

# Appendix B6

## Air quality management sub plan

Nambucca Heads to Urunga

## Document control

---

File name	NH2U AQMP Rev5
Report name	Air quality management sub plan
Revision number	5

---

Plan approved by:

*[signed]*

*Jason Moran*

Lend Lease Project Director

*[signed]*

*Jenny Butler*

Lend Lease EM

*[signed]*

*Paul Leonard*

Roads and Maritime Senior  
Project Manager

## Revision history

Revision	Date	Description	Approval
0	06/06/12	First draft	
1	24/08/12	Addressing Roads and Maritime comments and for issue	
2	Jan 2013	NH2U specific contractor information	
2.1	Feb 2013	Issued to agencies for comment	
2.2	May 2013	Updated to address agency comments	
3	July 2013	Updated to address DP&I comments	
4	July 2014	Minor update to change RMS to Roads and Maritime, and Abigroup to Lend Lease, plus other minor changes approved by the ER	
5	Aug 2015	Minor updates as approved by the ER	

## 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 .....	3
3.1	Relevant legislation and guidelines .....	3
3.2	Minister’s Conditions of Approval .....	3
3.3	Statement of commitments.....	4
4	Existing environment.....	5
4.1	Air quality records.....	5
4.2	Rainfall, soil dryness and wind .....	5
4.3	Soil characteristics.....	6
4.4	Sensitive receivers .....	7
5	Air quality criteria .....	9
6	Environmental aspects and impacts .....	10
6.1	Construction activities.....	10
6.2	Factors likely to affect dust generation and impacts.....	10
6.3	Impacts .....	11
7	Environmental control measures.....	12
8	Compliance management .....	17
8.1	Roles and responsibilities.....	17
8.2	Training.....	17
8.3	Monitoring and inspection.....	17
8.4	Licenses and permits.....	17
8.5	Auditing.....	18
8.6	Reporting .....	18
9	Review and improvement .....	19
9.1	Continuous improvement.....	19
9.2	AQMP update and amendment.....	19

## Appendices

### Appendix A Dust gauge locations and sensitive receivers

## Glossary / Abbreviations

<b>Abbreviation</b>	<b>Meaning</b>
AQMP	Air Quality Management Sub Plan
CEMP	Construction Environmental Management Plan
CoA	Condition of Approval
DDG	Dust Deposition Gauge
EA	Environmental Assessment
EEC	Endangered Ecological Community
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPL	Environment Protection Licence
EWMS	Environmental Work Method Statements
FM Act	<i>Fisheries Management Act 1994</i>
NOW	NSW Office of Water
OEH	Office of Environment and Heritage
PESCP	Progressive Erosion and Sediment Control Plan
SoC	Revised Statement of Commitments included in the Submissions Report
SWMP	Soil and Water Management Plan

# 1 Introduction

## 1.1 Context

This Air Quality Management Sub Plan (AQMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the upgrade of the Pacific Highway from Nambucca Heads to Urunga (NH2U). The NH2U Project is Stage 1 of the Warrell Creek to Urunga (WC2U) Project, approved by the Minister for Planning and Infrastructure in 2011.

The NH2U section of the WC2U Project involves construction of approximately 21.6km of new highway from south of Nambucca Heads Interchange to the existing Waterfall Way Interchange at Raleigh, north of Urunga. The NH2U Project is being constructed by Lend Lease.

This AQMP has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), the Roads and Maritime Statement of Commitments (SoC), the mitigation measures listed in the Warrell Creek to Urunga Environmental Assessment (EA) and all applicable legislation.

## 1.2 Background

The *Warrell Creek to Urunga – Upgrading the Pacific Highway - Environmental Assessment* (RTA 2010) assessed the impacts of construction and operation of the Project on air quality, within chapter 19.

The EA 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.

## 1.3 Environmental management systems overview

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

The AQMP is part of Lend Lease's 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 Lend Lease personnel and contractors.

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

## **2 Purpose and objectives**

### **2.1 Purpose**

The purpose of this Plan is to describe how Lend Lease propose 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 to air quality are minimised and within the scope permitted by the planning approval. To achieve this objective, Lend Lease 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 and SoC outlined in Table 3.1 and Table 3.2, and the mitigation measures detailed in the EA.
- 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 Sub Plan for measures to reduce greenhouse gas emissions during construction.

## 3 Environmental requirements

### 3.1 Relevant legislation and guidelines

#### 3.1.1 Legislation

Legislation relevant to air quality management includes:

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

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

#### 3.1.2 Guidelines and standards

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

- National Environment Protection Council's (NEPC) – 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 (DEC 2005).
- Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (DEC 2007).
- Air Quality Monitoring Criteria for Deposited Dust (DEC Guideline), Refer to Table 5-1 below.

### 3.2 Minister's Conditions of Approval

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

**Table 3-1 Conditions of Approval relevant to the AQMP**

CoA No.	Condition Requirements	Document Reference
C2	The Proponent shall employ all feasible and reasonable measures (including temporary cessation of relevant works, as appropriate) to ensure that the project is constructed in a manner that minimises dust emissions from the site, including wind-blown, traffic-generated dust, stockpiles and material tracking from construction sites onto public roads.	Table 7-1

### 3.3 Statement of commitments

Relevant SoC are listed Table 3-2 below. This includes reference to required outcomes, the timing of when the commitment applies, relevant documents or sections of the environmental assessment influencing the outcome and implementation.

**Table 3-2 Statements of commitment relevant to this AQMP**

Outcome	Ref #	Commitment	Timing	AQMP Reference
Minimise dust generation and impact to sensitive receivers.	AQ1	To minimise windblown, traffic generated or equipment generated dust emissions, there will be feasible and reasonable mitigation and management measures.	Construction	Table 7-1
	AQ2	Dust generating activities will stop where visible dust is being emitted outside the construction corridor and dust suppression measures are ineffective.	Construction	Table 7-1



## 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 19 of the EA.

### 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. There has however, 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 30 kilometres north of the Urunga. 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 <sup>3</sup> )	1 day a year	0.2 ppm (0.3 mg/m <sup>3</sup> )	0.03 ppm (0.04 mg/m <sup>3</sup> )
Nitrogen dioxide	1 hr	0.12 ppm (246 µg/m <sup>3</sup> )	1 day a year	0.036 ppm (73.8 µg/m <sup>3</sup> )	0.004 ppm (9.2 µg/m <sup>3</sup> )
Particles as PM <sub>10</sub>	1 day	50 µg/m <sup>3</sup>	5 days a year	37.8 µg/m <sup>3</sup>	20.3 µg/m <sup>3</sup>
Advisory reporting goals					
PM <sub>2.5</sub>	1 day	25 µg/m <sup>3</sup>	Gather data to facilitate review of goal	15.4 µg/m <sup>3</sup>	7.7 µg/m <sup>3</sup>

### 4.2 Rainfall, soil dryness and wind

The historical records from Coffs Harbour MO (Station ID 059040) have been selected to reflect the potential climatic conditions across the Project site due to its proximity to the overall site, and extent of available data (from 1943 to present). A summary of the relevant climatic records from the Bureau of Meteorology is provided in Table 4-2 below.

It is noted that monthly historical rainfall data is available from the Urunga weather station (Station ID 059037), but no further climatic conditions relevant to dust management are available. Monthly rainfall records from the Urunga weather station are provided in Table 4-3. In general, the yearly rainfall for the Urunga station is 240mm less on average than the Coffs Harbour data provided below.

Note, the information below is provided only to describe historical information for the region related to dust management, and site specific weather stations will record site specific information for the duration of the Project.

**Table 4-2 Summary of Coffs Harbour climatic records**

Summary of rainfall record from 1943 to present													
	Summer / Autumn						Winter / Spring						Year
	Dec	Jan	Feb	Mar	Apr	Ma	Jun	July	Aug	Sep	Oct	Nov	
	Mean rainfall (mm)	144.6	189.1	220.0	235.8	179.2	157.7	123.5	73.8	78.4	61.0	98.3	
Mean rain days	8.4	9.4	9.5	10.7	8.4	7.6	6.2	4.5	4.5	4.5	6.7	8.1	88.5
Mean wind speed (km/h 3pm)	22.5	22.4	20.9	19.4	17.0	14.6	14.7	15.5	18.2	21.7	22.9	23.7	19.5
Mean max temp (°C)	26.3	26.9	26.8	25.9	24.0	21.4	19.3	18.7	19.8	22.0	23.6	24.9	23.3

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 e.g. earthworks, climatic factors such as prolonged dry weather, combined with high winds, can increase the likelihood of dust particulate emissions.

**Table 4-3 Summary of Urunga rainfall records**

Summary of rainfall record from 1912 to 2012													
	Summer / Autumn						Winter / Spring						Year
	Dec	Jan	Feb	Mar	Apr	Ma	Jun	July	Aug	Sep	Oct	Nov	
	Mean rainfall (mm)	129.3	157.6	191.5	195.3	166.2	124.3	118.8	71.5	61.6	58.4	87.6	

It can be seen from the tables 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 4-4, with an indication of the potential for wind erosion i.e. dust emissions. The soil information has been derived from exploratory test pits and exploratory boreholes excavated during the Warrell Creek to Urunga geotechnical investigation conducted by Coffey Geotechnics (Ref. GEOTLCOV24043AB-CI).

**Table 4-4 Soil type and characteristics**

Chainage	Soil type	Characteristics	Potential for dust generation*
62,550 to 64,870	Residual & alluvial clayey silts, silty clays & clays	Low & high plasticity	Moderate
64,870 to 65,570 Deep Creek floodplain	Alluvial silty clays & silty sandy clays	Medium to high plasticity	Moderate
65,570 to 71,670	Alluvial & residual silty clays & silty sandy clays	Low, medium & high plasticity	Moderate
71,670 to 72,070 McGrath Creek flat	Organic clay	High plasticity	Low to moderate
72,070 to 76,570	Alluvial & residual Silty clays, silty sandy clays & clays	Low medium & high plasticity	Moderate
76,570 to 78,270 Kalang River floodplain	Alluvial Silts and clayey silts	Low & high plasticity	High
78,270 to 83,470	Alluvial & residual Silty clays, silty sandy clays & clays	Low, medium & high plasticity	Moderate

\*The potential for dust generation classification in Table 4-4 above is based on the likely fraction of the soil less than 75µm, plasticity and silt content.

#### 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 commercial, agricultural or industry users.
- Road users.
- Watercourses.

Residential sensitive receivers have been identified from their close proximity to the Project, and are identified in Appendix A.

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

**Table 4-5 Non-residential sensitive areas**

<b>Location</b>	<b>Receiver Type</b>
Railway Road, Nambucca Heads	Native Vegetation / Industrial
Auld Close, Valla	Native Vegetation
Deep Creek Road, Valla	Agricultural
Valla Beach Road, Valla Beach	Commercial
Birugan Close, Valla Beach	Native Vegetation
East West Road, Valla Beach	Agricultural
Burkes Lane, Valla Beach	Native Vegetation
Ballards Road, Pacific Highway	Native Vegetation
Boundary Road	Agricultural
Tower Road, Pacific Highway	Native Vegetation
Martells Road, Pacific Highway	Native Vegetation
Alex Pike Drive, Raleigh	Industrial

The main agricultural activity noted to be undertaken nearby to the alignment, and to which dust gauges have been located to monitor is noted to be macadamia farming. These can generally be identified in Appendix A by the dark green vegetation types in straight rows in the southern section of the Project.

The commercial and industrial activities near the alignment in the southern section of the Project include a landscape supply and caravan manufacture business. In the north, Alex Pike Drive in Raleigh contains light industrial facilities including a Council works depot and a concrete batching plant.

While the risk of impact to nearby agricultural and commercial receivers is predicted to be low (with the measures described in Section 7), consultation with all potentially affected residential and non-residential receivers will be undertaken throughout the Project to ensure impacts are minimised.

Dust gauges have been located to be representative of sensitive receivers along the length of the Project. The location of representative dust gauges, residential receivers and the non-residential sensitive receivers listed above are shown in Appendix A. Watercourses, native vegetation and additional sensitive sites can also be seen in Appendix A.

## 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. 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 below details the air quality monitoring criteria for deposited dust.

**Table 5-1 Air quality monitoring criteria for deposited dust<sup>a</sup>**

Pollutant	Annual concentration		Source
Deposited dust <sup>b</sup>	2 g/m <sup>2</sup> /month <sup>c</sup>	4 g/m <sup>2</sup> /month <sup>d</sup>	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 3580.10.1-2003 (AM-19).
- c. Maximum increase in deposited dust level.
- d. Maximum total deposited dust level.

## 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. These are:

- 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.

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

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

### 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 (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, water tank drinking water and general amenities.
- Impacts on commercial or industrial premises.
- Complaints from the public relating to dust or odours.

Some impacts on air quality attributable to the Project are anticipated and have been described in the EA. Chapter 7 of this Plan provides a suite of mitigation measures that will be implemented to avoid or minimise those impacts.

## 7 Environmental control measures

A range of environmental requirements and control measures are identified in the various environmental documents, including the EA, Submission Report, Statement of Commitments, supplementary assessments, Conditions of Approval, Roads and Maritime documents Lend Lease EMS Procedures (700 Environmental Series), 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	When to implement	Responsibility	Reference
<b>GENERAL</b>				
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 Progressive Erosion and Sediment Control Plans (PESCP).	Pre-construction / Construction	Site Engineer / Environmental Officer	Good practice
AQ3	Vegetation clearing will be staged where possible to minimise the area and time that surfaces are exposed.	Construction	Site Engineer	G36
AQ4	Exposed surfaces with no scheduled work for two weeks will be treated to minimise dust generation. Exposed surfaces will be treated 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	Foreman	G36
AQ5	Construction activities will be modified, reduced or controlled during high or unfavourable wind conditions if they have a potential to increase the generation or emission of dust.	Construction	Foreman	G36
AQ6	Control measures including water carts, sprinklers, sprays, dust screens or the application of geo-binding agents will be utilised where applicable to control dust emissions. The frequency of use will be modified to accommodate prevailing conditions.	Construction	Foreman	G36
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	Foreman	Good practice
AQ8	Waste will be segregated and collected on a regular basis to ensure odours associated with waste do not become an issue.	Construction	Foreman	Good practice
AQ9	The application of pesticides will be modified, reduced or controlled during high or unfavourable wind conditions where wind can carry pesticides outside of the defined treatment area.	Construction	Foreman	G36

AQ10	Stockpiles will be located in accordance with the criteria established in Appendix I of the SWMP, Stockpile Management Protocol. A suitable cover crop (for completed stockpiles) or provision of other covering over incomplete stockpiles will be established where stockpiles prone to dust emissions are in place for longer than 4 weeks.	Construction	Site Engineer / Foreman	G36
AQ11	There will be no burning off of waste.	Construction	Foreman	G36
<b>VEHICLE MOVEMENT AND MATERIAL STORAGE</b>				
AQ12	Areas of disturbed material and access roads will be stabilised where possible by methods such as compaction. Compounds, ancillary facilities, administration access roads and standing areas will be hard surfaced.	Construction	Superintendent	G36
AQ13	Measures will be implemented to minimise dust, soil or mud from being deposited by vehicles on public roads. This will be achieved by implementing mitigation measures such as rumble grids and large aggregate at entry/exit points.	Construction	Superintendent	G36
AQ14	Manual cleaning will also be carried out where appropriate. In the event of any spillage or tracking onto public roads, the material will be removed immediately, or as soon as reasonably practical after being identified, and measures (such as additional controls or restricting vehicle movements) implemented to prevent further tracking.	Construction	Superintendent	G36
AQ15	Hardstand areas and surrounding public roads will be cleaned, as required, using methods including brooms, bobcat attachments or street sweepers.	Construction	Foreman	Good practice
AQ16	Vehicle movement will be confined to designated haul roads and areas. These roads will have appropriate speed limits to ensure safe equipment operation and to reduce dust generation. Reduced speed limit may be implemented where dust generation persists.	Construction	Superintendent	G36
AQ17	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	Foreman	G36
<b>PLANT AND EQUIPMENT</b>				
AQ18	Haul trucks and plant equipment will be switched off when not in operation for periods of more than 15 minutes.	Construction	Foreman / Operators	G36 / Good practice
AQ19	Engines of plant parked next to residents will be switched off when not in operation.	Construction	Foreman / Operators	Good practice

AQ20	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	Foreman	G36
<b>BATCH PLANTS</b>				
AQ21	Water carts will be used to suppress dust around batch plants.	Construction	Foreman	Good practice
AQ22	Batch plants will be swept and cleaned to keep them in a tidy state to prevent the build up of dust weekly or more frequently if dust build up increases the risk of dust emission.	Construction	Foreman	Good practice
AQ23	High dust emitting structures or processors in batch plants (e.g. conveyer belts) will have water spraying systems or appropriate alternatives that provide greater control installed to suppress dust.	Construction	Site Engineer	Good practice
AQ24	Concrete batch plants to be fitted with dust filters to minimise air quality impacts from batching operations.	Construction	Site Engineer	G36
<b>BLASTING AND CRUSHING</b>				
AQ25	Where practical during blasting, a combination of the following mitigation measures will be used to suppress dust: <ul style="list-style-type: none"> <li>• Weather reports checked prior to blasting to ensure wind blown dust will not reach surrounding residents.</li> <li>• Controlled blasts to minimise dust produced.</li> </ul>	Construction	Foreman	Good practice
AQ26	Crushers will be positioned in protected areas, where practical, to reduce wind dispersion of dust particles (e.g. within cuts). Water spraying (or other suitable products) will be utilised if necessary.	Construction	Foreman	Good practice
<b>INSPECTION, MONITORING AND RECORDS</b>				
AQ27	Public roads will be inspected each day at main entry and exit points to and from areas where construction activities are taking place and compounds. Material tracked onto the road pavement will be removed in accordance with AQ14.	Construction	Foreman	G36

AQ28	Dust deposition gauges will be established three months 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	Environmental Officer	G36
AQ29	Weather forecast will be reviewed on a daily basis and appropriate measures implemented where unfavourable weather conditions (dry weather, strong winds) are anticipated.	Construction	Environmental Manager / Foreman	Good practice
AQ30	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	Environmental Manager	Good practice
AQ31	Dust will be managed to meet the deposited dust criteria detailed in Table 5-1. Dust control and operational procedures will be reviewed and modified if results exceed the criteria and are attributable to construction activities.	Construction	Environmental Manager / Foreman	Good practice

## 8 Compliance management

### 8.1 Roles and responsibilities

The Lend Lease 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 utility staff working on site will undergo site induction training relating to air quality management issues. The induction training will address elements related to air quality management including:

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

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

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

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

### 8.3 Monitoring and inspection

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

- Weekly formal inspections and informal daily checks will be undertaken by Lend Lease environmental team members to identify and action any air quality issues.
- 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 Licenses and permits

An EPL will be obtained for the scheduled activities "road construction", "crushing, grinding and separating" and "extractive activities". The EPL typically prescribes air quality parameters to be measured. The air quality monitoring criteria for the Project is listed in Table 5-1.

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 sub plan, MCoA and other relevant approvals, licenses and guidelines.

Audit requirements are detailed in Section 8.4 of the CEMP.

## **8.6 Reporting**

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

## **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.

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

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

# Appendix A

## Dust gauge locations and sensitive receivers

The proposed sensitive receivers identified for the purposes of targeted monitoring using depositional dust gauges are shown below in Table A-1. The final location of the dust gauge will be determined following consultation with private landowners where applicable.

**Table A -1 Nominated dust gauge locations**

<b>Dust Gauge ID</b>	<b>Location</b>	<b>Receiver Type</b>
DDG 2	27 Boggy Creek Road, Valla	Residential / Native Vegetation
DDG 3	2 Auld Close, Valla	Residential / Native Vegetation
DDG 4	Western side of corridor at Ch 64350 (North of Valla Compound), Valla	Residential
DDG 5	23 East West Road, Valla	Residential / Agricultural
DDG 12	354 South Arm Road, Urunga	Residential / Native Vegetation
DDG 13	South of Short Cut (off South Arm), Raleigh	Residential
DDG 14	79 Short Cut Road, Urunga	Residential
DDG 16	63 Waterfall Way, Raleigh	Residential / Native Vegetation
DDG 17	Valla Beach property	Control Gauge
DDG 20	7115 Pacific Highway, Valla	Residential

The locations of dust gauge locations and sensitive receivers in relation to the Project corridor are shown on the following maps.



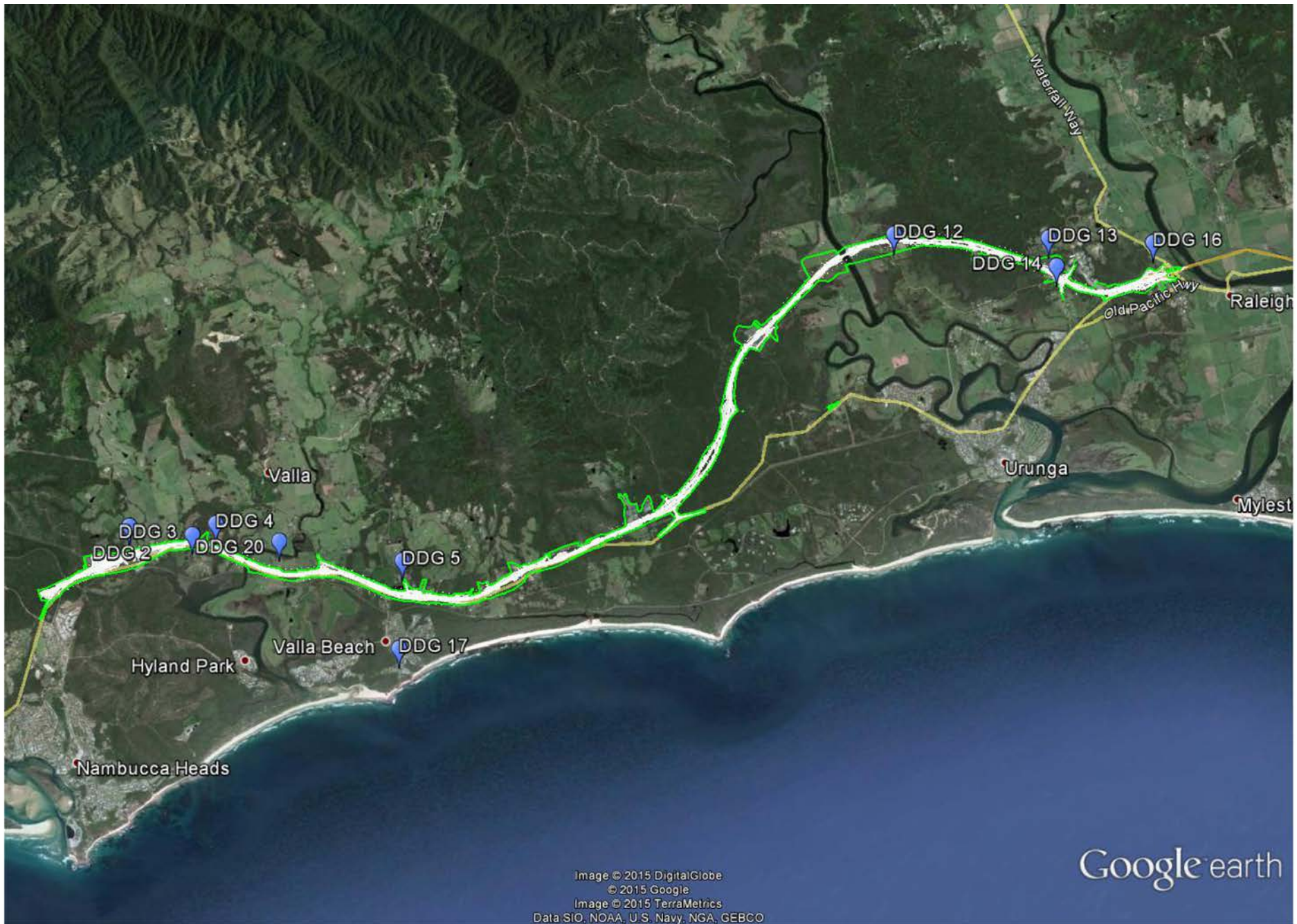
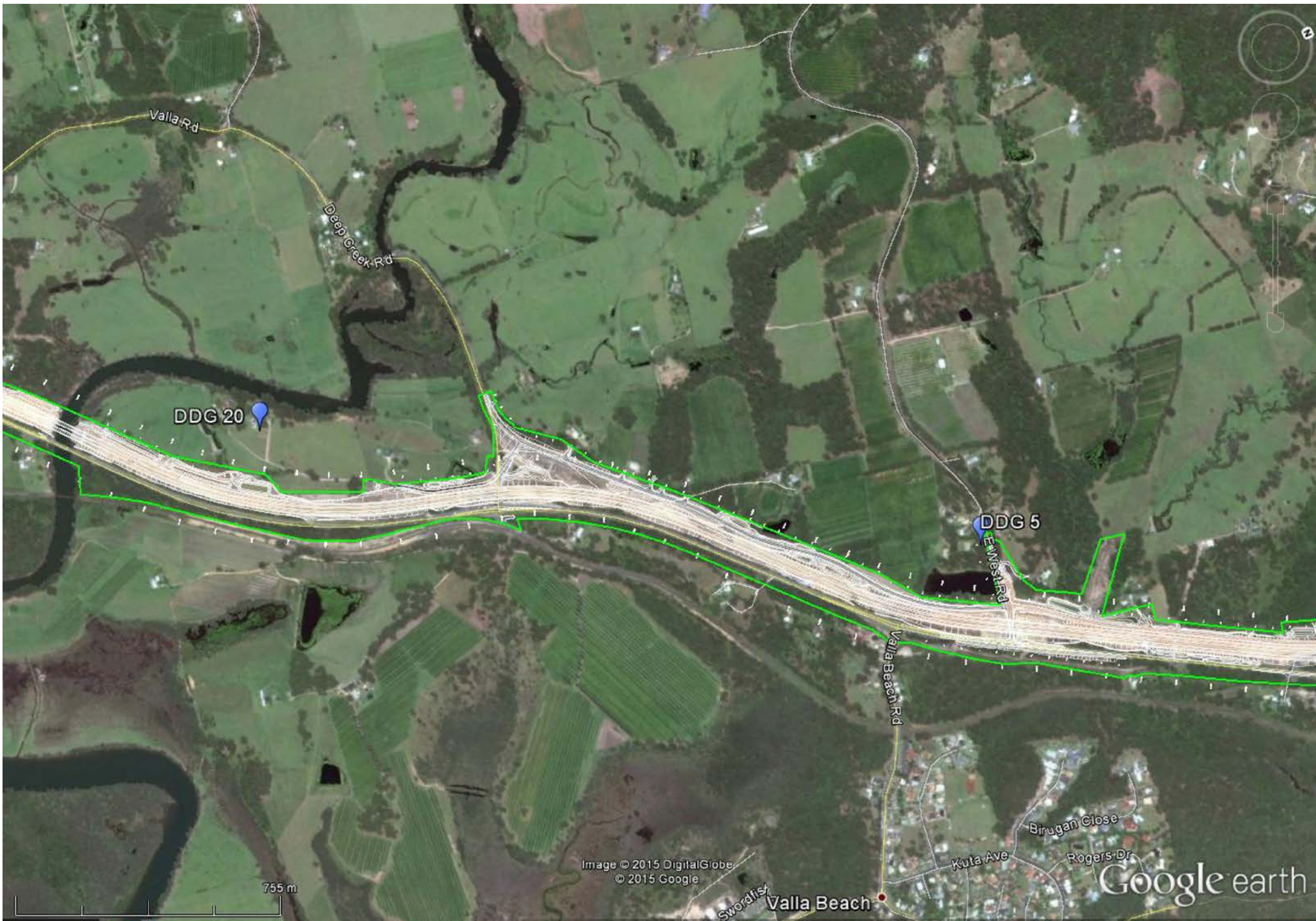




Image © 2015 DigitalGlobe  
© 2015 Google

Google earth



Valla Rd

Deep Creek Rd

DDG 20

DDG 5

Emma's Rd

Valla Beach Rd

Image © 2015 DigitalGlobe  
© 2015 Google

Swordfish

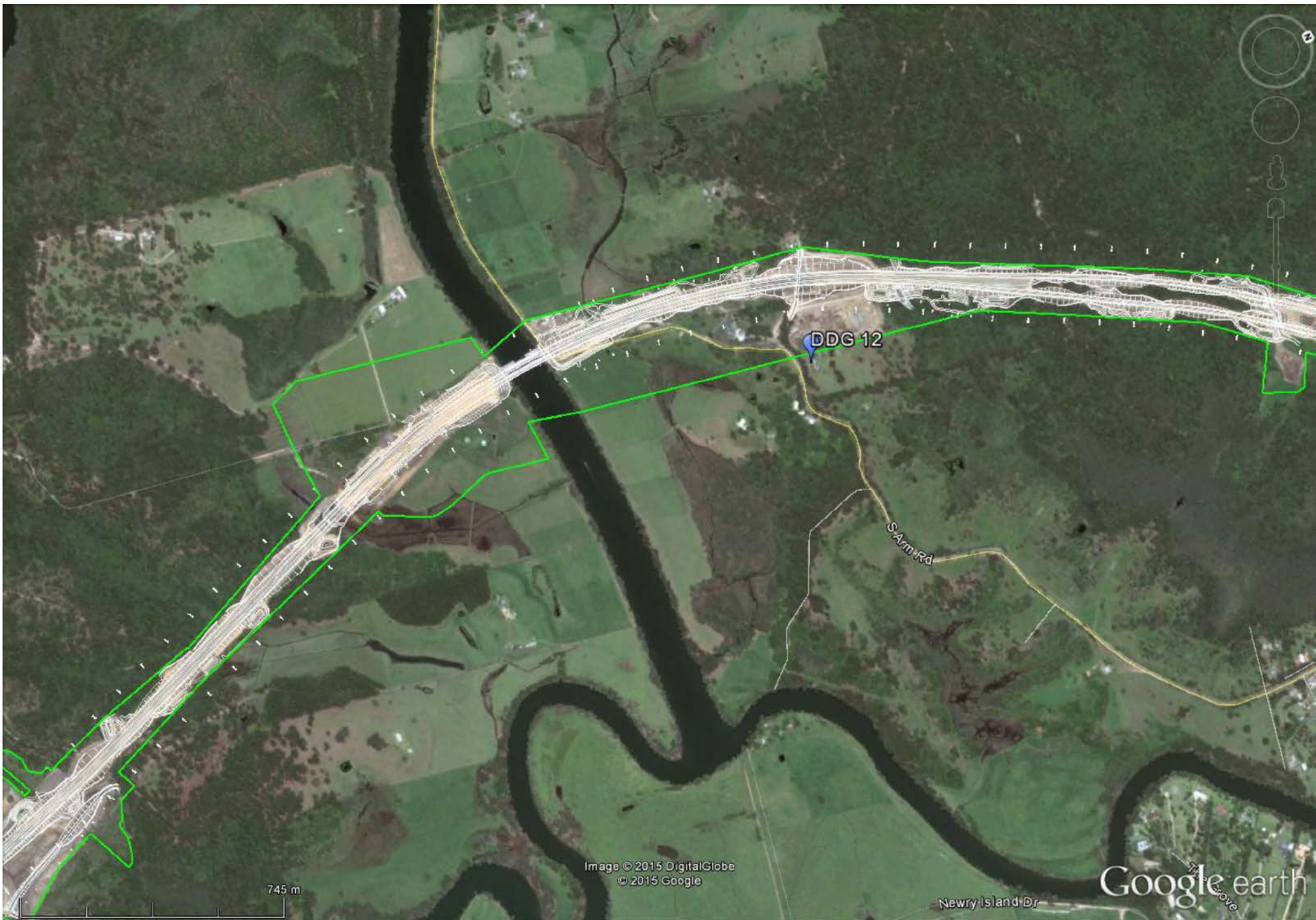
Valla Beach

Kuta Ave

Birugan Close

Rogers Dr

Google earth



DDG 12

S Arm Rd

Newry Island Dr

Image © 2015 DigitalGlobe  
© 2015 Google

Google earth

745 m

Tour Guide 2004

Imagery Date: 12/18/2014 30°30'14.31" S 152°58'51.51" E elev 3 m eye alt 3.29 km



Image © 2015 DigitalGlobe  
© 2015 Google

Google earth