as otherwise agreed by the Secretary, the Applicant shall prepare and implement a Community Communication Strategy to the satisfaction of the Secretary. The Strategy shall provide mechanisms to facilitate communication between the Applicant (and its contractor(s)), the Environmental Representative (see condition D22), the relevant council and community stakeholders (particularly adjoining landowners) on the construction environmental management of the SSI. The Strategy shall include, but not be limited to: Issues that shall be addressed through the Community Communication Strategy include (but are not necessarily limited to): (vi) air quality and dust;	Community Communication Strategy
D25	The Applicant shall prepare and implement (following approval) a Construction Environmental Management Plan for the SSI, prior to the commencement of construction, or as otherwise agreed by the Secretary. The Plan shall be prepared in consultation with the EPA, OEH, DPI (Fisheries), NOW and DoE and outline the environmental management practices and procedures that are to be followed during construction, and shall be prepared in consultation with the relevant government	This plan

CoA No.	Condition Requirements	Document Reference
	<p>agencies and in accordance with the <i>Guideline for the Preparation of Environmental Management Plans</i> (Department of Infrastructure, Planning and Natural Resources, 2004). The Plan shall include, but not necessarily be limited to:</p> <p>(a) a description of activities to be undertaken during construction of the SSI (including staging and scheduling);</p> <p>(b) statutory and other obligations that the Applicant is required to fulfil during construction, including approvals, consultations and agreements required from authorities and other stakeholders under key legislation and policies;</p> <p>(c) a description of the roles and responsibilities for relevant employees involved in the construction of the SSI, including relevant training and induction provisions for ensuring that employees, including contractors and sub-contractors, are aware of their environmental and compliance obligations under these conditions of approval;</p> <p>(d) an environmental risk analysis to identify the key environmental performance issues associated with the construction phase and details of how environmental performance would be managed and monitored to meet acceptable outcomes, including what actions will be taken to address identified potential adverse environmental impacts (including any impacts arising from the staging of the construction of the SSI). In particular, the following environmental performance issues shall be addressed in the Plan:</p> <p>(v) 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;</p> <p>(vi) measures to minimise hydrology impacts, including measures to stabilise bed and bank structures as required;</p> <p>(vii) measures for the handling, treatment and management of contaminated materials;</p> <p>(viii) measures to monitor and manage waste generated during construction including but not necessarily limited to: general procedures for waste classification,</p>	Table 7-1

handling, reuse, and disposal; use of secondary waste material in construction wherever feasible and reasonable; procedures or dealing with green waste including timber and mulch from clearing activities; and measures for reducing demand on water resources (including potential for reuse of treated water from sediment control basins);

(ix) measures to monitor and manage spoil, fill and materials stockpile sites including details of how spoil, fill or material would be handled, stockpiled, reused and disposed in a **Stockpile Management Protocol**. The Protocol shall include details of the locational criteria that would guide the placement of temporary stockpiles, and management measures that would be implemented to avoid/minimise amenity impacts to surrounding residents and environmental risks (including surrounding water courses). Stockpile sites that affect heritage, threatened species, populations or endangered ecological communities require the approval of the Secretary, in consultation with the EPA, OEH and DPI (Fisheries);

(x) measures to monitor and manage **hazard and risks** including emergency management and management measures to address potential risks to the Woodburn borefield drinking water catchment. These measures shall be developed in consultation with Rous Water;

(xi) the issues identified in condition D26;

(xii) details of community involvement and complaints handling procedures during construction, consistent with the requirement of conditions C1 to C4;

(xiii) details of compliance and incident management consistent with the requirements of condition D27; and

(xiv) procedures for the periodic review and update of the Construction Environmental Management Plan and Plans required under condition D26, as necessary (including where minor changes can be approved by the Environmental Representative).

The Plan shall be submitted for the approval of the Secretary no later than one month prior to the commencement of construction, or as otherwise agreed by the Secretary. The Plan may be prepared in stages, however,

CoA No.	Condition Requirements	Document Reference
	<p>construction works shall not commence until written approval of the relevant stage has been received from the Secretary.</p> <p>The approval of a Construction Environmental Management Plan does not relieve the Applicant of any requirement associated with this SSI approval. If there is an inconsistency with an approved Construction Environmental Management Plan and the conditions of this SSI approval, the requirements of this SSI approval shall prevail.</p>	
<p>2.25 (Sapphire to Woolgoolga Approval 2009) (specific to Arrawarra Rest Area)</p>	<p>The Proponent shall construct the project in a manner that minimises or prevents the emission of dust including wind blown and traffic generated dust, including but not limited to:</p> <ul style="list-style-type: none"> a) implementing practical measures for construction vehicles carrying loads; and b) minimising tracking of material from construction sites onto public roads. 	<p>This plan</p>

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 Chapter 18 of the EIS.

4.1 Air quality records

There is limited information about air quality in the vicinity of the Project. Long-term monitoring is not usually undertaken outside metropolitan and/or industrial areas, because pollutants typically do not exist in concentrations that would cause adverse environmental or health impacts. However, there has been short-term air quality monitoring adjacent to a dual carriageway section of the Pacific Highway at Korora, which is located in an urban area approximately 20 kilometres south of Woolgoolga. A monitoring station was established at Korora to monitor the ambient air quality from October 2005 to January 2007.

Table 4-1 Korora air quality monitoring results

Pollutant	Averaging period	NEPM goals		Korora monitoring results	
		Maximum concentration	10-year goal (max allowable exceedence)	Maximum recorded concentration	Average recorded concentration
National standards and goals for ambient air quality					
Carbon monoxide	8hr	9.0 ppm (10 mg/m ³)	1 day a year	0.2 ppm (0.3 mg/m ³)	0.03 ppm (0.04 mg/m ³)
Nitrogen dioxide	1 hr	0.12 ppm (246 µg/m ³)	1 day a year	0.036 ppm (73.8 µg/m ³)	0.004 ppm (9.2 µg/m ³)
Particles as PM ₁₀	1 day	50 µg/m ³	5 days a year	37.8 µg/m ³	20.3 µg/m ³
Advisory reporting goals					
PM _{2.5}	1 day	25 µg/m ³	Gather data to facilitate review of goal	15.4 µg/m ³	7.7 µg/m ³

4.2 Rainfall, soil dryness and wind

The rainfall records from Halfway Creek have been selected to reflect the potential rainfall conditions across the Project site due to its location within the overall site, and extent of available data (from 1886 to present). A summary of the rainfall records from the Bureau of Meteorology is provided in Table 4-2.

Table 4-2 Summary of rainfall records

Summary of rainfall record from 1888 to present													
	Summer / Autumn					Winter / Spring							
	Dec	Jan	Feb	Mar	Apr	Ma	Jun	July	Aug	Sep	Oct	Nov	Year
Mean rainfall (mm)	129.8	157.8	164	155.6	112.7	95.8	93.7	48.7	40.2	40.8	68.0	107.2	1214.3
Mean rain days	13.1	14.0	15.9	12.3	12.5	12.9	9.9	7.8	9.2	8.7	12.8	13.9	116.9
Mean wind speed 3pm (km/h) %	21.5	21.1	20.6	20.6	17.9	15.4	15.4	15.7	18.1	21.2	23.0	21.9	19.4
Mean temp (°C)#	30.7	28.3	27.7	26.7	24.4	21.7	19.8	19.2	20.4	22.8	24.7	27.1	24.2

The above table 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 eg earthworks, climatic factors such as prolonged dry weather, combined with high winds, can increase the likelihood of dust particulate emissions.

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

The soil types along the Project are described in Table 4-3, with an indication of the potential for wind erosion ie dust emissions. The soil information is from the DLWC Soil Landscapes of the Coffs Harbour (1999), Woodburn (2011) and Lismore and Ballina (1994) 1:100,000 sheets and the CSIRO Atlas of Australian Soils (1960-1968) 1:2,000,000 sheets.

Table 4-3 Soil type and characteristics

Section	Soil type	Characteristics	Dust emission risk
1	Swamp and alluvial landscapes at lower elevations (ie <10m) and transferral landscapes at higher elevations near Dirty Creek. No published soil landscape map is available for the northern portion of this section. Transferral – generally associated with undulating rises, low hills, footslopes, drainage plains and fans. Slopes are in the order of 0-10% and soils are typically highly acidic, highly sodic, highly erodible and of low bearing strength due to seasonal waterlogging. Alluvial – generally associated with level to undulating alluvial plains, floodplains and	Highly erodible and prone to water erosion in lower elevations. Reported presence of erodible siltstone seams around Dirty Creek Range.	<i>Moderate</i>

Section	Soil type	Characteristics	Dust emission risk
	river back plains. Slopes are in the order of 0-6% and soils are typically highly acidic, highly erodible, of low bearing strength and subject to flood hazards.		
	Swamp – generally associated with low, level to gently undulating coastal back barrier floodplains and estuarine backswamps. Slopes are in the order of 0-2% and soils are highly acidic, sodic and saline, and of a low bearing strength. Soil types are also prone to water erosion.		

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. The potential sensitive receivers include:

- Residences.
- Native vegetation.
- Sensitive agricultural and commercial industries.
- Road users.
- Watercourses.

The nearest potentially affected non-residential sensitive receivers have been identified as, but not limited to, the following:

- Local Businesses
- Passing Motorists
- Blueberry Farms

Residential sensitive receivers have been identified from their close proximity to the Project. The dust catchments are also representative of the noise catchment areas. The dust gauge locations identified in Appendix D have been selected based on the sensitive receivers, typical wind direction and speeds and schedule of construction activities. The locations were discussed and agreed at the project Environmental Review Group (ERG) meeting on 24 February 2015.

5 Air quality criteria

The Environment Protection Authority (EPA) sets goals for ambient dust concentrations and dust deposition, which is a measure of the impacts of nuisance.

The acceptable increment in annual average dust deposition depends on the existing deposition level. These are based on research by Dean (1990) and other investigations, which detail community response to dust fallout. It should be remembered that the air quality goals relate to the total dust burden in the air and not just the dust from the Project. In other words, there needs to be some consideration of background levels when using these goals to assess impacts.

Table 5-1 details the air quality monitoring criteria for deposited dust.

Table 5-1 Air quality monitoring criteria for deposited dust^a

Pollutant	Annual concentration		Source
Deposited dust ^b	2 g/m ² /month ^c	4 g/m ² /month ^d	NERDDC (1998)

Note:

- a. Adapted from DECCW guideline; 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 3580.10.1-1991 (AM-19).
- c. Maximum increase in deposited dust level.
- d. Maximum total deposited dust level.
- e. Refer to G36 Section .4.4 Air Quality 'Restrict dust generation to below 4g/m²/month measured as total insoluble solids during construction'.

6 Environmental aspects and impacts

6.1 Construction activities

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

- Dust and particulates.
- Gaseous.

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

- General earthworks particularly during site establishment.
- Vegetation clearing.
- Bulk Earthworks.
- Drilling and Blasting;
- 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.
- Liming operations

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.
- Herbicide and pesticide spraying.
- Odours/gases released during:
 - Excavations of organic or contaminated materials.
 - During sealing works.
 - Operation of concrete / asphalt batching plants.
 - Waste storage

6.2 Factors likely to affect dust generation and impacts

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.

6.3 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 (eg 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.
- Dust deposition impacts on sensitive agricultural receivers, including blueberry farms.

Some impacts on air quality attributable to the Project are anticipated and have been described in the EIS.

CoA B66 requires that:

- 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 Applicant 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.

Chapter 7 provides a suite of mitigation measures that will be implemented to avoid or minimise dust impacts.

7 Environmental control measures

A range of environmental requirements and control measures are identified in the various environmental documents, including the EIS, Submission Preferred Infrastructure Report (SPIR), supplementary assessments, Conditions of Approval and RMS documents, and from recent experience on similar road projects. Specific measures and requirements to address impacts on air quality are outlined in Table 7-1.

Table 7-1 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.		Pre-construction Construction	Construction Manager / Environment Manager	G38/G36 Good practice
AQ2	Air quality control measures from this plan will be included in relevant Environmental Work Method Statements (EWMS) and/or Erosion and Sediment Control Plans (ESCP).		Pre-construction / Construction	Site Engineer / Environment Manager	Good practice
AQ3	Vegetation clearing will be staged where possible to minimise the area and time that surfaces are exposed.		Construction	Site Engineer / Foreman	G40, SPIR (AQ1)
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 geofabrics for short term exposure and emulsion spray, spray grass, soil compaction and revegetation for longer term exposed areas or final finishes.		Construction	Site Engineer / Foreman	SPIR (AQ1)
AQ5	Construction activities will be modified, reduced or controlled during high or unfavourable wind conditions if they have a potential to increase dust generation.		Construction	Site Engineer / Foreman	G36, SPIR (AQ1)
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. Dust control equipment will be maintained to ensure its operability.		Construction	Site Engineer / Foreman	G36, SPIR (AQ1) / EPL
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.		Construction	Site Engineer / Foreman	Good practice
AQ8	Waste will be segregated and collected on a regular basis to ensure odours associated with waste do not become an		Construction	Site Engineer / Foreman	Good practice

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	issue.				
AQ9	The application of pesticides and herbicides will be modified, reduced or controlled during high or unfavourable wind conditions where wind can carry pesticides outside of the defined treatment area.		Construction	Site Engineer / Foreman	G36
AQ10	Stockpiles will be located in accordance with the criteria established in Appendix B8 of the CEMP. A suitable cover crop or provision of other covering over topsoil stockpiles will be established where stockpiles prone to wind erosion are in place for longer than 4 weeks ie spraying.		Construction	Site Engineer / Foreman	G36, SPIR (AQ1)
AQ11	There will be no burning off of waste.		Construction	Foreman	G36
AQ13	Stormwater, recycled water or other water sources shall be used, where feasible and reasonable, in preference to potable water for construction activities, including concrete mixing and dust control.		Construction	Site Engineer / Foreman	COA B35
VEHICLE MOVEMENT AND MATERIAL STORAGE					
AQ14	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.		Construction	Superintendent	G36
AQ15	Measures will be implemented to minimise dust, soil or mud being deposited from vehicles on public roads including rumble grids and large aggregate at entry/exit points, and immediate cleaning of any spillage on public roads. Management measures should include: <ul style="list-style-type: none"> Watering of unsealed haul roads, as required; and Visual checks of exhaust emissions. 		Construction	Site Engineer / Foreman	G36, SPIR (AQ1) / EPL
AQ16	Hardstand areas and surrounding public roads will be cleaned, as required, using methods including brooms, bobcat attachments or street sweepers.		Construction	Site Engineer / Foreman	Good practice
AQ17	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		Construction	Site Engineer / Foreman	G36, SPIR (AQ1)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	limit maybe implemented where dust generation persists				
AQ18	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.		Construction	Site Engineer / Foreman	G36, SPIR (AQ1)
PLANT AND EQUIPMENT					
AQ19	Haul trucks and plant equipment will be switched off when not in operation for periods of more than 30 minutes.		Construction	Foreman / Operators	G36 / EPL
AQ20	Engines of plant parked next to residents will be switched off when not in operation.		Construction	Foreman / Operators	Good practice
AQ21	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.		Construction	Site Engineer / Foreman	G36 / EPL
AQ22	Any plant, equipment or machinery will be immediately switched off should there be visible signs of smoke emissions emitting from equipment/machinery.		Construction	Foreman	Good practice
BATCH PLANTS					
AQ23	Water carts will be used to suppress dust around batch plants.		Construction	Site Engineer / Foreman	Good practice, SPIR (AQ1)
AQ24	Batch plants will be swept and cleaned to keep them in a tidy state to prevent the build up of dust, similarly with storage of potentially dust generating material.		Construction	Site Engineer / Foreman	Good practice
AQ25	High dust emitting structures or processors in batch plants (eg conveyer belts) will have water spraying systems installed to suppress dust.		Construction	Site Engineer / Foreman	Good practice, SPIR (AQ1)
AQ26	Concrete batch plants to be fitted with dust filters or similar to minimise air quality impacts from batching operations.		Construction	Site Engineer / Foreman	G36
BLASTING AND CRUSHING					

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
AQ27	Where practical during blasting, a combination of the following mitigation measures will be used to suppress dust: <ul style="list-style-type: none"> Weather reports checked prior to blasting to minimise the potential for wind blown dust will not reach surrounding residents. Controlled blasts to minimise dust produced. 		Construction	Site Engineer / Foreman	Good practice
AQ28	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.		Construction	Site Engineer / Foreman	Good practice
INSPECTION, MONITORING AND RECORDS					
AQ29	Public roads will be inspected each day at main entry and exit points to and from areas where construction activities are taking place, including the project compound and site offices. Material tracked onto the road pavement will be removed in accordance with AQ15.		Construction	Site Engineer / Foreman	G36
AQ30	Dust deposition gauges will be established at least one month prior to the commencement of construction to establish background dust levels. Monitoring equipment will remain in place until completion of the construction works and/or where ground conditions are stable. Results will be captured on a monthly basis and collected in accordance with DEC's "Approved Method for the Sampling and Analysis of Air Pollutants in NSW" guidelines.		Pre-construction / Construction	Site Engineer / Foreman	G36, SPIR (AQ1)
AQ31	Weather forecast will be reviewed on a daily basis and appropriate measures implemented where unfavourable weather conditions (dry weather, strong winds) are anticipated.		Construction	Environment Manager / Foreman	Good practice
AQ32	An onsite weather station will be established to record weather data. Rainfall at the premises will be measured and recorded in millimetres per 24-hour period at the same time each day from the time that the site office is established.		Pre-construction / Construction	Environment Manager	Good practice
AQ33	Dust control and operational procedures will be reviewed		Construction	Environment	Good practice, SPIR

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	and modified if results exceed the air quality criteria and are attributable to construction activities.			Manager / Foreman	(AQ1)

8 Compliance management

8.1 Roles and responsibilities

The OHLY 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.

8.2 Training

All employees, contractors and subcontractors 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.
- EPL conditions (eg. specifically dust management competency and maintenance of plant and equipment conditions, and the Dust Assessment Handbook).
- Roles and responsibilities for air quality management.
- Air quality mitigation and management measures.
- Procedure to be implemented in the event of an incident (eg 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 eg 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 (refer Appendices B to D). Monitoring and inspections will include, but not be limited to:

- Monthly dust monitoring in accordance with DEC's "Approved Method for the Sampling and Analysis of Air Pollutants in NSW" guidelines.
- 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.

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

8.4 Incident Response

Response to emergency situations will be undertaken in accordance with the Emergency Response & Incident Management Plan. An emergency situation is an event that could present significant risk to the environment, personnel or the community, as determined by the Construction Manager or the Environment Manager.

Environmental incidents will be reported immediately to a Supervisor who will contact either the Construction Manager, or Environment Manager as required under RMS Environmental Incident Classification and Reporting Procedure and Appendix I of SWMP) All incidents will be investigated and the appropriate course of action will be taken to address the issues. Serious environmental incidents will be reported to DECCW in accordance with the Protection of the Environment Operations Act 1997 – Duty to Notify. Some of the potential issues that may arise during construction works are listed below.

Table 8-1 Incidents Relevant to Air Quality

Issue no	Incident	Response	Responsibility
1	Dust event due to weather conditions.	Dust generating activities will cease under direction of the Construction Manager or Superintendent until adverse conditions subside. Exposed stockpiles and other dust generating items will be water sprayed or covered. Dust suppressants will be investigated.	Construction Manager Superintendents
2	Dust event due to a particular construction activity.	Dust generating activities will cease under direction of the Construction Manager or Superintendent until dust is adequately contained. Remedial measures will be implemented prior to recommencing work.	Project Manager Superintendents
3	Community complaint relating to dust.	Any dust complaints received from the community will be recorded, promptly investigated and addressed in accordance with the Community Consultation Strategy.	Environment Manager Community Manager

8.5 Licences and permits

An EPL will be obtained for the scheduled activity “road construction” by OHLY. The EPL typically prescribes air quality parameters to be measured. Where required the AQMP will be revised to include EPL compliance requirements when obtained.

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

8.6 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.

8.7 Reporting

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

Monthly reporting of dust monitoring will be reported through the ERG, EPL monthly report and project monthly reporting.

9 Review and improvement

9.1 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.

9.2 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.

The ER can approved minor amendments to the plan. Whereby other amendments are required, the document is to be submitted to DP&E for approval.

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 A

Dust catchment areas and sensitive receivers

Note - Assume nearest sensitive receivers are similar for noise and air quality

Appendix B

Dust deposition gauge procedure

Dust Deposition Gauge Procedure

Distribution

There are no restrictions on the distribution / circulation of this Procedure within the OHL York Joint Venture.

Purpose

This Procedure details the methodology for locating and setting up dust deposition gauges (DDGs), collecting dust samples and reporting the results in order for JV to monitor air quality during the construction works.

Induction / Training

The Environment Manager (EM) shall ensure that the Environmental Officer (EO) and other nominated persons responsible for managing DDGs understand the requirements of this Procedure.

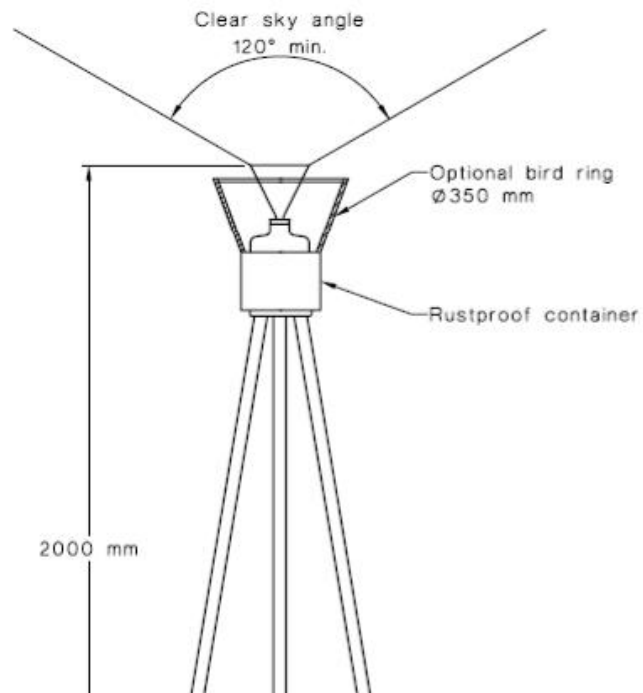
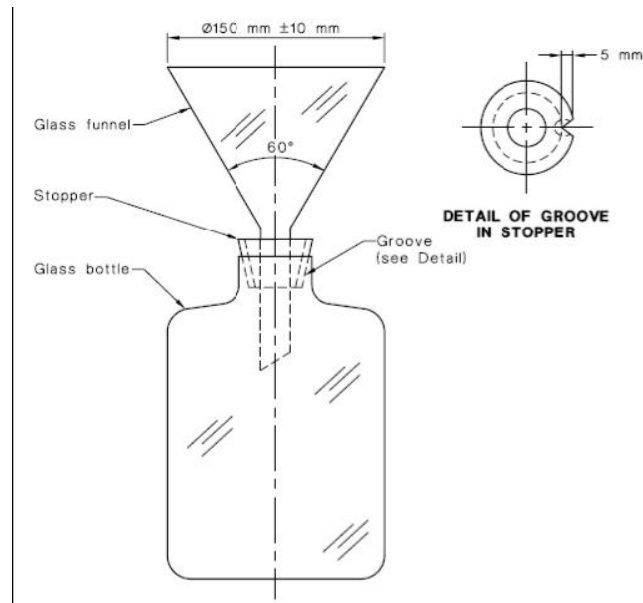
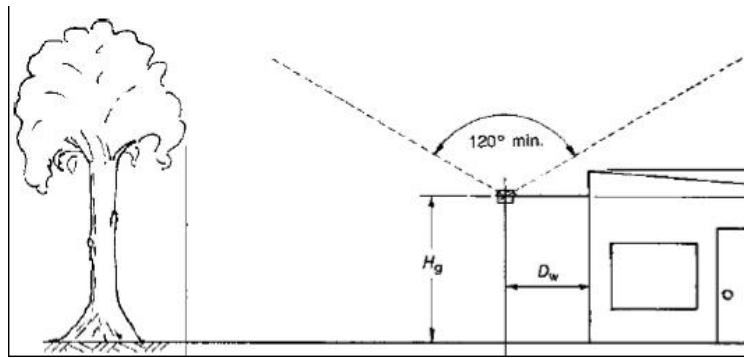
Scope

This Procedure is applicable to all JV personnel required to carry out air quality monitoring throughout the Project. The procedure details the methodology for collecting dust samples using a DDG and process for reporting the results in order to monitor air quality during the construction period.

Procedure

Location and Siting of DDGs

- a) The EM and EO shall ensure that the locations of all DDGs are consistent with those nominated in the Construction Air Quality Management Plan (AQMP) and located in consultation with DECCW and that any changes on site are reflected in the Plan.
- b) The EO shall ensure that the set up and siting of each DDG is in accordance with AS 3580 and AS 2922. These requirements are described below and shown in the following diagrams:
 - An inlet height of 2m above ground surface (± 0.2 m)
 - A clear sky angle of 120° above inlet
 - Unrestricted airflow of 360° around sampling unit
 - 5m from the nearest obstacle
 - A glass funnel 150mm in diameter (± 10 mm); and
 - A bottle with at least 4L capacity.



6. DDG Exchange Procedure

Materials Required for DDG exchange

- Bottles (clean and labelled with DDG number and/or landowner name)
- Bottle caps / lids (tight fitting)
- Plastic wash bottle (squeeze type) filled with distilled or deionised water
- A few spare funnels - 150mm (\pm 10mm), glass (A grade), 60 nominal size, in case of breakages
- Spare stoppers (to be supplied or new plastic cup with slot cut in base).

DDG Exchange

- a) DDGs should be changed by the EO or other nominated JV personnel every 30 days (\pm 2 days)
- b) During exchange, deposited matter adhering to the inside of the funnel should be washed into the DDG bottle using a minimum volume of distilled water from a wash bottle; NOTE: A clean brush or pipe cleaner can be used to dislodge any foreign/particulate matter adhering to the internal surfaces of the funnels
- c) Remove the funnel and attached stopper, and seal the bottle with a lid. Ensure the bottle is labelled with the correct DDG number
- d) Insert the cleaned funnel with the attached stopper into a fresh bottle containing copper sulphate pentahydrate algicide, and leave the funnel exposed for the next sampling period
- e) Care must be taken to ensure that the fresh bottle is labelled with the correct DDG number (e.g. bottle 7 must be placed at DDG location 7 or use landowners names to correlate)
- f) Ensure that the funnel is firmly held in the neck of the bottle, and that the funnel aperture plane is horizontal
- g) The EO shall ensure that all removed bottles are stored in an esky (cool, dark environment) to prevent algae or fungal growth until dispatch, which should be as soon as possible and no later than 7 days after collection.

Paperwork

1. Following the collection of DDGs, the EO or other nominated JV personnel carrying out the exchange shall ensure that the following paperwork is completed and a copy made for JV records:
 - **Dust Deposition Gauge Sampling Field Sheet** (see Appendix C of this document) including any notes on gauge damage, dusty conditions, excessive insects or other information which may affect results
 - **Chain of Custody Form** (provided by NATA accredited laboratory)

Sample Dispatch

1. Sample bottles and paperwork are to be packed into an esky for transport (ensure lid is sealed closed)
2. An address sheet is to be filled out and placed on the top of the esky for the return address to the NATA accredited lab
3. Include a note with the samples, outlining the EO contact details should any problems arise
4. See site compound reception to organise courier and send via courier to:
Client Laboratory Details (TBD)

Records

1. Results of the monthly DDG analysis will be received from the NATA accredited lab by the EO
2. The EO will record the data in a DDG monitoring register and assess the results against the criteria detailed in the AQMP
3. Exceedances of the criteria and / or regular reporting will be managed or undertaken as per the requirements of the AQMP

Appendix C Dust deposition gauge sampling field sheet

Dust Deposition Gauge Field Record Form

Date of Changeover: _____ Sampler: _____

DDG #	Location	Gauge & funnel condition	Photo Taken	Activities on site/other comments
DDG 1				
DDG 2				
DDG 3				
DDG 4				
DDG 5 Control				
DDG 6 Control				

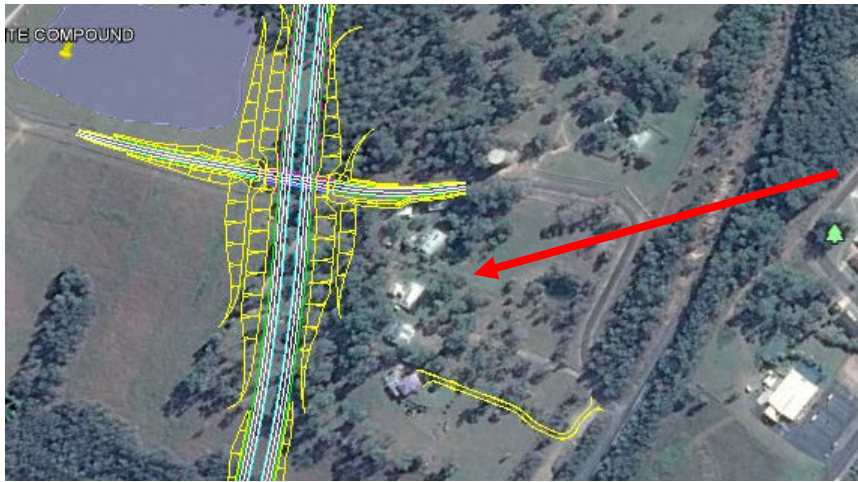
Appendix D Location of dust deposition gauges

Location of Dust Deposition Gauges

DDG Number	Chainage	Description
DDG#1	CH1300	Darlington Holiday Park, east side of alignment
DDG#2	CH2500	Kangaroo Trail Road Compound, east side of alignment
DDG#3	CH3200	Dance Studio, west side of alignment
DDG#4	CH5250	Post Office Lane, east side of alignment
DDG#5	CH6200	Corindi Access Road, Blueberry Farm, east side of alignment
DDG#6	CH7550	Crushing & Screening Operations, private resident east of alignment
DDG#7	CH7800	Large cut operations, west side of alignment
DDG#8	CH9450	Blueberry Packing Shed, west side of alignment
DDG#9	CH10100	Farming operations east of alignment
DDG#10	CH12300	Property close immediately east of alignment
DDG#11	CH14100	Private residents, east of alignment
DDG#12	CH8800	Control Site - Blueberry Farm, west of alignment



Dust Gauge Location 1 (approximate chainage 1300)



Dust Gauge Location 2 (approximate chainage 2500)



Dust Gauge Location 3 (approximate chainage 3200)



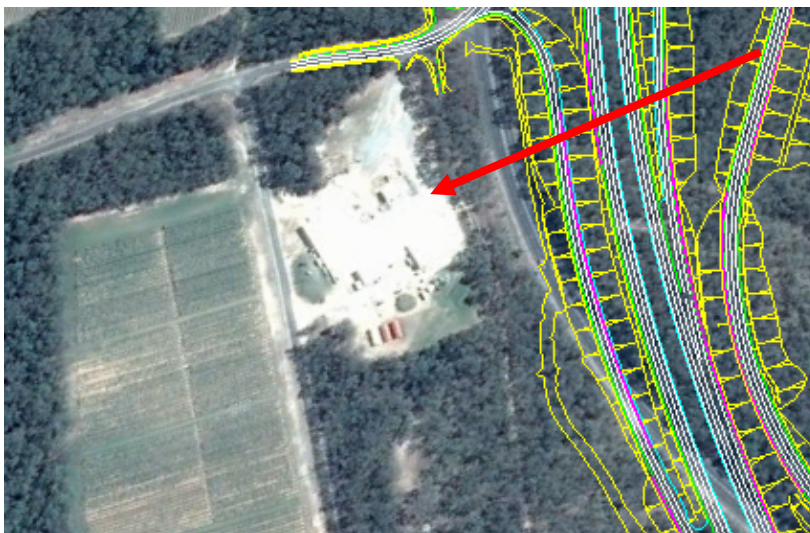
Dust Gauge Location 4 (approximate chainage 5200)



Dust gauges location 5 (chainage 6200)



Dust gauge locations 6 (chainage 7550) and 7 (chainage 7800)



Dust gauge location 8 (chainage 9400)



Dust gauge location 9 (chainage 10100)



Dust gauge location 10 (chainage 12300)



Dust gauge location 11 (chainage 14100)



Dust gauge location 12 (chainage 8800) – control site blueberry farm