

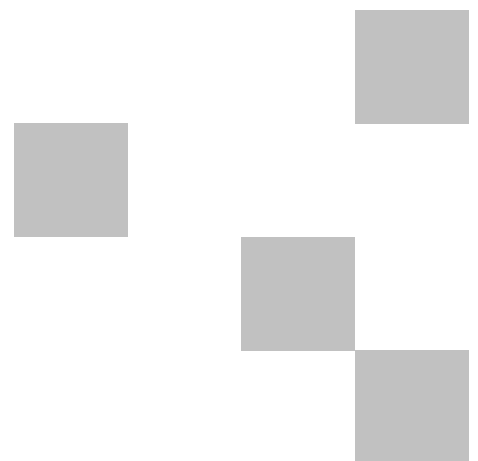


APPENDIX B3

Construction Noise and Vibration Management Sub-plan

Foxground and Berry bypass

September 2017



Document control

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Revision history

Revision	Date	Description	Approval
G	11/09/17	Upgrade project personnel	
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D	29/07/14	Fourth draft for submission to DP&E. All comments addressed.	
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B	25/06/14	Second draft for EPA review and comment	
A	30/05/14	First draft for RMS and ER review	

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1	RMS – Ryan Whiddon	Rev G
2	Project ER – Toby Hobbs	Rev G
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Glossary / Abbreviations

Ancillary facility	Defined by the Project Approval as a temporary facility for construction, including for example an office and amenities compound, construction compound, batch plant (concrete or bitumen), materials storage compound, maintenance workshop, testing laboratory.
CCS	Community Communication Strategy
CEMP	Construction Environmental Management Plan
CNIA	Construction Noise Impact Assessment
CNVMP	Construction Noise and Vibration Management Sub-plan
CoA	Condition of Approval
CRM	Community Relations Manager
DP&E	Department of Planning & Environment
dB(A)	Decibels using the A-weighted scale measured according to the frequency of the human ear.
DECC	Department of Environment and Climate Change (now EPA)
DP&E	Department of Planning and Environment
Director General	Director General of the NSW Department of Planning and Infrastructure (or delegate). Now the Secretary of the Department of Planning and Environment.
EA	Environmental Assessment
EMS	Environmental management system
Environmental aspect	Defined by AS/NZS ISO 14001:2004 as an element of an organisation's activities, products or services that can interact with the environment.
Environmental impact	Defined by AS/NZS ISO 14001:2004 as any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects.
Environmental objective	Defined by AS/NZS ISO 14001:2004 as an overall environmental goal, consistent with the environmental policy, that an organisation sets itself to achieve.
Environmental target	Defined by AS/NZS ISO 14001:2004 as a detailed performance requirement, applicable to the organisation or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
ER	Environmental Representative
EWMS	Environmental Work Method Statements

Feasible and reasonable	Defined by the Project Approval as the consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. Feasible relates to engineering considerations and what is practical to build. Reasonable relates to the application of judgement in arriving at a decision, taking into account mitigation benefits and cost of mitigation versus benefits provided, community views and nature and extent of potential improvements.
High-noise impact activities and work	Defined by the Project Approval as jack hammering, rock breaking or hammering, pile driving, vibratory rolling, cutting of pavement, concrete or steel or other work occurring on the surface that generates noise with impulsive, intermittent, tonal or low frequency characteristics.
Highly Noise Affected	Defined by the ICNG to be a sensitive receiver exposed to construction noise levels greater than 75 dB $L_{Aeq(15min)}$.
ICNG	<i>Interim Construction Noise Guidelines</i> (DECC 2009)
INP	Industrial Noise Policy
L_{eq}	Equivalent continuous sound level - the constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.
$L_{Aeq(15min)}$	The A-weighted equivalent continuous (energy average) A-weighted sound pressure level of the construction works under consideration over a 15-minute period and excludes other noise sources such as from industry, road, rail and the community.
$L_A(max)$	the A-weighted maximum noise level only from the construction works under consideration, measured using the fast time weighting on a sound level meter.
L_{90}	The sound pressure level exceeded for 90% of the measurement period. For 90% of the measurement period it was louder than the L_{90} .
Low noise impact activities and work	Defined by the Project Approval as deliveries, site access, equipment pre-start, refuelling, office works, foot-based and manual activities using hand tools, work in ancillary activities, and finishing works and clean-up.
NCA	Noise Catchment Area
OEH	Office of Environment and Heritage
PNL	Predicted noise level
Project, the	The Princes Highway Upgrade - Foxground and Berry Bypass Project, defined as <i>“The construction and operation of approximately 11.6 kilometres of two lane divided carriageways (with the exception of the cutting through Toolijooa Ridge which comprises two lanes plus a climbing lane in each direction), with provisions for the possible future widening to three lanes within the road corridor (if required in the future).”</i>
RBL	The Rating Background Level for each period is the medium value of the assessment background level for the period over all of the days measured. There is therefore an RBL value for each period (day, evening and night)
RMS	Roads and Maritime Services
rms	Root mean square of vibration signal.

Secretary	Secretary of the Department of Planning and Environment
SoC	Revised Statement of Commitments included in the Submissions Report
Sound Power Level	The total sound emitted by a source
Sound Pressure Level	The amount of sound at a specified point
SWL	Sound power level

1 Introduction

1.1 Purpose

This Construction Noise and Vibration Management Sub-plan (CNVMP) describes how Fulton Hogan will minimise and manage noise and vibration impacts during construction of the Foxground and Berry bypass Project (the Project).

This CNVMP has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), the RMS Statement of Commitments (SoC), the mitigation measures listed in the *Foxground and Berry bypass Environmental Assessment (EA)* (AECOM, 2012) and applicable legislation.

1.2 Background

As part of the EA development, a detailed construction and operational noise and vibration assessment was prepared to address the Director General's Requirements issued by the then Department of Planning. The EA assessed the predicted noise and vibration impacts during the construction of the Project. The noise and vibration assessment was included in the EA as *Volume 2 Appendix E Technical paper: Noise and vibration*.

The EA concluded that there would be some noise and vibration impacts during construction and the extent would vary depending on the type of activity in progress and the proximity to sensitive receivers. Additional consultation has been undertaken by Fulton Hogan with potentially affected residents and DP&E under CoA C13 in relation to controlled blasting limits of ground vibration and air blast overpressure. All impacts associated with construction activities (including controlled blasting) will be mitigated through the implementation of the construction noise and vibration mitigation measures provided in this CNVMP.

1.3 Structure of CNVMP

This CNVMP is part of Fulton Hogan's environmental management framework for the Project and is supported by other documents such as work procedures, a Blast Management Plan and noise contours. The review and document control processes for this CNVMP are described in Chapter 10 of the CEMP.

1.4 Consultation for preparation of the CNVMP

This CNVMP has been developed in consultation with the EPA. A summary of consultation undertaken during the preparation of this CNVMP is provided in Appendix A2 of the CEMP.

Community involvement and stakeholder engagement during the project is addressed primarily in the *Community Communication Strategy (CCS)*.

2 Legal and other requirements

2.1 Legislation

Legislation relevant to noise and vibration management includes:

- *Protection of the Environment Operations Act 1997* (POEO Act), and
- *Protection of the Environment Operations (Noise Control) Regulation 2008*.

Relevant provisions of the above legislation are identified in the register of legal requirements included in Appendix A1 of the CEMP.

2.2 Guidelines and standards

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

- *NSW Environmental Criteria for Road Traffic Noise* (ECRTN) (EPA 1999)
- *NSW Industrial Noise Policy* (INP) (EPA 2000)
- *Road Noise Policy* (RNP) (EPA 2011)
- *RTA Environmental Noise Management Manual* (ENMM) (RTA 2001a)
- *Interim Construction Noise Guideline* (ICNG) (DECC 2009)
- *Assessing Vibration: A Technical Guideline* (DEC 2006)
- *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (1990) Australian and New Zealand Environment Conservation Council (ANZECC)
- German Standard *DIN 4150 - Part 3 - Structural Vibration in Buildings - Effects on Structures*
- Australian Standard *AS2187.2 'Explosives – Storage and use Part 2: Use of explosives', and*
- Australian Standard *AS2107 'Acoustics - Recommended design sound levels and reverberation times for building interiors'.*
- *British Standard BS738501:1990 'Evaluation and measurement for vibration in buildings. Guide for measurement of vibration and evaluation of their effects on buildings.'*

2.3 Minister's Conditions of Approval

The CoA relevant to this CNVMP are listed in Table 2-1 below. A cross reference is also included to indicate where the condition is addressed in this CNVMP or other project / environmental management documents.

Table 2-1 Conditions of Approval relevant to this CNVMP

CoA No.	Condition Requirements	Document Reference
CoA B36	As part of the Construction Environment Management Plan for the Project required under condition B35, the Proponent shall prepare and implement the following sub plan(s):	
	(c) a Construction Noise and Vibration Management Sub-plan to detail how construction noise and vibration impacts will be minimised and managed. The sub-plan shall be developed in consultation with the EPA and include, but not necessarily be limited to:	This CNVMP Section 1.1 Section 1.4
	(i) identification of nearest sensitive receptors and relevant construction noise and vibration goals applicable to the Project;	Section 3.1 Chapter 4
	(ii) identification of key noise and/or vibration generating construction activities (based on representative construction scenarios, including at ancillary facilities) that have the potential to impact on surrounding sensitive receivers including expected noise/ vibration levels;	Chapter 6 Appendix C – Indicative Plant and Equipment Sound Power Levels
	(iii) identification of feasible and reasonable measures proposed to be implemented to minimise construction noise and vibration impacts (including construction traffic noise impacts);	Chapter 7
	(iv) Condition deleted by DP&E 31 Jul 2015	
	(v) procedures and mitigation measures to ensure relevant vibration and blasting criteria are achieved, including a suitable blast program, applicable buffer distances for vibration intensive works, use of low-vibration generating equipment/ vibration dampeners or alternative construction methodology, and pre- and post- construction dilapidation surveys of sensitive structures where blasting and/ or vibration is likely to result in damage to buildings and structures (including surveys being undertaken immediately following a monitored exceedance of the criteria);	Chapter 7 mitigation measure ID CNVMM26-CNVMM28 and CNVMM31-CNVMM35. Section 8.3 Appendix D – Blast Management Plan Appendix H – Construction Vibration Safe Working Distances
(vi) procedures for notifying sensitive receivers of construction activities that are likely to affect their noise and vibration amenity, as well as procedures for dealing with and responding to noise complaints; and	Chapter 8.5 <i>Community Communication Strategy</i> identifies the	

CoA No.	Condition Requirements	Document Reference
	(vii) a program for construction noise and vibration monitoring clearly indicating monitoring frequency, location, how the results of this monitoring would be recorded and, procedures to be followed where significant exceedances of relevant noise and vibration goals are detected;	approach to consultation with potentially noise affected receivers. Section 8.3 Section 8.4
C3	The Proponent shall only undertake construction activities associated with the Project during the following standard construction hours: (i) 7:00am to 6:00pm Mondays to Fridays, inclusive; and (ii) 8:00am to 1:00pm Saturdays; and (iii) at no time on Sundays or public holidays.	Chapter 7 mitigation measure ID CNVMM1.
C4	Works outside of the standard construction hours identified in condition C3 may be undertaken in the following circumstances: (a) works that generate noise that is: (i) no more than 5 dB(A) above rating background level at any residence; or (ii) no more than the noise management levels specified in Table 3 of the <i>Interim Construction Noise Guideline</i> (Department of Environment and Climate Change, 2009) at other sensitive land uses; or (b) where a negotiated agreement has been reached with affected receivers, where the prescribed noise levels cannot be achieved; or (c) for delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or (d) For the area between Toolijooa Road and Tindalls Lane, encompassing Toolijooa cut, Broughton Creek floodplain and major bridge works (outside of Berry township) low noise impact activities and works as follows: (i) between 6:00am and 7:00am Monday to Friday; and (ii) between 6:00pm and 7:00pm Monday to Friday; and (iii) between 1:00pm and 5:00pm on Saturdays; and (iv) at no time after 6pm on a day preceding a public holiday long weekend; or (v) (e) where it is required in an emergency to avoid the loss of life, property and/or to prevent environmental harm; or (f) works approved through an EPL, including for works identified in an out of hours procedure.	Chapter 7 Appendix E – Out of Hours Work Approval Procedure
C5	Except as expressly permitted by an Environment Protection Licence issued for the Project, high noise impact activities and works shall only be undertaken: (a) between the hours of 8:00am to 6:00pm Mondays to Fridays; (b) between the hours of 8:00am to 1:00pm Saturdays; and (c) in continuous blocks not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block.	Chapter 7 mitigation measure ID CNVMM20

CoA No.	Condition Requirements	Document Reference						
	For the purposes of this condition 'continuous' includes any period during which there is less than a one hour respite between ceasing and recommencing any of the work the subject of this condition.							
C6	Condition deleted by DP&E 31 Jul 2015							
C7	<p>Blasting associated with the Project shall only be undertaken during the following hours:</p> <ul style="list-style-type: none"> (a) 9:00am to 5:00pm, Mondays to Fridays, inclusive; (b) 9:00am to 1:00pm on Saturdays; and (c) at no time on Sundays or public holidays. <p>This condition does not apply in the event of a direction from the NSW Police Force or other relevant authority for safety or emergency reasons to avoid loss of life, property loss and/or to prevent environmental harm.</p>	Appendix D – Blast Management Plan						
C8	The Proponent shall implement feasible and reasonable noise mitigation measures with the aim of achieving the construction noise management levels detailed in the <i>Interim Construction Noise Guideline</i> (DECC, 2009) during construction activities. Any activities that could exceed the construction noise management levels shall be identified and managed in accordance with the Construction Noise and Vibration Management Sub plan required under condition B36.	Section 4.1 Chapter 7						
C9	<p>The Proponent shall implement all feasible and reasonable mitigation measures with the aim of achieving the following construction vibration goals:</p> <ul style="list-style-type: none"> (a) for structural damage to heritage structures, the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration - effects of vibration on structures; (b) for damage to other buildings and/or structures, the vibration limits set out in the British Standard BS 7385-1:1990 - Evaluation and measurement for vibration in buildings. Guide for measurement of vibration and evaluation of their effects on buildings; and (c) for human exposure, the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: A Technical Guideline (Department of Environment and Conservation, 2006). 	Section 4.2 Chapter 7						
C10	<p>The Proponent shall ensure that airblast overpressure generated by blasting associated with the Project does not exceed the criteria specified in Table 1 when measured at the most affected residence or other sensitive receiver.</p> <p>Table 1 - Airblast overpressure criteria</p>	Chapter 7 Appendix D – Blast Management Plan Section 4.3						
	<table border="1"> <thead> <tr> <th data-bbox="367 1054 831 1102">Airblast overpressure (dB(Lin Peak))</th> <th data-bbox="837 1054 1480 1102">Allowable exceedance</th> </tr> </thead> <tbody> <tr> <td data-bbox="367 1107 831 1155">115</td> <td data-bbox="837 1107 1480 1155">5% of total number of blasts over a 12 month period</td> </tr> <tr> <td data-bbox="367 1160 831 1193">120</td> <td data-bbox="837 1160 1480 1193">0%</td> </tr> </tbody> </table>	Airblast overpressure (dB(Lin Peak))	Allowable exceedance	115	5% of total number of blasts over a 12 month period	120	0%	
Airblast overpressure (dB(Lin Peak))	Allowable exceedance							
115	5% of total number of blasts over a 12 month period							
120	0%							

CoA No.	Condition Requirements	Document Reference											
C11	<p>The Proponent shall ensure that ground vibration generated by blasting associated with the Project does not exceed the criteria specified in Table 2 when measured at the most affected residence or other sensitive receiver.</p> <p>Table 2 - Peak particle velocity criteria</p> <table border="1" data-bbox="367 347 1541 587"> <thead> <tr> <th data-bbox="367 347 636 422">Receiver</th> <th data-bbox="642 347 956 422">Peak particle velocity (mm/s)</th> <th data-bbox="963 347 1541 422">Allowable exceedance</th> </tr> </thead> <tbody> <tr> <td data-bbox="367 427 636 512" rowspan="2">Residence on privately owned land</td> <td data-bbox="642 427 956 470">5</td> <td data-bbox="963 427 1541 470">5% of total number of blasts over a 12 month period</td> </tr> <tr> <td data-bbox="642 475 956 512">10</td> <td data-bbox="963 475 1541 512">0%</td> </tr> <tr> <td data-bbox="367 517 636 587">Non-Aboriginal heritage item</td> <td data-bbox="642 517 956 587">3</td> <td data-bbox="963 517 1541 587">0%</td> </tr> </tbody> </table>	Receiver	Peak particle velocity (mm/s)	Allowable exceedance	Residence on privately owned land	5	5% of total number of blasts over a 12 month period	10	0%	Non-Aboriginal heritage item	3	0%	<p>Chapter 7 Appendix D – Blast Management Plan Section 4.3</p>
Receiver	Peak particle velocity (mm/s)	Allowable exceedance											
Residence on privately owned land	5	5% of total number of blasts over a 12 month period											
	10	0%											
Non-Aboriginal heritage item	3	0%											
C12	<p>To ensure that the criteria specified in conditions C10 and C11 are satisfied at the most affected residence or other sensitive receiver, blasting trials shall be undertaken prior to the commencement of the Project's blasting program, with results from the trial blasts used to determine site specific blast design to satisfy the relevant criteria.</p>	<p>Chapter 7 Appendix D – Blast Management Plan Section 4.3</p>											
C13	<p>The blasting criteria identified in conditions C10 and/or C11 may be exceeded where the Proponent has written approval from the Director General. In obtaining the Director General approval for any such exceedance the Proponent shall submit to the Director General:</p> <ul style="list-style-type: none"> (a) a written agreement from the EPA and the relevant landowner to exceed the criteria; (b) details of the proposed blasting program and justification for the proposed increase to blasting criteria including alternatives considered (where relevant); (c) an assessment of the environmental impacts of the increased blast limits on the surrounding environment and most affected residences or other sensitive receivers including, but not limited to noise, vibration and air quality and any risk to surrounding utilities, services or other structures; (d) in relation to any identified non-Aboriginal heritage items in the vicinity of blasting works, an assessment of heritage impacts; (e) details of the blast management, mitigation and monitoring procedures to be implemented; and (f) details of consultation undertaken (including clear identification of proposed blast limits and potential property impacts) and agreement reached with the relevant landowners and EPA (including a copy of the agreement in relation to increased blasting limits). <p>Unless otherwise agreed by the Director General, the following exclusions apply to the application of this condition:</p> <ul style="list-style-type: none"> (a) any agreements reached may be terminated by the landowner at any time should concerns about the increased blasting limits be unresolved; and (b) the blasting limit agreed to under any agreement can at no time exceed a maximum Peak Particle Velocity vibration level of 25 mm/s or maximum Airblast Overpressure level of 125 dBL. 	<p>Chapter 7 Section 4.3 Appendix D – Blast Management Plan</p>											

2.4 Statement of commitments

Relevant SoC are listed in Table 2-2 below. This includes reference to required outcomes and the timing of when the commitment applies. A cross reference is also included to indicate where the condition is addressed in this CNVMP or other project / environmental management documents.

Table 2-2 Statements of commitment relevant to this CNVMP

Outcome	Ref #	Commitment	Timing	CNVMP Reference
Minimise construction noise and vibration impacts	NV1	Mitigation and management measures, such as noise barriers, pre-dilapidation surveys and monitoring, will be used to minimise construction noise and vibration at sensitive receivers.	Construction	Chapter 7 mitigation measure ID CNVMM22, CNVMM28, CNVMM32, CNVMM34, CNVMM35. Section 8.3
	NV2	If required due to ground conditions, impact piling ('driven piles') will be conducted during standard working hours.	Construction	Chapter 7 mitigation measure ID CNVMM9 and CNVMM20.

3 Existing environment

The Project area extends from the junction of Toolijooa Road and the Princes Highway south of Gerringong to the junction of the Princes Highway and Schofields Lane, south of Berry. Defining features include Toolijooa Ridge, the Broughton Creek floodplain and the Foxground bends area. The area incorporates a mix of land uses including pastureland and agricultural properties, rural residential areas and the town of Berry with its associated urban residential, recreational, commercial and light industrial areas.

3.1 Sensitive receivers

Residences, businesses and other community facilities (such as churches and open spaces) are located along the Project alignment at varying distances from the existing highway and project alignment.

The rural areas to the north of Berry are dominated by pastureland and rural settlement patterns. Generally, the existing noise levels experienced at residences in this area is relatively low except for the sensitive receivers located in close proximity to the existing highway. In particular, residences located next to the existing highway between Toolijooa Road and Tindalls Lane are exposed to high traffic noise levels due to the braking and acceleration of vehicles on the steep grades and sharp bends that characterise this section of the existing highway.

Within Berry, the existing highway runs directly through town along Queen Street. Businesses and residences located along Queen Street experience a high level of traffic noise. Noise associated with the existing traffic along Queen Street also affects surrounding residences and businesses that do not have a direct frontage to the highway.

South of Berry, Mark Radium Park and the Bupa Aged Care Facility are located along the Princes Highway.

Residences and churches located along North Street currently experience a low noise environment and are largely unaffected by the existing highway. Traffic volumes are relatively low, although local traffic travelling from the north of Berry to Kangaroo Valley Road uses North Street to avoid congestion along Queen Street. Occasional heavy vehicle or farm machinery movements also occur on North Street and are associated with the agricultural properties located on the northern side of North Street. The low noise environment at this location makes it an attractive walking and cycling route.

Residences located at Huntingdale Park Estate and other residential areas along Kangaroo Valley Road also experience a relatively quiet noise environment. Traffic noise is largely generated by light vehicular traffic. There is also a small buffer separating residences along Huntingdale Park Road and the existing highway which shields residences from highway traffic noise to some degree.

The noise assessment undertaken as part of the EA process identified and considered potential noise impacts for 591 noise sensitive receiver locations, shown in Appendix E of the EA. The noise sensitive receivers near the Project alignment comprise isolated rural houses and the low density urban area of Berry and surrounds.

The location of sensitive receivers is shown on Figure 6-1 and on the Sensitive Area Plans in Appendix A6 of the CEMP. Sensitive receivers are also listed in Appendix A of this CNVMP.

3.2 Noise Monitoring

Background noise monitoring was conducted as part of the EA noise assessment. Background noise levels for the area reflect the daily traffic volume patterns. Traffic noise is the dominant noise source in the area. The detailed results of the noise monitoring are provided in the Noise and Vibration Technical Paper at Appendix E in the EA.

The monitoring locations are listed in Table 3-1 below and shown on Figure 3-1.

Table 3-1 Noise logging locations

Logger	Serial number	Address	Comments
BG1	194636	46 Princes Highway, Broughton Village	40 m from existing alignment
BG2	194802	10 Austral Park Road, Broughton	460 m from existing alignment
BG3	194677	200 Princes Highway, Berry	165 m from existing alignment
BG4	8199	111 Princes Highway, Berry	270 m from existing alignment
BG5	194643	132 North Street, Berry	5 m from North Street
BG6	194525	92 North Street, Berry	5 m from North Street
BG7	194688	2 The Gables, Berry	5 m from Kangaroo Valley Road
BG8	194663	Andersons Lane, Berry	100 m from existing alignment
BG9	194687	Andersons Lane, Berry	300 m from existing alignment
BG10	194678	Andersons Lane, Berry	600 m from existing alignment

A summary of the noise monitoring results from the EA is provided in Table 3-2.

Table 3-2 Background noise monitoring results (dB(A))

Noise logging location	Rating background level (RBL) dB(A)		
	Day (7am to 6pm) L_{A90}	Evening (6pm to 10pm) L_{A90}	Night (10pm to 7am) L_{A90}
BG1	48	40	40 ¹
BG2	40	41 (42) ²	40
BG3	41	39	38
BG4	41	39	37
BG5	35	37 (35) ²	35
BG6	36	36	35
BG7	37	37	37
BG8	44	41	33
BG9	41	39	35
BG10	38	36	33

Note 1: Night time L_{A90} has been adjusted to the lower evening L_{A90} .

Note 2: The numbers in brackets indicated the RBL with the INP adjustments included.

3.3 Noise Catchment Areas

Six Noise Catchment Areas (NCAs) representing the existing noise environments have been adopted for the Project. A description of each NCA is provided below in Table 3-3 and their locations shown on Figure 3-1.

Table 3-3 Noise catchment areas

NCA	Chainage		Representative logger	Notes
NCA1	Start	7500	BG2	BG2 is considered to be more representative of this NCA and provides a more conservative assessment.
	End	11100		
NCA 2	Start	11100	BG2	Nil
	End	13500		
NCA3	Start	13500	BG3	Nil
	End	14900		
NCA4	Start	14900	BG4	Nil
	End	16400		
NCA5	Start	16400	BG5	Representative of receivers on North Street and marginally more conservative than BG6.
	End	18100		
NCA6	Start	18100	BG10	Representative of receivers surrounding the proposed stockpiling site.
	End	18300		

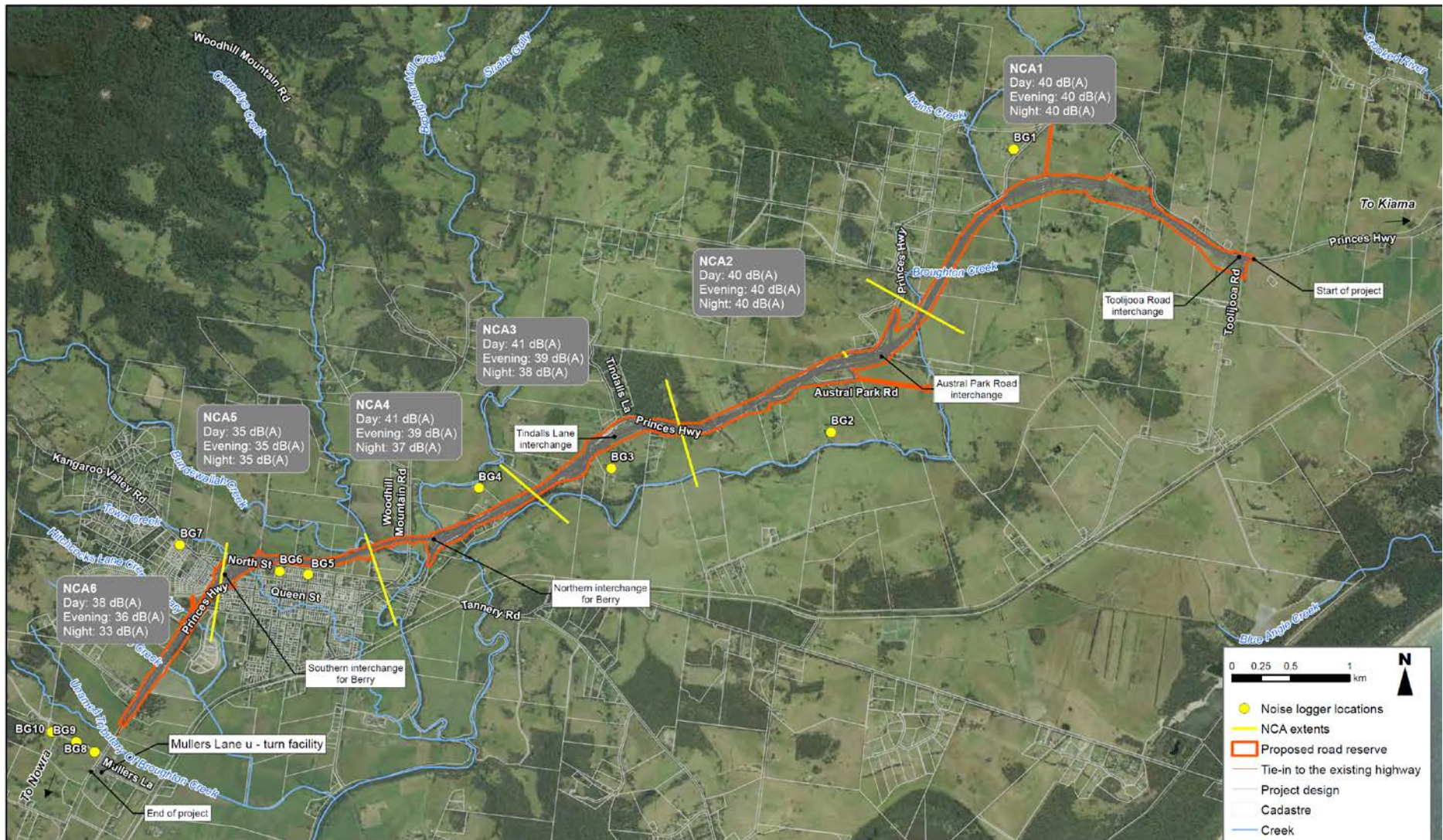


Figure 3-1 Noise catchment areas

4 Noise, vibration and blast criteria

4.1 Construction noise criteria

The Project-specific construction noise management levels (NMLs) have been determined in accordance with the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009) and are documented in Appendix B of this CNVMP.

All feasible and reasonable noise mitigation measures will be implemented with the aim of achieving the NMLs. However, as identified in the EA, predicted noise levels during construction will exceed these NMLs, due to the low daytime background noise levels. The predicted construction noise levels are identified in Appendix A of this CNVMP and will be adopted as the construction noise criteria.

Figure 4-1 shows the process by which predicted noise levels (PNL) during construction are applied to assess construction noise from the Project.

To appropriately address construction noise levels, three specific stages of noise mitigation will be implemented depending on the predicted construction noise levels:

1. **PNL less than 60 dB(A)** - Mitigation for works where predicted noise levels are less than or equal to 60 dB(A): this is the baseline package of mitigation measures to be implemented.
2. **PNL between 60 dB(A) and 75 dB(A)** - Mitigation for works where predicted noise levels are greater than 60 dB(A) but less than or equal to 75 dB(A): this is a higher stage of noise mitigation measures where predicted noise levels at receivers are above 60 dB(A). A level of 60 dB(A) has been selected as it is approximately 10 to 15 dB(A) above the daytime NML in each NCA.
3. **PNL greater than 75 dB(A)** - Mitigation for works where predicted noise levels are greater than 75 dB(A): this is the highest stage of mitigation measures to be implemented where a sensitive receiver is identified as Highly Noise Affected as defined by the ICNG.

Further details on the stages of construction noise mitigation measures are provided in Chapter 7 of this CNVMP.

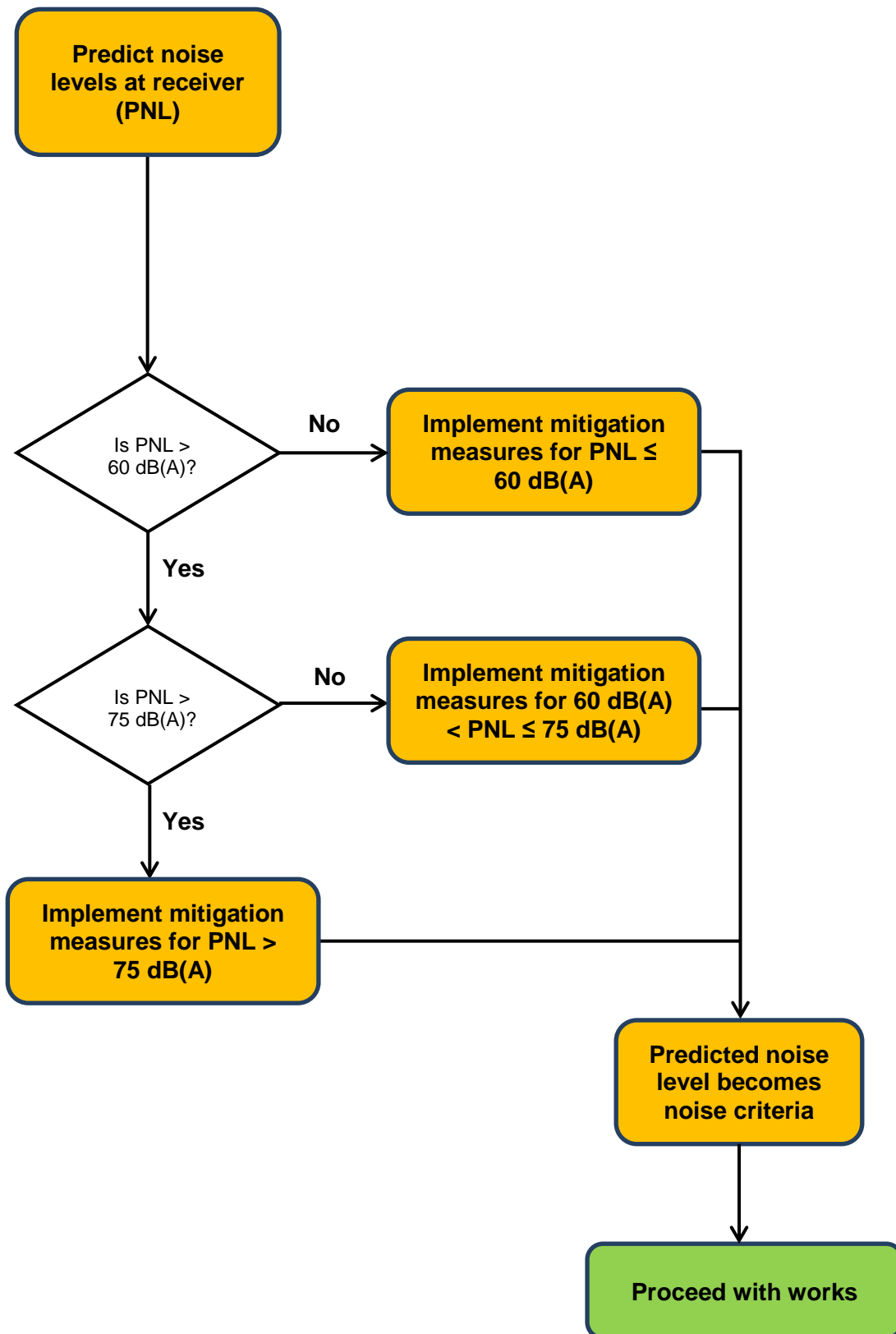


Figure 4-1 Process using PNLs to determine construction noise criteria

4.2 Vibration criteria

CoA C9 requires that all feasible and reasonable mitigation measures be implemented for the Project with the aim of achieving the following construction vibration goals:

- for structural damage to heritage structures, the vibration limits set out in the German Standard *DIN 4150-3: Structural Vibration - effects of vibration on structures*;
- for damage to other buildings and/or structures, the vibration limits set out in the British Standard *BS 7385-1:1990 - Evaluation and measurement for vibration in buildings. Guide for measurement of vibration and evaluation of their effects on buildings*; and
- for human exposure, the acceptable vibration values set out in *Environmental Noise Management Assessing Vibration: A Technical Guideline* (Department of Environment and Conservation, 2006).

In regard to controlled blasting related ground vibration, limits are established in accordance with CoA C11. Under C13, on the basis that written agreements are in place between Fulton Hogan and private landowners, DP&E may approve proposals to increase vibration levels above those specified in CoA C11. This is detailed further in Section 4.3. Further details of each of these references are provided below and specific vibration criteria for the Project identified.

4.2.1 Heritage Structures

The German standard DIN 4150: *Part 3 – 1999 Effects of Vibration on Structure* (DIN 1999) guideline values for peak particle velocity (mm/s) criteria at heritage structures are summarised in Table 4-1 and shown graphically on Figure 6-2.

Table 4-1 Structural damage criteria – Heritage Structures

Type of Structure	Peak Component Particle Velocity (PPV) mm/s			
	Vibration at the foundation at a frequency of:			Vibration of horizontal plane of highest floor at all frequencies
	1 to 10 Hz	10 to 50 Hz	50 to 100 Hz*	
Structures that, because of their sensitivity to vibration, do not correspond to those listed in lines 1 and 2 and are of great intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

* For frequencies above 100 Hz, the maximum values specified in this column shall be applied.

Values referred to are at the base of the building

4.2.2 Other buildings and structures

British Standard *BS 7385: Part 2: 1993 'Evaluation and measurement for vibration in buildings Part 2. Guide to damage levels from ground borne vibration'* gives guidance on the levels of vibration above which building structures could be damaged. These values apply to buildings other than heritage buildings, including residential, industrial and commercial buildings, for the Project.

For the purposes of BS 7385 damage is classified as cosmetic (formation of hairline cracks), minor (formation of large cracks) or major (damage to structural elements). Guideline values give in the Standard are associated with the threshold of cosmetic damage only, usually in wall and/or ceiling lining materials. The BS 7385 values for vibration limits above which cosmetic damage could occur are provided in Table 4-2 and Figure 4-2 below.

Table 4-2 Transient Vibration Guide Values for Cosmetic Damage (BS 7385:2 1993)

Line (see Fig 6.2)	Type of Building	Peak component particle velocity in frequency range of predominant pulse	
		4 to 15 Hz	15 Hz and above
1	Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures. Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Note 1. Values referred to are at the base of the building

Note 2: For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded.

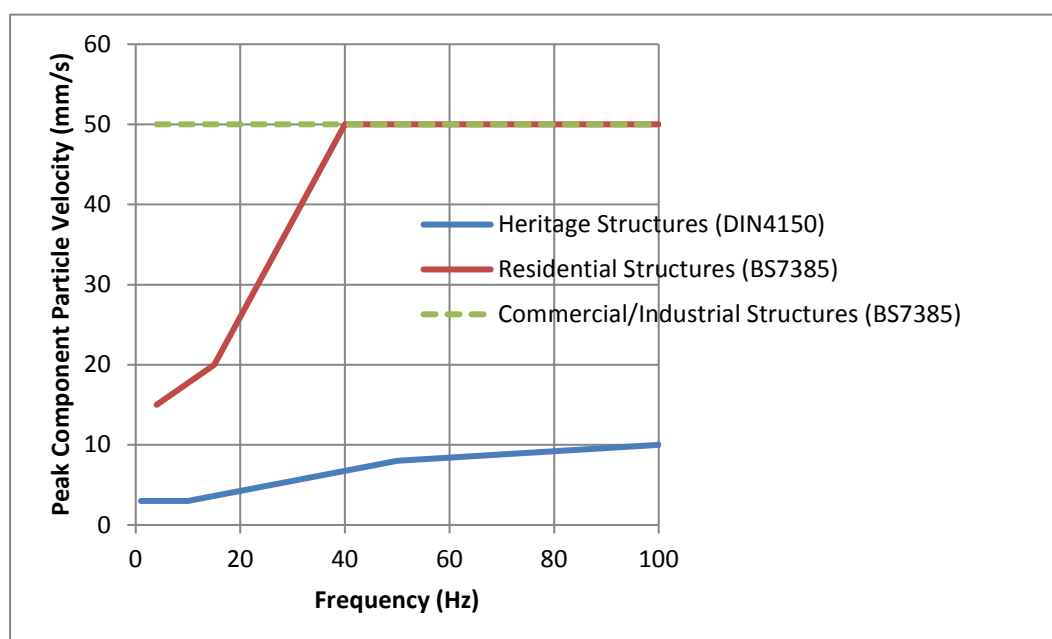


Figure 4-2 Summary of Project vibration criteria for structures

4.2.3 Human Exposure

In accordance with CoA C9, the vibration criteria for the Project relating to human comfort sourced from *Assessing Vibration – A Technical Guideline* (DEC, 2006) and include:

- continuous vibration from uninterrupted sources;
- impulsive vibration – up to three instances of sudden impact e.g. dropping heavy items, per monitoring period; and
- intermittent vibration such as from drilling, compacting or activities that would result in continuous vibration if operated continuously.

Table 4-3 identifies the relevant human exposure criteria for the Project.

Table 4-3 Preferred and maximum vibration acceleration criteria

Location	Daytime		Night-time	
	Preferred	Maximum	Preferred	Maximum
Continuous Vibration (weighted root mean square (rms) vibration levels for continuous acceleration (m/s ²) in the vertical direction)				
Residences	0.010	0.020	0.007	0.014
Offices, schools, educational institutions and places of worship	0.020	0.040	0.020	0.040
Impulsive Vibration (weighted root mean square (rms) vibration levels for impulsive acceleration (m/s ²) in the vertical direction)				
Residences	0.3	0.6	0.1	0.2
Offices, schools, educational institutions and places of worship	0.640	1.280	0.640	1.280
Intermittent Vibration (m/s^{1.75})				
Residences	0.2	0.4	0.13	0.26
Offices, schools, educational institutions and places of worship	0.4	0.8	0.4	0.8

4.3 Blast criteria

CoA C10 requires that airblast overpressure generated by blasting associated with the Project does not exceed the criteria specified in Table 4-4 when measured at the most affected residence or other sensitive receiver.

Table 4-4 Airblast overpressure criteria

Airblast overpressure (dB(Lin) Peak)	Allowable exceedance
115	5% of total number of blasts over a 12 month period
120	0%

CoA C11 requires that ground vibration generated by blasting associated with the Project does not exceed the criteria specified in Table 4-5 when measured at the most affected residence or other sensitive receiver, unless approved by DP&E under the provisions of CoA C13.

Table 4-5 Peak particle velocity criteria

Receiver	Peak particle velocity (mm/s)	Allowable exceedance
Residence on privately owned land	5	5% of total number of blasts over a 12 month period
	10	0%
Non-Aboriginal Heritage item	3	0%

The "Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration" (ANZECC, 1990) recommends measurement of air-blast overpressure at any sensitive receiver at least 3.5 m from building or structure, and ground vibration measured at any point on the sensitive site at least the longest dimension of the foundations of a building or structure away from the building or structure.

In accordance with CoA C12, to ensure that the criteria specified in CoAs C10 and C11 (Table 4-4 and Table 4-5) are satisfied at the most affected residence or other sensitive receiver, Fulton Hogan will undertake blasting trials prior to the commencement of the Project blasting program, with results from the trial blasts used to determine site specific blast design to satisfy the relevant criteria.

In accordance with the requirements of CoA C13, the blasting criteria identified in CoA C10 and/or C11 may be exceeded where Fulton Hogan has written approval from the Director General. In obtaining the Director General's approval for any such exceedance, Fulton Hogan will submit to the Director General:

- a written agreement from the EPA and the relevant landowner to exceed the criteria;
- details of the proposed blasting program and justification for the proposed increase to blasting criteria including alternatives considered (where relevant);
- an assessment of the environmental impacts of the increased blast limits on the surrounding environment and most affected residences or other sensitive receivers including, but not limited to noise, vibration and air quality and any risk to surrounding utilities, services or other structures;
- details of the blast management, mitigation and monitoring procedures to be implemented; and
- details of consultation undertaken (including clear identification of proposed blast limits and potential property impacts) and agreement reached with the relevant landowners and EPA (including a copy of the agreement in relation to increased blasting limits).

Unless otherwise agreed by the Director General, the following exclusions apply to the application of CoA C13:

- any agreements reached may be terminated by the landowner at any time should concerns about the increased blasting limits be unresolved; and
- the blasting limit agreed to under any agreement can at no time exceed a maximum Peak Particle Velocity vibration level of 25 mm/s or maximum Airblast Overpressure level of 125 dB(Lin) Peak.

The provisions to increase applicable blast criteria in agreement with the relevant landowners under CoA C13 do not apply where the property is a non-Aboriginal heritage item.

5 Environmental aspects and impacts

The key construction activities and the associated potential sources of noise and vibration impact were identified through a risk management approach. The consequence and likelihood of each activity's impact on the environment was assessed to prioritise its significance. The results of this risk assessment are included in Appendix A3 of the CEMP.

6 Noise, vibration and blasting impact assessment

The key source of noise and vibration impacts will be from construction activities that use plant and equipment, and blasting activities.

6.1 Noise impact assessment

6.1.1 Activities

Table 6-1 provides a summary of construction scenarios, including at ancillary facilities, typical plant and equipment required and sound power levels (SWLs) for the Project, based on the assessment provided in the EA. Appendix C provides sound power levels of individual items of equipment.

Table 6-1 Sound power levels for project construction scenarios

Scenario Ref	Construction Scenario	Typical equipment used	SWL Range (dB(A))
A	Site establishment / landscaping	Excavators, chainsaws, mulching plant and chipper, cranes, generators, bobcat, powered hand tools, air compressor.	105-110
B	Earthworks	Road trucks, compactor, grader, multi-tyred and vibratory rollers, concrete trucks, concrete vibrator, asphalt paving plant, backhoe, sweeper, compressor, generators, rock crusher.	112-120
C1	Bored piling	Bored piling rig.	100-110
C2*	<i>Impact piling</i>	<i>Impact piling rig.</i>	<i>124-134</i>
D	Bridge works	Piling rigs, cranes.	112-120
E	Paving	Road trucks, compactor, jackhammers, multi-tyred vibratory rollers, concrete trucks, concrete vibrator, asphalt paving plant, backhoe, concrete saw, profiler, sweeper, compressor, generator.	113-118
F	Ancillary facilities	Refer Table 6-3 for details for each ancillary facility.	112-124

* It is not expected that impact piling will occur as part of the Project. The predicted noise impact is presented here should geotechnical investigations indicate that bored piling is not feasible.

6.1.2 General construction noise impacts

Based on the typical representative construction scenarios (A to E) identified in Table 6-1, the number of receivers with predicted noise levels (PNLs) within the various ranges are presented in Table 6-2 as well as the highest predicted noise level for each NCA.

These predictions are based on typical representative construction works for each scenario (A to E) that include a number of items of plant operating simultaneously. Note that the predictions do not factor in reductions on noise levels that can be achieved through reasonable and feasible mitigation measures.

The noise impacts from ancillary facilities (Scenario F) are discussed in Section 6.1.3

Table 6-2 Summary of receivers levels of general construction noise

Noise Catchment Area	Scenario	Highest PNL, dB(A)	Receivers with PNL ≤60dB(A)	Receivers with 60dB(A)<PNL≤75 dB(A)	Receivers with PNL >75dB(A)
NCA1	A	65	25	3	0
	B	69	21	7	0
	C1	63	27	1	0
	C2	85	5	17	6
	D	71	24	4	0
	E	71	22	6	0
NCA2	A	62	15	1	0
	B	68	11	5	0
	C1	60	16	0	0
	C2	82	1	12	3
	D	64	14	2	0
	E	69	10	6	0
NCA3	A	57	15	0	0
	B	62	12	3	0
	C1	54	15	0	0
	C2	76	0	14	1
	D	58	15	0	0
	E	63	12	3	0
NCA4	A	73	27	10	0
	B	78	24	12	1
	C1	70	29	8	0
	C2	92	0	24	13
	D	67	34	3	0
	E	79	24	10	3
NCA5	A	69	384	36	0
	B	74	335	85	0
	C1	66	404	16	0
	C2	88	82	267	71
	D	72	397	23	0
	E	75	328	92	0
NCA6	A	68	53	24	0
	B	73	34	43	0
	C1	65	59	18	0
	C2	87	1	38	38
	D	73	49	28	0
	E	74	30	47	0

* It is not expected that impact piling will occur as part of the Project. The predicted noise impact is presented here should geotechnical investigations indicate that bored piling is not feasible.

With the exception of any impact piling works, as discussed below, the majority of sensitive receivers that are impacted by the works are exposed to predicted construction noise levels lower than 60 dB(A). During works near these sensitive receivers, the noise mitigation measures for $PNL \leq 60$ dB(A) will be implemented (refer to Chapter 7).

A smaller number of sensitive receivers are exposed to predicted construction noise levels above 60 dB(A) but less than or equal to 75 dB(A). During works near these sensitive receivers, the noise mitigation measures for 60 dB(A) $< PNL \leq 75$ dB(A) will be implemented (refer to Chapter 7).

Should impact piling works occur, then the number of receivers predicted to be exposed to noise levels above 60 dB(A) increases significantly and all reasonable and feasible mitigation measures will be implemented. However, impact piling works are not expected to be required for the Project.

Table 6-2 also identifies the total number of Highly Noise Affected sensitive receivers, as defined by the ICNG as locations where predicted noise levels are above 75 dB(A). Only a small number of noise sensitive receivers are predicted to be Highly Noise Affected during typical works. These are:

- For earthworks: Receiver 70 in NCA4.
- For paving works: Receivers 68, 69 and 70 in NCA4.

During the relevant works near these sensitive receivers, the noise mitigation measures for $PNL > 75$ dB(A) will be implemented (refer to Chapter 7). Highly Noise Affected sensitive receivers will also require management in accordance with CoA C5 to ensure that they are only undertaken between:

- between the hours of 8:00 am to 6:00 pm Mondays to Fridays;
- between the hours of 8:00 am to 1:00 pm Saturdays; and
- in continuous blocks not exceeding three hours each with a minimum respite period from those activities and works of not less than one hour between each block.

Should impact piling works occur, then a significantly higher number of sensitive receivers may be Highly Noise Affected. During any such works, the mitigation measures for Highly Noise Affected receivers would be implemented. However, impact piling works are not expected to be required for the Project.

It is important to note that only a very small number of sensitive receivers are predicted to be Highly Noise Affected, as defined by the ICNG, and only during specific works. It is expected that implementation of reasonable and feasible mitigation measures, including the use of bored rather than impact piling, during construction works will mean that no sensitive receiver is exposed to noise levels above 75 dB(A) for prolonged periods of time.

Noise contour maps are attached as Appendix G, showing the extent of the works above which predicted noise levels exceed:

- 45 dB(A) – no significant construction noise impacts expected for works with predicted noise levels below this.
- 60 dB(A) – level at which noise mitigation measures for $60 < PNL \leq 75$ dB(A) will be implemented; and
- 75 dB(A) – level at which noise mitigation measures for $PNL > 75$ dB(A) will be implemented.

For other sensitive land uses:

- construction activities are not expected to coincide with Sunday services at churches along North Street. As such, impacts are considered to be unlikely but construction scheduling will be considered as necessary;
- activities at the sportsground at Berry would typically only occur concurrently with construction works during Saturdays mornings, from 9am to 1pm. Impacts will be considered during construction scheduling.

All Out of Hours work will require internal approval in accordance with the procedure in Appendix E to ensure compliance with EPL conditions and CoA C4(f) .

6.1.3 Ancillary facilities, stockpile and materials processing sites

The Project will require several site compounds and a temporary concrete batching plant (ancillary facilities), a number of stockpile sites and two material processing sites which will accommodate a range of activities, plant and equipment. Site compounds will accommodate the majority of management, engineering, specialist and administrative personnel and will typically comprise:

- office accommodation
- staff amenities
- light vehicle parking
- a maintenance workshop, and
- material and chemical storage.

Minor ancillary facilities and stockpile sites will be subject to assessments and approvals under CoA's C32- 34.

Stockpile sites will be used to store materials for construction or materials generated from within the construction site. Materials processing sites will be required to crush and process materials generated from within the construction site. A temporary concrete batching plant will also be located within site compound 3, and adjacent to processing site 2 and stockpile site 6.

Sites may include only one, or combinations, of the abovementioned activities. Table 6-3 summarises the likely combination of activities, plant and equipment. In addition, the ancillary facilities, stockpile and materials processing areas are shown in Figure 6-1. Refer to Appendix A5 of the CEMP for the Ancillary Facilities Assessment.

Table 6-3 Likely combination of activities, plant and equipment at site compounds, stockpile and materials processing sites

Site location & approximate chainage	Site type/name	Activities	Typical plant and equipment required
SITE COMPOUNDS			

Site location & approximate chainage	Site type/name	Activities	Typical plant and equipment required
Broughton Creek Ch 9850-10000	Site compound 1	Staff and worker parking Office accommodation Equipment maintenance Laydown and storage	Loaders Excavators Truck and dogs Light vehicles Generators Air compressors Cranes Compactors Rollers Sweepers
Ch 10300-10500	Site compound 2	As above	As above
Austral Park Road Ch 12100-12500	Site compound 3 Temporary concrete batching plant	As above Concrete batching	As above Concrete batching plant
Tindalls Lane Interchange Ch 14300	Site compound 4	As above	As above
Woodhill Mountain Road Ch 16100-16200	Site compound 5	As above	As above
Kangaroo Valley Road Ch 17600	Site compound 6	As above	As above
STOCKPILE SITES AND MATERIALS PROCESSING SITES			
Toolijooa Road 7650-8050	Stockpile site 1	Material handling and storage	Loaders Excavators Truck and dogs Light vehicles Generators Air compressors Cranes Compactors Rollers Sweepers
Ch 8600-8800	Stockpile site 2	As above	As above
Ch 8700-8900	Stockpile site 3	As above	As above
Ch 9500-9800	Materials processing site 1 Stockpile site 4	As above Rock crushing and screening	As above Impact crusher Jaw crusher Cone crushers Reclaimer screen Mobile screens

Site location & approximate chainage	Site type/name	Activities	Typical plant and equipment required
Ch 11900-12300	Stockpile site 5	Materials handling and storage	Loaders Excavators Truck and dogs Light vehicles Generators Air compressors Cranes Compactors Rollers Sweepers
Ch 12000-12600	Materials processing site 2 Stockpile site 6 (co-located with site compound 3)	As above Rock crushing and screening	As above plus; Impact crusher Jaw crusher Cone crushers Reclaimer screen Mobile screens
Ch 14000-14400	Stockpile site 7 (co-located with site compound 4)	Materials handling and storage	Loaders Excavators Truck and dogs Light vehicles Generators Air compressors Cranes Compactors Rollers Sweepers
16000-16100	Stockpile site 8 (co-located with site compound 5)	As above	As above

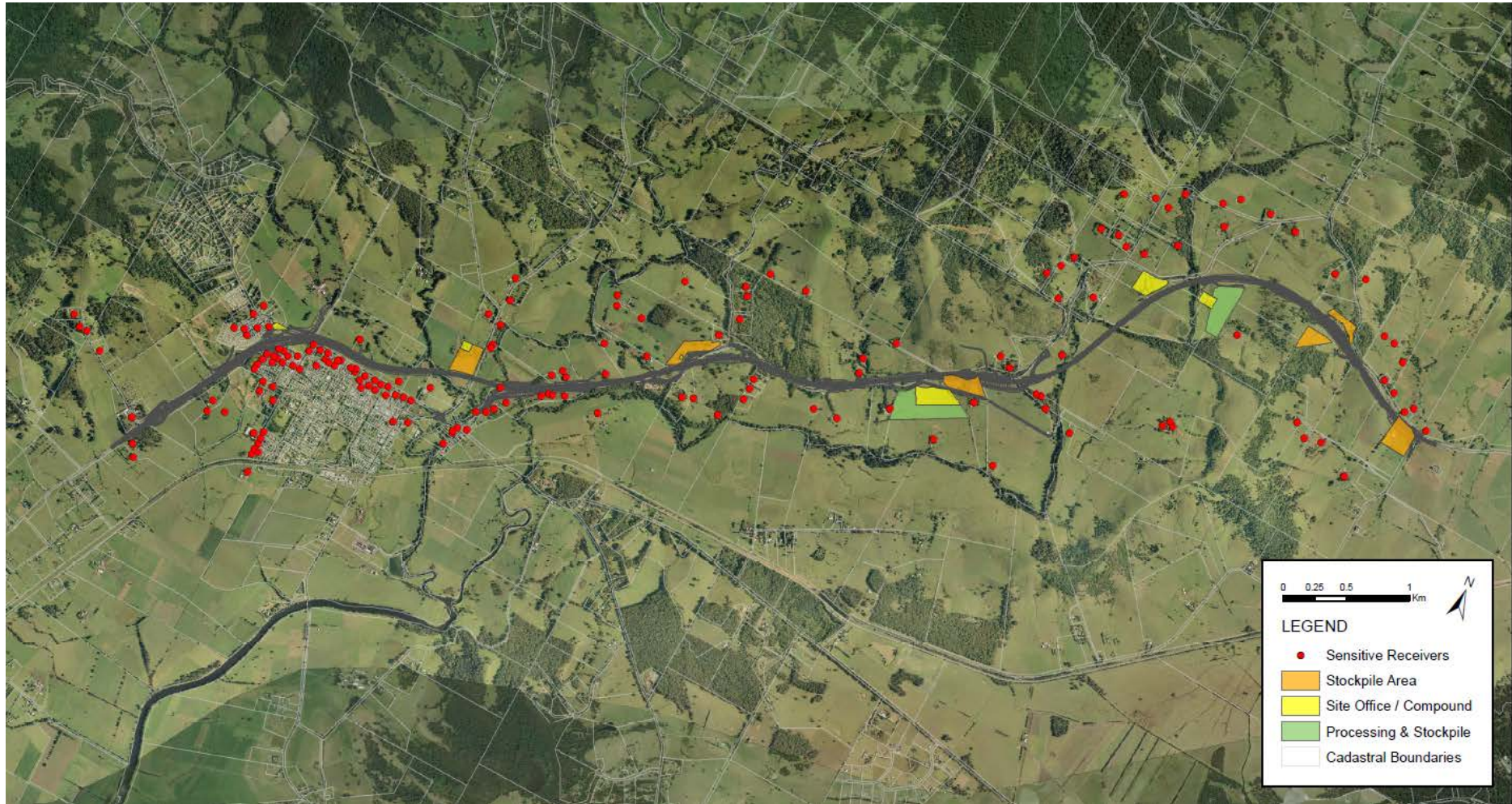


Figure 6-1 Ancillary facilities, stockpile and materials processing areas and location of sensitive receivers

Table 6-4 provides the predicted noise levels at various distances from each site type. Predicted noise levels for individual sensitive receivers are included in Appendix A. The noise levels from the sites will vary depending on the activities occurring at the time and therefore a range of predicted noise levels have been provided for typical and worst case activities in each site, considering the relative size of the site. The assumed sound power levels for the sites are documented in Appendix C.

Table 6-4 Predicted noise levels from site type (L_{Aeq} (15min))

Facility reference no.	Distance from facility				
	50 metres	100 metres	200 metres	300 metres	500 metres
SITE COMPOUND (ANCILLARY FACILITIES)					
Broughton Creek Ch 9850-10000	62 - 70	56 - 64	50 - 58	46 - 54	42 - 50
Ch 10300-10500	59 - 67	53 - 61	47 - 55	43 - 51	39 - 47
Austral Park Road Ch 12100-12500	62 - 70	56 - 64	50 - 58	46 - 54	42 - 50
Tindalls Lane Interchange Ch 14300	58 - 66	52 - 60	46 - 54	42 - 50	38 - 46
Woodhill Mountain Road Ch 16100-16200	58 - 66	52 - 60	46 - 54	42 - 50	38 - 46
Kangaroo Valley Road Ch 17600	61 - 69	55 - 63	49 - 57	45 - 53	41 - 49
STOCKPILE SITES & PROCESSING SITES					
Toolijooa Road 7650-8050	62 - 70	56 - 64	50 - 58	46 - 54	42 - 50
Ch 8600-8800	59 - 67	53 - 61	47 - 55	43 - 51	39 - 47
Ch 8700-8900	59 - 67	53 - 61	47 - 55	43 - 51	39 - 47
Ch 9500-9800	65 - 75	59 - 69	53 - 63	49 - 59	45 - 55
Ch 11900-12300	62 - 70	56 - 64	50 - 58	46 - 54	42 - 50
Ch 12000-12600	66 - 75	60 - 69	54 - 63	50 - 59	46 - 55
Ch 14000-14400	61 - 69	55 - 63	49 - 57	45 - 53	41 - 49
16000-16100	60 - 68	54 - 62	48 - 56	44 - 52	40 - 48

The predicted noise levels from ancillary facilities are typically below 60 dB(A) at distances greater than 100 m from the facility. All reasonable and feasible mitigation measures for PNL \leq 60 dB(A) will be implemented for all ancillary facilities (refer to Chapter 7).

During any works at facilities where receivers are within 100 m of noisy activities, the noise mitigation measures for $60 \text{ dB(A)} < \text{PNL} \leq 75 \text{ dB(A)}$ will be implemented (refer to Chapter 7).

The construction noise predictions also indicate that one noise sensitive receiver may be at risk of being Highly Noise Affected ($\text{PNL} > 75 \text{ dB(A)}$) as defined in the ICNG) for limited short-term operations. This receiver is Receiver 36 near materials processing site 2 and stockpile site 6, and may be exposed to noise levels in excess of 75 dB(A) at times when activities are occurring within 40 m of the residence. It is expected that most works within materials processing site 2 and stockpile site 6 will be undertaken at distances further than 40 m.

Noise levels at this receiver will be managed by:

- applying all reasonable and feasible mitigation measures for $\text{PNL} > 75 \text{ dB(A)}$ (refer to Chapter 7) where works are occurring within 40 m; and
- providing respite periods for high noise impact activities in accordance with CoA C5 where works are occurring within 40 m; and
- locating noise intensive plant within the processing and stockpile sites as far as practical from the receivers.

It is expected that activities will be able to be located within the site such that, with appropriate mitigation measures, this receiver will not be Highly Noise Affected.

In most cases, receivers located near ancillary facilities are unlikely to be exposed to the noise levels shown in Table 6-4 for extended continuous periods, as activities at the facilities are not expected to be sustained at all times. The exception to this may be the temporary concrete batching facility at Site Compound 3, which is likely to operate continuously during certain construction phases, although only during standard work hours. Where possible, additional noise attenuation measures will be incorporated such as stockpiling to create noise mounds that minimise noise impacts on nearby receivers.

The location of the batching plant within Site Compound 3 is such that it will be at least 300 m from the nearest sensitive receivers (Receivers 33, 34 and 36). At these distances, daytime noise levels from the batching plant are predicted to be $46 - 50 \text{ dB(A)}$ and are no more than 10 dB(A) above the daytime RBL. Therefore it is considered that noise from the temporary concrete batching plant will be appropriately managed with the implementation of all reasonable and feasible mitigation measures (refer to Chapter 7) and with the location being such that noise sensitive receivers are not within 300 m.

Noise contours for the sites are included in Appendix G, showing typical distances at which the predicted noise levels exceed 60 dB(A) and 75 dB(A) respectively. Note that these predictions do not account for any reasonable and feasible mitigation measures and are based on activities being based in the worst case location within the facility. In reality, it is likely that noise levels from the facilities will be lower.

Any Out of Hours work at these sites will require internal approval in accordance with the procedure in Appendix E to ensure compliance with EPL conditions and CoA C4(f) ..

6.2 Vibration impact assessment

Table 6-5 lists vibration intensive plant likely to be used during construction and provides recommended safe working distances that relate to cosmetic / structural damage and human discomfort for the proposed works. These are based on the recommendations provided in the EA and in-house data. Note that the cosmetic damage safe working distances are based on residential structures and larger setbacks may be required when working near heritage structures.

Table 6-5 Recommended safe working distances for vibration intensive plant

Plant description	Rating / description	Safe working distance	
		Cosmetic damage (m)*	Human response (m)**
Vibratory roller	< 50 kN (Typically 1-2t)	>5	>15-20
Vibratory roller (2-4 tonne)	< 100 kN (Typically 2-4t)	>6	>20
Vibratory roller (4-6 tonne)	< 200 kN (Typically 4-6t)	>12	>40
Vibratory roller (7-13 tonne)	< 300 kN (Typically 7-13t)	>15	>100
Vibratory roller (13-18 tonne)	> 300 kN (Typically 13-18t)	>20	>100
Vibratory roller (>18 tonne)	> 300 kN (> 18 t)	>25	>100
Excavation works	40t excavator	>3	>20
Small hydraulic hammer	(300 kg – 5-12t excavator)	>2	>7
Medium hydraulic hammer	(900 kg – 12-18t excavator)	>7	>20
Large hydraulic hammer	(1,600 kg – 18-34t excavator)	>22	>70
Impact piling***	Indicative only – monitoring required.	>40	>120
Pile boring	≤ 800mm	>2	N/A
CFA piling	Continuous flight augured	>2	N/A
Jackhammer	Handheld	>1 (nominal)	Avoid contact with structure

* BS 7385: Part 2 – 1993 **Assessing Vibration – A Technical Guideline

*** It is not expected that impact piling will occur as part of the Project. The recommended vibration safe distances are presented here should geotechnical investigations indicate that bored piling is not feasible.

The extent of the potential construction vibration impact is dependent on the type of equipment, the activity being undertaken, the separation distance and intervening ground conditions. Earthworks and bridge works are expected to be the major vibration-causing activities, given the use of vibratory rollers and hydraulic hammers. There is a higher likelihood that these activities would cause human annoyance up to 100 m away from the construction area. For structural impacts, cosmetic damage to buildings would not be likely where the building is located more than 25 m from the Project.

Appendix H presents the safe working distances for the two major classes of vibratory activities expected – vibratory rollers and hydraulic hammers.

There are likely to be instances where vibration intensive activities within the safe-working distances for human response must occur and cannot be avoided. This could be due to the work required, the underlying geological site conditions or the proximity of the building / receiver to the construction site. In these instances, the mitigation and management measures outlined in Chapter 7 will be implemented.

It is not expected that significant works would occur within the safe working distances for cosmetic damage. Should works be required within these distances, then all reasonable and feasible vibration mitigation measures would be implemented (refer Chapter 7) and vibration monitoring would be undertaken (refer Chapter 8) to ensure that the vibration levels do not exceed the relevant cosmetic damage criteria.

Should impact piling works occur, then a number of sensitive receivers may be exposed to vibration levels in excess of the human response criteria and would potentially be within the

cosmetic damage safe working distance. In this case, all reasonable and feasible vibration mitigation measures would be implemented (refer Chapter 7) and vibration monitoring would be undertaken (refer Chapter 8). However, impact piling works are not expected to be required for the Project.

Vibration impacts from the operation of ancillary facilities are not anticipated due to the typical activities and distance of receivers and structures from the facilities. However, in cases where occasional vibration intensive activities (such as compaction work) are proposed within ancillary facilities and this is within the safe working distances outlined in Table 6-5, then the mitigation measures outlined in Chapter 7 will be implemented.

6.3 Blasting impact assessment

Refer to the Blast Management Plan provided in Appendix D of this CNVMP for the blasting impact assessment.

7 Environmental mitigation measures

Specific mitigation measures to address impacts from construction noise and vibration are outlined in Table 7-1.

The noise mitigation measures are provided in three stages, depending on the predicted noise levels, as discussed in Section 4.1. As it is recognised that the NMLs are low in the Project area and will be exceeded during works, feasible and reasonable mitigation measures for $PNL \leq 60 \text{ dB(A)} L_{eq}$ will be implemented at all times.

Noise mitigation measures for Out of Hours work are also provided in accordance with the *Out of Hours Work Approval Procedure* provided in Appendix E.

The vibration mitigation measures are to be implemented where works are occurring within the safe working distances for human response identified in Section 6.2.

Table 7-1 Noise and vibration mitigation measures

ID	Mitigation Measure	Timing		Responsibility
		PC ¹	C ²	
NOISE: PNL ≤ 60 dB(A) L_{eq}				
CNVMM1	Undertake works during standard construction hours. Where works must occur outside of standard hours, assess Out of Hours works in accordance with the <i>Out of Hours Work Approval Procedure</i> provided in Appendix E of the CNVMP.	✓	✓	Construction Manager
CNVMM2	Implement a hot line and complaints handling procedure for noise and other construction related complaints.	✓	✓	Community Relations Manager
CNVMM3	Ensure all mobile construction equipment have non-tonal reversing alarms.	✓	✓	Foreman Operators
CNVMM4	Plan and conduct works in a manner to minimise the reversing of vehicles with audible reversing alarms.		✓	Construction Manager Foreman
CNVMM5	Trucks will travel via internal haul roads and major roads where practicable to minimise use of local roads.		✓	Foreman
CNVMM6	Site access points and roads will be positioned as far as practicable away from residential receivers.		✓	Foreman
CNVMM7	Ensure that truck tailgates are cleared and locked at the point of unloading.		✓	Foreman Operators
CNVMM8	Use two way radios at the minimum effective volume.		✓	Foreman Operators
CNVMM9	Utilise bored or CFA piling instead of impact piling where permitted by ground conditions.		✓	Construction Manager
CNVMM10	Vehicle warning devices, such as horns, are not to be used as signalling devices.		✓	Foreman Operators

ID	Mitigation Measure	Timing		Responsibility
		PC ¹	C ²	
CNVMM11	Undertake regular maintenance of plant and equipment, including silencers, to ensure that noise emissions do not increase over time. Servicing, refuelling and warm-up to be undertaken during standard construction hours in accordance with CNVMM1.		✓	Foreman Operators
CNVMM12	Turn vehicles and machinery off when not in use.		✓	Foreman Operators
NOISE: 60 dB(A) < PNL ≤ 75 dB(A) L_{eq}				
	Implement all feasible and reasonable mitigation measures CNVMM1 to CNVMM12 inclusive.	✓	✓	As noted above
CNVMM13	Measure noise levels from noise intensive plant prior to use and check against the manufacturer's specifications and/or the sound power levels listed in Appendix C. Repeat this periodically to ensure that it meets the manufacturers specifications and that noise levels do not significantly increase over time.	✓	✓	Construction Manager
CNVMM14	Maximise the offset distance between noisy items of plant and sensitive receivers for each task and activity.		✓	Foreman Operators
CNVMM15	Locate plant and equipment to take advantage of barriers provided by existing site features and structures.		✓	Foreman Operators
CNVMM16	Orient plant and equipment known to emit noise strongly in one direction so that the noise is directed away from noise sensitive areas.		✓	Foreman Operators
CNVMM17	Use traffic controllers to minimise occurrences of vehicles queuing, idling or reversing near noise sensitive receivers as much as is practical		✓	Construction Manager Foreman
CNVMM18	Avoid metal-to-metal contact on equipment where feasible.		✓	Foreman Operators
CNVMM19	Avoid dropping material from a height into unlined metal trays (e.g. line trays with soil or similar to reduce drumming noise).		✓	Foreman Operators
NOISE: PNL > 75 dB(A) L_{eq}				
	Implement all feasible and reasonable mitigation measures CNVMM1 to CNVMM19 inclusive.	✓	✓	As noted above

ID	Mitigation Measure	Timing		Responsibility
		PC ¹	C ²	
CNVMM20	Undertake high noise impact activities only: <ul style="list-style-type: none"> between the hours of 8:00 am to 6:00 pm Mondays to Fridays; between the hours of 8:00 am to 1:00 pm Saturdays; and in continuous blocks not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block. 		✓	Construction Manager
CNVMM21	Consult with affected sensitive receivers to determine if there are times that work can be carried out that will least affect them.	✓	✓	Environmental Manager Community Relations Manager
CNVMM22	Install temporary hoarding where feasible to shield noise to affected sensitive receivers.		✓	Construction Manager
CNVMM23	Should impact piling be necessary, provide advance notification to the community, sensitive receivers and the EPA. Refer to the <i>Community Communication Strategy</i> for additional information.		✓	Environmental Manager Community Relations Manager
VIBRATION				
CNVMM24	Undertake works during standard construction hours. Where works must occur outside of standard hours, assess Out of Hours works in accordance with the <i>Out of Hours Work Approval Procedure</i> provided in Appendix E of the CNVMP.	✓	✓	Construction Manager
CNVMM25	Implement a hot line and complaints handling procedure for vibration and other construction related complaints.	✓	✓	Community Relations Manager
CNVMM26	Avoid vibration intensive works within the safe working distances outlined in Table 6-5 unless necessary.		✓	Foreman
CNVMM27	If vibration intensive plant is to be used within the safe working distance for cosmetic damage, works would not proceed until attended vibration measurements are undertaken.		✓	Foreman Environmental Officer

ID	Mitigation Measure	Timing		Responsibility
		PC ¹	C ²	
CNVMM28	Where vibration intensive works are occurring for a continuous period of time within the safe working distance for cosmetic damage, a permanent vibration monitoring system will be installed to warn operators (via flashing light, audible alarm, short message service (SMS) etc.) when vibration levels are approaching the cosmetic damage objective to ensure applicable criteria are not exceeded.		✓	Environmental Officer Operators
CNVMM29	Restrict speeds of construction traffic to 20 km/h across the site, or 40 km/h for haul roads. Signpost the speed limit.		✓	Foreman
CNVMM30	Restrict construction traffic to designated roadways.		✓	Foreman
CNVMM31	Run plant that has high and low vibration operating settings on the lowest effective vibration setting, including static rolling where feasible.		✓	Foreman
CNVMM32	Undertake pre-construction dilapidation surveys of buildings and structures where construction works will occur within safe working distances for cosmetic damage, prior to that work being undertaken.	✓	✓	Environmental Officer
CNVMM33	Implement the <i>Blast Management Plan</i> in Appendix D of this CNVMP where blasting is required.	✓	✓	Foreman Specialist Subcontractor
CNVMM34	Undertake post-construction dilapidation surveys of buildings and structures where construction works has occurred within safe working distances for cosmetic damage.		✓	Environmental Officer Environmental Manager
CNVMM35	Undertake surveys of buildings and structures immediately following a monitored exceedance of the relevant vibration criteria.		✓	Environmental Officer Environmental Manager
OUT OF HOURS WORK				
NOISE: LOW IMPACT (NML EXCEEDANCE ≤ 20 dB(A) & NO EXCEEDANCE OF SLEEP DISTURBANCE CRITERIA)				

ID	Mitigation Measure	Timing		Responsibility
		PC ¹	C ²	
OOHMM1	<p>Assess Out of Hours works in accordance with the <i>Out of Hours Work Approval Procedure</i> provided in Appendix E of the CNVMP, including:</p> <ul style="list-style-type: none"> • Justification for Out of Hours work. • Noise and vibration assessment. • Notification to and consultation with EPA. • Implementation of reasonable and feasible mitigation measures for receivers where the night time NMLs are predicted to be exceeded. • Consultation with the affected community. 	✓	✓	<p>Environmental Manager</p> <p>Community Relations Manager</p>
OOHMM2	<p>Inform the community in accordance with the requirements of the Environment Protection Licence before any Out of Hours work is to be undertaken and provide the following information:</p> <ul style="list-style-type: none"> • Programmed times and locations of construction work. • Construction noise and vibration impact predictions. • Construction noise and vibration mitigation measures being implemented on site. 	✓	✓	Community Relations Manager
OOHMM3	Implement a hot line and complaints handling procedure for noise and other construction related complaints.	✓	✓	Community Relations Manager
OOHMM4	Turn machinery and vehicles off when not in use.		✓	Foreman Operators
OOHMM5	Do not use vehicle warning devices, such as horns, as signalling devices.		✓	Foreman Operators
OOHMM6	Maximise the offset distance between noisy items of plant and sensitive receivers for each task and activity.		✓	Foreman Operators
OOHMM7	Locate plant and equipment to take advantage of barriers provided by existing site features and structures.		✓	Foreman Operators
OOHMM8	Orient plant and equipment known to emit noise strongly in one direction so that the noise is directed away from noise sensitive areas.		✓	Foreman Operators
OOHMM9	Ensure all mobile construction equipment have non-tonal reversing alarms.		✓	Foreman Operators

ID	Mitigation Measure	Timing		Responsibility
		PC ¹	C ²	
OOHMM10	Plan and conduct works in a manner to minimise the reversing of vehicles with audible reversing alarms.		✓	Construction Manager Foreman
OOHMM11	Use traffic controllers to minimise occurrences of vehicles queuing, idling or reversing near noise sensitive receivers as much as is practical.		✓	Construction Manager Foreman
OOHMM12	Ensure that truck tailgates are cleared and locked at the point of unloading.		✓	Foreman Operators
OOHMM13	Use two way radios at the minimum effective volume.		✓	Foreman Operators
OOHMM14	Site access points and roads will be positioned as far as practicable away from residential receivers.		✓	Foreman Operators
OOHMM15	Avoid metal-to-metal contact on equipment where feasible.		✓	Foreman Operators
OOHMM16	Avoid dropping material from a height into unlined metal trays (e.g. line trays with soil or similar to reduce drumming noise).		✓	Foreman Operators
OUT OF HOURS WORK				
NOISE: MEDIUM TO HIGH IMPACT (NML EXCEEDANCE > 20 dB(A) AND/OR EXCEEDANCE OF SLEEP DISTURBANCE CRITERIA)				
OOHMM17	Undertake regular noise monitoring during works to ensure that noise levels do not exceed predicted noise levels.		✓	Environmental Manager
OOHMM18	Consult with affected sensitive receivers to determine if there are times that noisy work can be carried out that will least affect them.	✓		Community Relations Manager Construction Manager
OOHMM19	Offer respite periods to affected sensitive receivers.	✓	✓	Community Relations Manager Construction Manager

ID	Mitigation Measure	Timing		Responsibility
		PC ¹	C ²	
OOHMM20	Install temporary hoarding where feasible to shield noise to affected sensitive receivers.		✓	Construction Manager
OOHMM21	Consider temporary relocation of receivers where the construction noise level exceeds the NML by more than 25 dB(A).	✓	✓	Community Relations Manager

1. PC means pre-construction
2. C means construction

8 Compliance management

8.1 Roles and responsibilities

Fulton Hogan's Project Team organisational structure and overall roles and responsibilities are outlined in Section 4.1 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Table 7-1 of this CNVMP.

8.2 Training

All employees, subcontractors and utility staff working on site will undergo site induction training that includes construction noise and vibration management issues, including:

- existence and requirements of this CNVMP
- relevant legislation
- standard construction hours
- the process for seeking approval for Out of Hours work, including consultation with the EPA and sensitive receivers
- location of noise sensitive receivers
- noise and vibration mitigation measures;
- complaints reporting
- specific responsibilities to minimise impacts on the community and built environment from noise and vibration associated with the works, and

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

8.3 Monitoring and inspections

Regular monitoring and inspections will be undertaken during construction in accordance with Table 8-1. Additional requirements and responsibilities in relation to the monitoring and inspections, including equipment calibration details, are documented in Sections 8.1 and 8.2 of the CEMP.

Where monitoring indicates that the noise or vibration level consistently exceeds the predicted noise level used to apply mitigation measures, then additional mitigation measures will be applied to lower the noise level to the predicted noise level. For the purposes of this CNVMP, an exceedance is determined to be a measured level from construction works 3 dB(A) or more above the predicted noise level.

Standard noise monitoring locations have been selected for monthly noise monitoring as part of the Project and are shown on the map in Appendix F. These locations are:

- 1 – Receiver 12 – 25 Princes Highway, Broughton Village
- 2 – Receiver 33 – 40 Austral Park Road, Broughton
- 3 – Receiver 37 – 371 Princes Highway, Broughton
- 4 – Receiver 53 – 185 Princes Highway, Berry
- 5 – Receiver 65 – 40 Princes Highway, Berry
- 6 – Receiver 164 – 136 North Street, Berry
- 7 – Receiver 329 – 98 North Street, Berry
- 8 – Receiver 416 – 17 George Street, Berry
- 9 – Mark Radium Park, Berry
- 10 – Receiver 582 – 8 Huntingdale Park Road, Berry

Note that these locations are subject to ease of access and acceptance from the resident that monthly monitoring can occur on or at the boundary of their property. If a resident does not wish monitoring to occur, than an equivalent nearby alternative location will be selected.

Other potential sensitive receivers that are identified during the construction phase via acoustic assessments, consultation or complaint may also be subject to attended monitoring for the purposes of establishing acoustic impacts and trends at any specific receiver.

Table 8-1 Monitoring and inspection

Monitoring details	Record	Frequency	Responsibility	Test procedures
INSPECTIONS				
Inspection of works to ensure that noise, vibration and blast mitigation measures are being implemented on site.	Environmental Inspection Checklist	Weekly	Environmental Officer	Nil
NOISE MONITORING				
Noise monitoring at standard monitoring locations identified in Appendix F.	Noise Monitoring Record	Monthly	Environmental Officer	<p>Where noise monitoring is to occur at a sensitive receiver location, the monitoring will be undertaken at the nearest relevant sensitive receiver. If monitoring cannot be undertaken at the receiver, a suitable representative location will be selected.</p> <p>The testing method includes:</p> <ul style="list-style-type: none"> • Sound level meter configured for “Fast” time weighting and “A” frequency weighting. • The test environment will be free from reflecting objects where possible. Where the noise monitoring is conducted within 3.5 metres of large walls or a building facade, then a reflection correction of up to -2.5 dB(A) will be applied to remove the effect of increased noise due to sound reflections from such structures. • The tests will not be carried out during rain or when the wind speed at the test site exceeds 5 m/s. • Conditions such as wind velocity, wind direction, temperature, relative humidity and cloud cover will be recorded. These may be obtained from the nearest Bureau of Meteorology monitoring station or on-site weather station/observations. • The monitoring period should be sufficient such that the measured noise levels are representative of the noise over a 15-minute period. • At a minimum L_{eq}, L_{max}, L_{10} and L_{90} levels will be measured and reported. <p>The observations of the person undertaking the measurements will be reported including audibility of construction noise, other noise in the environment and any discernible construction activities contributing to the noise at the receiver.</p>
Where complaint is received and monitoring is considered an appropriate response to determine if noise levels exceed predicted construction noise levels from Appendix A of this CNVMP.	Noise Monitoring Record	As required	Environmental Officer	

Monitoring details	Record	Frequency	Responsibility	Test procedures
Spot checks of noise intensive plant where it is required to check the noise emission from the plant against manufacturer's specifications.	Noise Monitoring Record	Monthly for construction activities with PNL>60 dB(A)	Environmental Officer	The test procedure for construction plant will follow the stationary test procedures according to Australian Standard AS 2012.1 Acoustics – Measurement of airborne noise emitted by earth-moving machinery and agricultural tractors – Stationary test condition. The testing method includes: <ul style="list-style-type: none"> • Sound level meter configured for “Fast” time weighting and “A” frequency weighting. • The test environment will be free from reflecting objects. • The tests will not be carried out during rain or when the wind speed at the test site exceeds 5 m/s. • In accordance with AS 2012.1, a minimum of 3 measurement points will be defined at locations on the hemispherical surface around the plant with the radius determined by the basic length (L) of the machine. • The A-weighted L_{eq} background noise at the measurement locations will be at least 6 dB and preferably 10 dB below the level with the plant operating. • Both L_{eq} and L₁₀ levels will be measured and reported.
Where required for the purposes of refining construction methods or techniques to reduce noise levels.	Noise Monitoring Record	As required	Environmental Officer	
VIBRATION MONITORING				
At the commencement of vibratory compaction work within 50 m of residential buildings.	Vibration Monitoring Record	As required	Environmental Officer	Attended vibration monitoring will be undertaken when checking the safe working distances from construction plant (e.g. compaction plant) or in response to a complaint.
Where complaint is received and monitoring is considered an appropriate response.	Vibration Monitoring Record	As required	Environmental Officer	The testing method includes: <ul style="list-style-type: none"> • Monitoring to be conducted for at least three distances from the plant, including a representative distance for the nearest sensitive structures and/or receivers. • The testing will be conducted at each location to obtain a suitable representation of the range of vibration levels that would occur from the tested plant. • The plant will be tested in the settings in which it is expected to operate. For vibratory rollers this may include both “High” and “Low” settings.
Where an activity may occur within safe working distances for cosmetic damage for no more than one day continuously.	Vibration Monitoring Record	As required	Environmental Officer	Peak (PPV) vibration levels and the dominant frequency of the vibration will be recorded for assessment against the structural and cosmetic damage criteria. In situations in which human comfort is also of concern then the rms vibration level should also be recorded.
Where required for the purposes of refining construction methods to reduce vibration levels.	Vibration Monitoring Record	As required	Environmental Officer	

Monitoring details	Record	Frequency	Responsibility	Test procedures
Where an activity may occur within safe working distances for cosmetic damage for a period of more than one day continuously.	Vibration Monitoring Record	As required	Environmental Officer	<p>Continuous vibration monitoring will be undertaken in situations where there is a risk that vibration from a particular construction activity may exceed the cosmetic damage criteria at a sensitive structure. This will be where activities may occur within the safe working distances for cosmetic damage identified in Section 8.3.1.</p> <p>The testing method includes:</p> <ul style="list-style-type: none"> • Vibration logger to continuously measure vibration levels while the relevant works are occurring within the safe working distance for cosmetic damage. • Measurement to be conducted as close as possible to the sensitive structure. • A warning system will be implemented with the monitoring system including one or both of the following: <ul style="list-style-type: none"> - Audible and/or visual warning alarm - SMS and/or email alerts to site staff.
Dilapidation surveys of buildings and structures where construction works occurs within the safe working distance for cosmetic damage	Dilapidation Report	Prior to that work being undertaken and post-construction	Construction Manager	<p>At a minimum, dilapidation surveys and reports will comprise:</p> <ul style="list-style-type: none"> • A visual inspection of the structure, including all internal and external walls, ground level floors and external pavements, all connections of other structures above ground level and their connection at ground level and any exposed foundations. • Full written report outlining the condition of the internal and external components of each property. • A series of photographs of each identified defect/crack. • A sketched floor plan showing the exact location of each defect and measurements of crack width/defect size. • Identification of any condition changes relative to pre-construction and the likely cause of the change (post-construction only).

8.4 Non-conformances

Non-conformances will be dealt with and documented in accordance with Section 8.5 of the CEMP.

8.5 Complaints

Complaints will be recorded and addressed in accordance with Section 6.3 of the CEMP and the *Community Communication Strategy (CCS)*.

The process for notifying the Director General of complaints received in relation to Out of Hours work approved under CoA C4(e) is shown in the flow charts in Section 8.2 of the CCS.

The procedure for informing the community about construction impacts is included in Appendix E of the CCS.

8.6 Audits

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

9 Review and improvement of CNVMP

The CNVMP will be reviewed annually to ensure compliance with legislative requirements and its suitability and effectiveness for the project.

The review may be in the form of:

- a formal management review
- a second party audit, and/or
- an inclusion as a separate item at a site meeting.

The Environmental Manager can review and update the CNVMP more regularly where:

- significant changes in construction activities occur
- where targets are not being achieved, or
- in response to audits and nonconformity reports.

Minor changes to the CNVMP will be approved by the Environmental Representative in accordance with Section 1.7 of the CEMP.

The EPA will be provided with a copy of the CNVMP each time it is revised.

Appendix A

Noise Sensitive Receiver Locations and Predicted Construction Noise Levels

Noise sensitive receiver locations and predicted noise levels for scenarios:

A – Site establishment / landscaping

B – Earthworks

C1 – Bored piling works

C2 – Impact piling works – not expected to occur as part of Project

D – Bridgeworks

E – Paving

F – Ancillary facilities, stockpile sites and processing sites

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
1	1	DP843071	53	Willowvale	Kiama	322 Princes Highway	65	69	63	85	71	71	68
2	1	DP594214	770	Toolijooa	Kiama	70 Toolijooa Road	43	48	<40	61	47	47	50
3	1	DP626929	3	Willowvale	Kiama	338 Princes Highway	61	65	60	82	68	68	71
4	1	DP594214	769	Toolijooa	Kiama	69 Millers Lane	41	46	<40	60	47	46	48
5	1	DP626929	1	Willowvale	Kiama	364 Princes Highway	59	64	54	76	56	62	55
6	1	DP621894	150	Willowvale	Kiama	374 Princes Highway	60	65	52	74	53	58	54
7	1	DP621894	151	Willowvale	Kiama	368 Princes Highway	49	54	45	67	53	53	51
8	1	DP621894	151	Willowvale	Kiama	368 Princes Highway	48	53	45	67	54	54	50
9	1	DP621894	151	Willowvale	Kiama	368 Princes Highway	50	55	47	69	56	56	54
10	1	DP3638	14	Willowvale	Kiama	458 Princes Highway	41	46	<40	57	44	44	54
11	1	DP607155	10	Broughton Village	Kiama	487 Princes Highway	41	46	<40	57	44	44	54
11a	1	DP607155	11	Broughton Village	Kiama	25 Princes Highway	49	54	46	68	42	55	56
12	1	DP607155	11	Broughton Village	Kiama	25 Princes Highway	41	46	<40	57	44	44	54
13	1	DP358821	1	Foxground	Kiama	42 Princes Highway	41	46	<40	57	44	44	54
14	1	DP377518	A	Broughton Village	Kiama	37 Princes Highway	45	50	42	64	50	51	63

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
14a	1	DP701647	22	Broughton Village	Kiama	71 Princes Highway	57	63	55	77	<40	63	54
15	1	DP709501	1	Foxground	Kiama	44 Princes Highway	45	50	42	64	50	51	63
16	1	DP717678	212	Broughton Village	Kiama	46 Princes Highway	46	51	44	66	52	52	48
17	1	DP709501	1	Foxground	Kiama	44 Princes Highway	46	51	44	66	52	52	48
17a	1	DP882532	1	Broughton Village	Kiama	111 Princes Highway	60	65	57	79	65	64	66
18	1	DP717678	211	Broughton Village	Kiama	54 Thompsons Road	46	51	44	66	52	52	48
19	1	DP848594	5	Broughton Village	Kiama	32 Thompsons Road	49	54	46	68	55	55	53
20	1	DP736089	1	Broughton Village	Kiama	172 Princes Highway	48	53	45	67	52	54	60
21	1	DP198207	1	Broughton Village	Kiama	9 Thompsons Road	45	50	42	64	50	51	60
22	1	DP751254	224	Broughton Village	Kiama	15 Thompsons Road	45	50	42	64	50	51	60
22a	1	DP3344	9	Broughton Village	Kiama	161 Princes Highway	63	68	60	82	63	69	67
23	1	DP778833	4	Broughton Village	Kiama	Princes Highway	50	55	47	69	56	56	59
24	1	DP1050292	241	Broughton Village	Kiama	10 Tomlins Road	41	46	<40	61	48	48	48
25	2	DP919179	1	Broughton Village	Shoalhaven	Princes Highway	60	65	57	79	50	64	46
26	2	DP652594	70	Broughton Village	Shoalhaven	Princes Highway	44	49	42	64	43	50	42
27	2	DP653306	69	Broughton Village	Shoalhaven	500 Princes Highway	41	46	<40	60	46	47	45
28	2	DP528555	1	Broughton Village	Shoalhaven	500 Princes Highway	57	62	52	74	46	61	41
29	2	DP528555	1	Broughton Village	Shoalhaven	500 Princes Highway	46	51	42	64	50	51	<40
30	2	DP389443	A	Broughton Village	Shoalhaven	500 Princes Highway	58	63	49	71	56	58	41
31	2	DP593476	1	Broughton Village	Shoalhaven	495 Princes Highway	56	61	55	77	64	64	55
32	2	DP593476	2	Broughton Village	Shoalhaven	441 Princes Highway	50	55	46	68	55	55	51
33	2	DP628132	4	Broughton	Shoalhaven	40 Austral Park Road	53	58	51	73	61	61	71
34	2	DP628132	2	Broughton	Shoalhaven	10 Austral Park Road	44	49	41	63	50	50	61
35	2	DP110284	1	Broughton	Shoalhaven	437 Princes Highway	46	51	44	66	<40	53	50

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
36	2	DP628132	1	Broughton	Shoalhaven	390 Princes Highway	51	56	49	71	47	58	82
37	2	DP602354	2	Broughton	Shoalhaven	371 Princes Highway	62	68	60	82	43	69	51
38	2	DP602354	2	Broughton	Shoalhaven	371 Princes Highway	53	58	52	74	40	61	50
39	2	DP801512	4	Broughton	Shoalhaven	350 Princes Highway	51	56	46	68	44	55	53
40	2	DP801512	4	Broughton	Shoalhaven	350 Princes Highway	47	52	40	62	<40	49	45
41	3	DP801512	1	Broughton	Shoalhaven	12 Gembrook Lane	57	62	54	76	<40	63	45
42	3	DP801512	2	Broughton	Shoalhaven	26 Gembrook Lane	51	56	50	72	45	59	44
43	3	DP801512	3	Broughton	Shoalhaven	28 Gembrook Lane	46	51	44	66	47	53	46
44	3	DP602354	3	Broughton	Shoalhaven	40 Tindalls Lane	46	51	44	66	47	53	46
45	3	DP602354	4	Broughton	Shoalhaven	40 Tindalls Lane	46	51	44	66	47	53	46
46	3	DP602354	1	Broughton	Shoalhaven	10 Tindalls Lane	49	54	42	64	41	51	54
47	3	DP602354	4	Broughton	Shoalhaven	40 Tindalls Lane	49	54	42	64	41	51	54
48	3	DP809756	17	Broughton	Shoalhaven	9 Tindalls Lane	51	56	43	65	43	52	74
49	3	DP714112	4	Berry	Shoalhaven	200 Princes Highway	45	51	43	65	51	51	45
50	3	DP714112	4	Berry	Shoalhaven	200 Princes Highway	49	54	46	68	55	55	50
51	3	DP714112	3	Berry	Shoalhaven	200 Princes Highway	48	53	43	65	52	53	53
52	3	DP882453	182	Berry	Shoalhaven	Princes Highway	45	50	42	64	50	51	51
53	3	DP801177	1	Berry	Shoalhaven	185 Princes Highway	56	61	53	75	58	62	58
54	3	DP882453	182	Berry	Shoalhaven	Princes Highway	56	61	53	75	58	62	58
55	3	DP801177	2	Berry	Shoalhaven	185 Princes Highway	44	49	41	63	43	50	40
56	4	DP563651	2	Berry	Shoalhaven	155 Princes Highway	64	69	55	77	49	63	48
57	4	DP1029979	33	Berry	Shoalhaven	123 Beach Road	52	57	49	71	47	58	<40
58	4	DP840646	31	Berry	Shoalhaven	111 Princes Highway	64	69	61	83	44	69	<40
59	4	DP841950	2	Berry	Shoalhaven	112 Princes Highway	61	66	57	79	54	63	<40

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
60	4	DP840646	31	Berry	Shoalhaven	111 Princes Highway	57	62	54	76	50	62	43
61	4	DP840646	32	Berry	Shoalhaven	111 Princes Highway	55	60	47	69	52	55	<40
62	4	DP841950	3	Berry	Shoalhaven	112 Princes Highway	67	73	62	84	59	66	<40
63	4	DP841950	3	Berry	Shoalhaven	112 Princes Highway	69	74	64	86	62	68	<40
64	4	DP1029979	32	Berry	Shoalhaven	Princes Highway	67	72	62	84	67	69	<40
65	4	DP848390	26	Berry	Shoalhaven	40 Princes Highway	57	62	54	76	55	62	46
67	4	DP1057897	101	Berry	Shoalhaven	40 Princes Highway	65	70	62	84	57	71	47
68	4	DP1057897	101	Berry	Shoalhaven	40 Princes Highway	70	75	67	89	55	76	46
69	4	DP733992	3	Berry	Shoalhaven	78 Woodhill Mountain Road	70	75	67	89	55	76	46
70	4	DP602348	4	Berry	Shoalhaven	29 Princes Highway	73	78	70	92	55	79	<40
71	4	DP1040653	8	Berry	Shoalhaven	76 Woodhill Mountain Road	50	55	47	69	56	56	66
72	4	DP1057897	100	Berry	Shoalhaven	10 Princes Highway	53	59	52	74	49	60	42
73	4	DP1040653	8	Berry	Shoalhaven	76 Woodhill Mountain Road	49	54	46	68	54	54	67
74	4	DP1035983	101	Berry	Shoalhaven	10 Tannery Road	46	51	44	66	47	51	41
75	4	DP1035983	100	Berry	Shoalhaven	2 Pulman Street	51	56	49	71	50	57	43
76	4	DP261005	9	Berry	Shoalhaven	4 Pulman Street	48	53	46	68	48	54	<40
77	4	DP261005	7	Berry	Shoalhaven	8 Pulman Street	42	47	<40	61	47	48	<40
78	4	DP261005	8	Berry	Shoalhaven	6 Pulman Street	45	50	43	65	48	51	<40
79	4	DP724944	1	Berry	Shoalhaven	1 Pulman Street	51	56	48	70	51	57	44
80	4	DP1017132	23	Berry	Shoalhaven	3 Pulman Street	46	51	44	66	51	51	44
81	4	DP261005	5	Berry	Shoalhaven	12 Pulman Street	41	46	<40	61	44	47	40
82	4	DP261005	6	Berry	Shoalhaven	10 Pulman Street	43	48	40	62	45	49	<40

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
83	4	DP621857	1	Berry	Shoalhaven	7 Pulman Street	42	47	42	64	51	51	44
84	4	DP261005	4	Berry	Shoalhaven	14 Pulman Street	44	49	41	63	46	50	<40
85	4	DP369821	A	Berry	Shoalhaven	5 Pulman Street	46	51	44	66	51	51	44
86	4	DP621857	2	Berry	Shoalhaven	9 Pulman Street	44	49	41	63	48	49	42
87	4	DP5270	20	Berry	Shoalhaven	11 Pulman Street	44	49	42	64	49	49	42
88	4	DP772051	22	Berry	Shoalhaven	18 Pulman Street	42	47	<40	61	46	48	<40
89	4	DP261005	3	Berry	Shoalhaven	16 Pulman Street	43	48	40	62	47	49	<40
90	4	DP629875	1	Berry	Shoalhaven	13 Pulman Street	44	49	41	63	48	48	41
91	4	DP5270	18	Berry	Shoalhaven	15 Pulman Street	43	48	40	62	48	48	41
92	4	DP771851	2	Berry	Shoalhaven	89 Woodhill Mountain Road	43	48	40	62	48	48	41
93	4	DP4497	46	Berry	Shoalhaven	Woodhill Mountain Road	56	61	54	76	62	62	47
94	5	DP584975	2	Berry	Shoalhaven	140 Princes Highway	44	49	40	62	48	48	40
95	5	DP550334	2	Berry	Shoalhaven	81 Albert Street	49	53	46	68	55	55	43
96	5	DP550334	1	Berry	Shoalhaven	2 Prince Alfred Street	51	55	48	70	57	57	44
97	5	DP332423	2	Berry	Shoalhaven	134 Princes Highway	45	50	43	65	51	52	41
98	5	DP332423	1	Berry	Shoalhaven	132 Princes Highway	46	50	43	65	51	52	41
99	5	DP329544	B	Berry	Shoalhaven	8 Prince Alfred Street	49	54	46	68	51	55	43
100	5	DP402291	B	Berry	Shoalhaven	3 Prince Alfred Street	52	56	49	71	57	57	45
101	5	DP572830	1	Berry	Shoalhaven	10 Prince Alfred Street	48	53	46	68	50	54	42
102	5	DP402291	A	Berry	Shoalhaven	150 North Street	55	60	52	74	57	61	44
103	5	DP572830	2	Berry	Shoalhaven	12 Prince Alfred Street	47	52	44	66	50	53	40
104	5	DP300918	A	Berry	Shoalhaven	5 Prince Alfred Street	49	54	48	70	50	57	<40
105	5	DP572830	2	Berry	Shoalhaven	12 Prince Alfred Street	<40	40	<40	56	42	42	<40
106	5	DP1038231	1	Berry	Shoalhaven	7 Prince Alfred Street	49	54	47	69	47	56	<40

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
107	5	DP975886	1	Berry	Shoalhaven	9 Prince Alfred Street	45	50	43	65	50	52	41
108	5	DP816490	11	Berry	Shoalhaven	20 Prince Alfred Street	42	47	41	63	48	48	40
109	5	DP329427	1	Berry	Shoalhaven	79 Albert Street	51	56	48	70	56	57	42
110	5	DP973922	1	Berry	Shoalhaven	143 North Street	60	66	58	80	58	67	45
111	5	DP751268	64	Berry	Shoalhaven	137 Queen Street	<40	43	<40	59	45	45	<40
112	5	DP221105	1	Berry	Shoalhaven	135 Queen Street	<40	43	<40	59	42	46	<40
113	5	DP816490	12	Berry	Shoalhaven	22 Prince Alfred Street	43	48	42	64	48	51	<40
114	5	DP791614	1	Berry	Shoalhaven	24 Prince Alfred Street	41	45	<40	60	45	47	<40
115	5	DP751268	64	Berry	Shoalhaven	137 Queen Street	46	51	43	65	52	52	41
116	5	DP745962	1	Berry	Shoalhaven	69 Albert Street	53	57	51	73	56	60	43
117	5	DP745962	1	Berry	Shoalhaven	69 Albert Street	54	59	52	74	56	61	43
118	5	DP221105	1	Berry	Shoalhaven	135 Queen Street	55	60	52	74	55	61	43
119	5	DP745962	1	Berry	Shoalhaven	69 Albert Street	47	52	46	68	48	55	<40
120	5	DP310005	2	Berry	Shoalhaven	80 Albert Street	54	58	52	74	52	61	41
121	5	DP953827	1	Berry	Shoalhaven	28 Prince Alfred Street	47	51	44	66	51	53	41
122	5	DP949902	2	Berry	Shoalhaven	26 Prince Alfred Street	42	47	<40	61	47	48	<40
123	5	DP952372	1	Berry	Shoalhaven	30 Prince Alfred Street	42	47	41	63	46	50	<40
124	5	DP970121	1	Berry	Shoalhaven	32 Prince Alfred Street	42	47	<40	61	47	48	<40
125	5	DP742700	1	Berry	Shoalhaven	122 Queen Street	42	47	<40	61	47	48	<40
126	5	DP302348	1	Berry	Shoalhaven	78 Albert Street	41	46	<40	61	47	48	40
127	5	DP745962	1	Berry	Shoalhaven	69 Albert Street	48	53	46	68	53	55	41
128	5	DP310331	A	Berry	Shoalhaven	34 Prince Alfred Street	52	57	49	71	54	58	42
129	5	DP703237	61	Berry	Shoalhaven	36 Prince Alfred Street	40	45	<40	60	46	46	<40
130	5	DP951287	1	Berry	Shoalhaven	38 Prince Alfred Street	40	45	<40	60	46	47	<40

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
131	5	DP950717	1	Berry	Shoalhaven	40 Prince Alfred Street	40	45	<40	59	46	46	<40
132	5	DP8058	17	Berry	Shoalhaven	19 Prince Alfred Street	40	45	<40	60	47	47	<40
133	5	DP8058	16	Berry	Shoalhaven	21 Prince Alfred Street	40	45	<40	61	46	48	<40
134	5	DP788147	101	Berry	Shoalhaven	123 Queen Street	<40	41	<40	57	43	43	<40
135	5	DP354126	5A	Berry	Shoalhaven	42 Prince Alfred Street	41	46	<40	61	45	47	<40
136	5	DP532935	2	Berry	Shoalhaven	23 Prince Alfred Street	<40	44	<40	60	46	46	<40
137	5	DP309567	1	Berry	Shoalhaven	70 Albert Street	48	53	46	68	49	55	<40
138	5	DP845715	1	Berry	Shoalhaven	138 North Street	56	61	53	75	52	62	43
139	5	DP380097	B	Berry	Shoalhaven	27 Prince Alfred Street	<40	44	<40	59	46	45	<40
140	5	DP380097	A	Berry	Shoalhaven	25 Prince Alfred Street	<40	44	<40	59	46	45	<40
141	5	DP342913	3	Berry	Shoalhaven	79 Princess Street	40	45	<40	59	45	46	<40
142	5	DP525672	1	Berry	Shoalhaven	68 Albert Street	49	54	46	68	49	55	40
143	5	DP24948	2	Berry	Shoalhaven	4 Alexandra Street	53	58	50	72	44	58	<40
144	5	DP24948	3	Berry	Shoalhaven	6 Alexandra Street	56	60	53	75	42	62	<40
145	5	DP527284	2	Berry	Shoalhaven	67 Albert Street	51	56	49	71	53	58	41
146	5	DP307805	1	Berry	Shoalhaven	29 Prince Alfred Street	42	46	<40	61	44	48	<40
147	5	DP626391	1	Berry	Shoalhaven	66 Albert Street	47	52	45	67	49	54	40
148	5	DP932362	3	Berry	Shoalhaven	31 Prince Alfred Street	<40	43	<40	57	44	44	<40
149	5	DP652642	4	Berry	Shoalhaven	8 Alexandra Street	53	58	51	73	43	60	<40
150	5	DP209665	1	Berry	Shoalhaven	77 Princess Street	43	48	41	63	47	50	<40
151	5	DP532935	1	Berry	Shoalhaven	70 Princess Street	43	48	41	63	47	50	<40
152	5	DP380097	A	Berry	Shoalhaven	25 Prince Alfred Street	43	48	41	63	47	50	<40
153	5	DP872963	1011	Berry	Shoalhaven	102 Queen Street	43	48	41	63	47	50	<40
154	5	DP652643	5	Berry	Shoalhaven	10 Alexandra Street	51	56	50	72	43	59	<40

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
155	5	DP667521	4	Berry	Shoalhaven	97 Victoria Street	<40	44	<40	58	45	45	<40
156	5	DP8058	12	Berry	Shoalhaven	75 Princess Street	40	45	<40	60	44	47	<40
157	5	DP840778	21	Berry	Shoalhaven	68 Princess Street	<40	44	<40	58	43	45	<40
158	5	DP402384	A	Berry	Shoalhaven	62 Albert Street	52	57	49	71	48	58	<40
159	5	DP8058	4	Berry	Shoalhaven	76 Victoria Street	<40	42	<40	57	44	44	<40
160	5	DP1038574	2	Berry	Shoalhaven	73 Princess Street	41	45	<40	60	45	47	<40
161	5	DP840778	21	Berry	Shoalhaven	68 Princess Street	41	45	<40	60	45	47	<40
162	5	DP945577	1	Berry	Shoalhaven	74 Victoria Street	<40	43	<40	57	42	44	<40
163	5	DP825542	7	Berry	Shoalhaven	Queen Street	42	47	<40	61	40	48	<40
164	5	SP42722		Berry	Shoalhaven	136 North Street	57	62	54	76	52	63	42
165	5	DP920044	1	Berry	Shoalhaven	71 Princess Street	41	46	<40	61	45	47	<40
166	5	DP8058	6	Berry	Shoalhaven	72 Victoria Street	<40	43	<40	57	42	44	<40
167	5	DP568038	20	Berry	Shoalhaven	68 Princess Street	49	53	46	68	42	55	<40
168	5	DP872963	1012	Berry	Shoalhaven	Princess Street	40	45	<40	60	44	47	<40
169	5	DP840778	20	Berry	Shoalhaven	68 Princess Street	40	45	<40	59	43	46	<40
170	5	DP8058	7	Berry	Shoalhaven	70 Victoria Street	<40	43	<40	57	42	44	<40
171	5	SP50800		Berry	Shoalhaven	134 North Street	58	63	55	77	52	64	42
172	5	DP568038	20	Berry	Shoalhaven	7 Alexandra Street	47	52	46	68	43	55	<40
173	5	DP8058	19	Berry	Shoalhaven	63 Albert Street	47	52	46	68	43	55	<40
174	5	DP8058	8	Berry	Shoalhaven	65 Princess Street	<40	42	<40	58	40	44	<40
175	5	DP605825	1	Berry	Shoalhaven	66 Princess Street	40	45	<40	59	42	46	<40
176	5	DP840778	21	Berry	Shoalhaven	68 Princess Street	40	45	<40	59	42	46	<40
177	5	DP17926	7	Berry	Shoalhaven	68 Victoria Street	<40	43	<40	57	42	44	<40
178	5	DP8058	19	Berry	Shoalhaven	63 Albert Street	<40	43	<40	57	42	44	<40

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
179	5	SP53489		Berry	Shoalhaven	132 North Street	58	63	55	77	52	64	42
180	5	DP617648	1	Berry	Shoalhaven	64 Princess Street	41	46	<40	60	43	47	<40
181	5	DP1045738	1	Berry	Shoalhaven	95 Queen Street	40	45	<40	59	41	46	<40
182	5	DP8058	18	Berry	Shoalhaven	61 Albert Street	55	59	52	74	47	61	<40
183	5	DP8058	4	Berry	Shoalhaven	130 North Street	59	64	56	78	51	64	41
184	5	DP8058	4	Berry	Shoalhaven	130 North Street	53	58	50	72	43	59	<40
185	5	DP8058	2	Berry	Shoalhaven	86 Queen Street	46	51	45	67	45	54	<40
186	5	DP17926	3	Berry	Shoalhaven	28 Alexandra Street	<40	44	<40	59	41	45	<40
187	5	DP17926	4	Berry	Shoalhaven	26 Alexandra Street	<40	44	<40	58	41	45	<40
188	5	DP17926	6	Berry	Shoalhaven	22 Alexandra Street	<40	44	<40	59	42	46	<40
189	5	DP8058	17	Berry	Shoalhaven	59 Albert Street	56	61	53	75	47	62	<40
190	5	DP211764	1	Berry	Shoalhaven	56 Albert Street	48	53	46	68	47	54	<40
191	5	DP8058	20	Berry	Shoalhaven	15 Alexandra Street	43	48	41	63	44	50	<40
192	5	DP400209	A	Berry	Shoalhaven	Queen Street	<40	43	<40	59	<40	46	<40
193	5	DP17926	2	Berry	Shoalhaven	46 Queen Street	<40	43	<40	57	41	44	<40
194	5	DP8058	17	Berry	Shoalhaven	54 Albert Street	50	55	47	69	47	56	40
195	5	DP570413	1	Berry	Shoalhaven	84 Queen Street	44	49	42	64	45	51	<40
196	5	DP333365	A	Berry	Shoalhaven	85 Queen Street	<40	43	<40	59	42	46	<40
197	5	DP8058	16	Berry	Shoalhaven	57 Albert Street	54	59	51	73	49	60	40
198	5	SP46981		Berry	Shoalhaven	126 North Street	59	64	56	78	50	65	41
199	5	SP46981		Berry	Shoalhaven	126 North Street	59	64	56	78	50	65	41
200	5	DP8058	19	Berry	Shoalhaven	61 Princess Street	42	46	<40	61	44	48	<40
201	5	DP8058	2	Berry	Shoalhaven	83 Victoria Street	42	46	<40	61	44	48	<40
202	5	DP8058	2	Berry	Shoalhaven	83 Victoria Street	42	46	<40	61	44	48	<40

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
203	5	DP924675	8	Berry	Shoalhaven	19 Alexandra Street	40	45	<40	60	43	47	<40
204	5	DP369043	A	Berry	Shoalhaven	81 Queen Street	40	45	<40	60	43	47	<40
205	5	DP8058	15	Berry	Shoalhaven	55 Albert Street	56	61	53	75	47	62	40
206	5	DP8058	16	Berry	Shoalhaven	52 Albert Street	48	53	46	68	46	54	<40
207	5	DP8058	3	Berry	Shoalhaven	81 Victoria Street	40	45	<40	59	42	46	<40
208	5	DP270250	2	Berry	Shoalhaven	78 Queen Street	44	49	41	63	45	50	<40
209	5	DP369043	A	Berry	Shoalhaven	81 Queen Street	40	45	<40	60	43	46	<40
210	5	SP45774		Berry	Shoalhaven	124 North Street	60	65	57	79	49	66	41
211	5	DP8058	15	Berry	Shoalhaven	50 Albert Street	47	52	45	67	46	53	<40
212	5	DP270250	3	Berry	Shoalhaven	78 Queen Street	<40	44	<40	59	44	46	<40
213	5	DP270250	1	Berry	Shoalhaven	78 Queen Street	46	50	43	65	43	52	<40
214	5	DP8058	6	Berry	Shoalhaven	79 Queen Street	40	45	<40	59	41	46	<40
215	5	DP8058	14	Berry	Shoalhaven	53 Albert Street	55	60	52	74	47	61	40
216	5	DP8058	18	Berry	Shoalhaven	54 Princess Street	41	46	<40	60	43	47	<40
217	5	DP8058	4	Berry	Shoalhaven	79 Victoria Street	41	46	<40	60	42	47	<40
218	5	DP1010242	1	Berry	Shoalhaven	76 Queen Street	46	51	43	65	43	52	<40
219	5	DP8058	8	Berry	Shoalhaven	122 North Street	60	65	57	79	51	66	43
220	5	DP328649	A	Berry	Shoalhaven	48 Albert Street	48	53	46	68	45	55	<40
221	5	DP304729	1	Berry	Shoalhaven	52 Princess Street	41	46	<40	60	42	47	<40
222	5	DP304729	2	Berry	Shoalhaven	75 Victoria Street	40	45	<40	59	42	46	<40
223	5	DP1010242	1	Berry	Shoalhaven	76 Queen Street	45	50	42	64	44	51	<40
224	5	DP328649	B	Berry	Shoalhaven	75 Queen Street	50	55	47	69	47	56	41
225	5	DP8058	13	Berry	Shoalhaven	51 Albert Street	56	61	53	75	46	62	<40
226	5	DP374950	A	Berry	Shoalhaven	46 Albert Street	50	55	48	70	45	56	<40

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
227	5	DP374950	B	Berry	Shoalhaven	73 Queen Street	49	54	46	68	44	55	<40
228	5	DP8058	9	Berry	Shoalhaven	120 North Street	61	66	58	80	47	66	40
229	5	DP210451	1	Berry	Shoalhaven	50 Princess Street	41	46	<40	60	42	47	<40
230	5	DP210451	2	Berry	Shoalhaven	73 Victoria Street	40	45	<40	59	42	46	<40
231	5	DP380132	A	Berry	Shoalhaven	69 Queen Street	40	45	<40	59	42	46	<40
232	5	DP8058	10	Berry	Shoalhaven	118 North Street	60	65	57	79	46	66	40
233	5	DP8058	12	Berry	Shoalhaven	49 Albert Street	56	61	53	75	46	62	41
234	5	DP8058	12	Berry	Shoalhaven	44 Albert Street	50	55	48	70	45	57	<40
235	5	DP327819	2	Berry	Shoalhaven	71 Victoria Street	41	46	<40	60	42	47	<40
236	5	DP327819	1	Berry	Shoalhaven	48 Princess Street	41	46	<40	60	42	47	<40
237	5	DP8058	11	Berry	Shoalhaven	47 Queen Street	56	61	53	75	46	62	40
238	5	DP604982	4	Berry	Shoalhaven	69 Victoria Street	42	47	<40	61	42	48	<40
239	5	DP604982	3	Berry	Shoalhaven	46 Princess Street	42	47	<40	61	42	48	<40
240	5	DP8058	10	Berry	Shoalhaven	65 Queen Street	40	45	<40	60	43	47	<40
241	5	DP8058	10	Berry	Shoalhaven	65 Queen Street	50	55	47	69	46	56	<40
242	5	DP8058	11	Berry	Shoalhaven	42 Albert Street	53	58	50	72	45	59	41
243	5	DP100024	1	Berry	Shoalhaven	70 Queen Street	46	51	43	65	43	52	<40
244	5	SP58852		Berry	Shoalhaven	6 Albany Street	44	48	41	63	43	49	<40
245	5	DP8058	13	Berry	Shoalhaven	44 Princess Street	41	46	<40	60	42	47	<40
246	5	DP940561	1	Berry	Shoalhaven	35 Alexandra Street	41	46	<40	61	41	47	<40
247	5	DP608223	3	Berry	Shoalhaven	68 Queen Street	45	50	42	64	43	51	<40
248	5	DP8058	10	Berry	Shoalhaven	67 Victoria Street	41	46	<40	60	41	47	<40
249	5	DP8058	12	Berry	Shoalhaven	42 Princess Street	44	49	41	63	42	50	<40
250	5	DP8058	11	Berry	Shoalhaven	65 Victoria Street	44	49	41	63	42	50	<40

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
251	5	DP865149	1	Berry	Shoalhaven	114 North Street	61	66	58	80	45	67	<40
252	5	DP865149	2	Berry	Shoalhaven	1 Albany Street	58	63	55	77	45	64	<40
253	5	DP848574	8121	Berry	Shoalhaven	3 Albany Street	57	62	54	76	45	63	<40
254	5	DP837816	811	Berry	Shoalhaven	43 Albert Street	56	61	53	75	40	62	<40
255	5	DP8058	1	Berry	Shoalhaven	40 Albert Street	53	58	50	72	44	59	<40
256	5	DP8058	16	Berry	Shoalhaven	63 Queen Street	42	47	<40	61	41	48	<40
257	5	DP815237	1	Berry	Shoalhaven	112 North Street	61	66	58	80	44	67	41
258	5	DP8058	2	Berry	Shoalhaven	38 Albert Street	50	55	47	69	44	56	40
259	5	DP619195	1	Berry	Shoalhaven	66 Queen Street	45	50	42	64	44	51	<40
260	5	DP619195	1	Berry	Shoalhaven	66 Queen Street	42	47	41	63	43	49	<40
261	5	DP18189	5	Berry	Shoalhaven	11 Albany Street	44	49	41	63	43	50	<40
262	5	DP18189	4	Berry	Shoalhaven	13 Albany Street	43	49	41	63	43	50	<40
263	5	DP18189	3	Berry	Shoalhaven	15 Albany Street	45	50	42	64	42	50	<40
264	5	DP18189	2	Berry	Shoalhaven	63 Victoria Street	44	49	41	63	42	50	<40
265	5	DP375126	4	Berry	Shoalhaven	21 Albany Street	<40	43	<40	58	41	44	<40
266	5	DP375126	3	Berry	Shoalhaven	19 Albany Street	40	45	<40	59	41	46	<40
267	5	DP390864	B	Berry	Shoalhaven	17 Albany Street	41	46	<40	60	41	47	<40
268	5	DP774981	82	Berry	Shoalhaven	41 Albert Street	57	62	54	76	43	63	40
269	5	DP8058	15	Berry	Shoalhaven	61 Queen Street	<40	44	<40	59	43	46	<40
270	5	DP18189	1	Berry	Shoalhaven	61 Victoria Street	42	47	<40	61	43	48	<40
271	5	DP199995	2	Berry	Shoalhaven	58 Victoria Street	43	48	40	62	42	49	<40
272	5	DP21422	6	Berry	Shoalhaven	110 North Street	60	65	58	80	44	66	<40
273	5	DP21422	18	Berry	Shoalhaven	39 Albert Street	56	61	53	75	46	62	<40
274	5	DP924690	1	Berry	Shoalhaven	64 Queen Street	49	54	46	68	46	55	<40

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
275	5	DP377349	B	Berry	Shoalhaven	57 Victoria Street	41	46	<40	60	43	47	<40
276	5	DP377349	A	Berry	Shoalhaven	36 Princess Street	42	47	40	62	43	48	<40
277	5	DP510786	3	Berry	Shoalhaven	36 Albert Street	49	54	47	69	45	56	40
278	5	DP411284	B	Berry	Shoalhaven	59 Queen Street	<40	44	<40	59	43	46	<40
279	5	DP199995	1	Berry	Shoalhaven	54 Victoria Street	41	46	<40	60	42	47	<40
280	5	DP21422	7	Berry	Shoalhaven	108 North Street	60	65	57	79	46	66	40
281	5	DP21422	16	Berry	Shoalhaven	37 Albert Street	53	58	51	73	44	60	41
282	5	DP707322	6	Berry	Shoalhaven	57 Queen Street	<40	43	<40	58	<40	44	<40
283	5	DP633496	13	Berry	Shoalhaven	30 Princess Street	43	48	40	62	43	49	<40
284	5	DP355525	4	Berry	Shoalhaven	60 Queen Street	45	50	42	64	45	51	40
285	5	DP21422	16	Berry	Shoalhaven	35 Albert Street	45	50	42	64	45	51	40
286	5	DP633496	12	Berry	Shoalhaven	53 Victoria Street	42	47	<40	62	43	48	<40
287	5	DP707322	5	Berry	Shoalhaven	34 Albert Street	50	55	48	70	43	56	<40
288	5	DP375126	23	Berry	Shoalhaven	10 King Street	<40	43	<40	58	41	44	<40
289	5	DP375126	24	Berry	Shoalhaven	8 King Street	<40	44	<40	58	42	45	<40
290	5	DP390864	A	Berry	Shoalhaven	6 King Street	<40	44	<40	59	42	45	<40
291	5	DP710284	2	Berry	Shoalhaven	4 King Street	41	46	<40	60	43	47	<40
292	5	DP710284	1	Berry	Shoalhaven	54 Victoria Street	41	46	<40	60	43	47	<40
293	5	DP21422	9	Berry	Shoalhaven	106 North Street	62	67	59	81	44	67	41
294	5	DP512947	3	Berry	Shoalhaven	55 Queen Street	41	46	<40	62	44	48	<40
295	5	DP512947	2	Berry	Shoalhaven	32 Albert Street	49	54	46	68	46	54	41
296	5	DP376884	B	Berry	Shoalhaven	33 Princess Street	43	48	42	64	45	49	40
297	5	DP376884	A	Berry	Shoalhaven	58 Queen Street	45	50	44	66	47	51	40
298	5	DP513697	1	Berry	Shoalhaven	51 Victoria Street	42	47	<40	61	44	48	<40

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
299	5	DP818336	31	Berry	Shoalhaven	177 Princes Highway	58	63	54	76	47	61	42
300	5	DP21422	10	Berry	Shoalhaven	104 North Street	61	66	59	81	44	67	<40
301	5	DP21422	14	Berry	Shoalhaven	33 Albert Street	57	62	54	76	46	63	43
302	5	DP867234	1	Berry	Shoalhaven	26 Princess Street	40	45	<40	61	44	47	40
303	5	DP867234	2	Berry	Shoalhaven	49 Victoria Street	41	46	<40	61	44	47	<40
304	5	DP607856	11	Berry	Shoalhaven	102 North Street	62	67	59	81	45	67	<40
305	5	DP332021	A	Berry	Shoalhaven	53 Queen Street	<40	44	<40	60	42	46	<40
306	5	DP512947	1	Berry	Shoalhaven	30 Albert Street	50	55	49	71	47	57	45
307	5	DP362175	11	Berry	Shoalhaven	31 Princess Street	42	47	40	62	46	48	<40
308	5	DP362175	6	Berry	Shoalhaven	56 Queen Street	44	49	42	64	47	50	41
309	5	DP524531	2	Berry	Shoalhaven	47 Victoria Street	41	46	<40	61	44	47	<40
310	5	DP847692	2	Berry	Shoalhaven	1 King Street	<40	43	<40	58	43	44	<40
311	5	DP21422	14	Berry	Shoalhaven	31 Albert Street	55	60	53	75	45	61	43
312	5	DP319122	1	Berry	Shoalhaven	7 King Street	<40	43	<40	56	42	44	<40
313	5	DP866821	41	Berry	Shoalhaven	5 King Street	<40	43	<40	57	42	44	<40
314	5	DP362174	B	Berry	Shoalhaven	3 King Street	<40	43	<40	57	43	44	<40
315	5	DP847692	1	Berry	Shoalhaven	52 Victoria Street	40	45	<40	60	44	46	<40
316	5	DP607856	12	Berry	Shoalhaven	100 North Street	62	67	59	81	47	67	45
317	5	DP21422	13	Berry	Shoalhaven	29 Albert Street	54	59	52	74	44	59	41
318	5	DP511332	1	Berry	Shoalhaven	28 Albert Street	48	53	47	69	44	55	41
319	5	DP362175	10	Berry	Shoalhaven	29 Princess Street	41	46	41	63	45	49	41
320	5	DP608789	102	Berry	Shoalhaven	54 Queen Street	44	49	43	65	47	51	41
321	5	DP524531	1	Berry	Shoalhaven	45 Victoria Street	41	46	<40	61	44	47	40
322	5	DP511332	2	Berry	Shoalhaven	51 Queen Street	44	49	41	63	47	47	41

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
323	5	DP513699	4	Berry	Shoalhaven	43 Victoria Street	41	46	<40	60	45	46	40
324	5	DP608789	101	Berry	Shoalhaven	52 Queen Street	44	49	42	64	48	50	41
325	5	DP531079	2	Berry	Shoalhaven	27 Princess Street	43	48	<40	61	47	48	42
326	5	DP803611	18	Berry	Shoalhaven	26 Albert Street	50	55	48	70	47	56	46
327	5	DP866821	42	Berry	Shoalhaven	5a King Street	41	46	<40	59	43	44	<40
328	5	DP1065069	1	Berry	Shoalhaven	50 Victoria Street	42	47	<40	61	44	47	<40
329	5	DP419555	Y	Berry	Shoalhaven	98 North Street	62	67	58	80	46	65	46
330	5	DP419555	X	Berry	Shoalhaven	27 Albert Street	56	61	52	74	45	60	45
331	5	DP803611	19	Berry	Shoalhaven	20 Edward Street	42	47	<40	61	47	48	<40
332	5	DP530751	2	Berry	Shoalhaven	37 Edward Street	45	50	43	65	46	50	41
333	5	DP513699	3	Berry	Shoalhaven	41 Victoria Street	43	48	40	62	45	46	40
334	5	DP530751	1	Berry	Shoalhaven	50 Queen Street	46	51	44	66	48	51	42
335	5	DP374043	A	Berry	Shoalhaven	48 Victoria Street	42	47	<40	61	45	47	<40
336	5	DP331166	3	Berry	Shoalhaven	33 Edward Street	47	52	44	66	43	53	<40
337	5	DP169279	1	Berry	Shoalhaven	10 Clarence Street	<40	43	<40	57	40	44	<40
338	5	DP8058	27	Berry	Shoalhaven	8 Clarence Street	<40	44	<40	58	42	45	<40
339	5	DP505765	4	Berry	Shoalhaven	6 Clarence Street	43	48	40	62	45	48	40
340	5	DP505765	3	Berry	Shoalhaven	4 Clarence Street	43	48	<40	61	45	48	<40
341	5	DP505765	2	Berry	Shoalhaven	2 Clarence Street	42	47	<40	61	45	47	40
342	5	DP503068	8	Berry	Shoalhaven	94 North Street	62	67	56	78	46	64	45
343	5	DP29513	1	Berry	Shoalhaven	25 Albert Street	55	59	51	73	43	58	<40
344	5	DP771830	13	Berry	Shoalhaven	11 Edward Street	41	46	<40	61	43	47	<40
345	5	DP300048	1	Berry	Shoalhaven	48 Queen Street	45	50	43	65	48	51	43
346	5	DP771830	12	Berry	Shoalhaven	9 Edward Street	47	52	45	67	44	53	41

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
347	5	DP29513	2	Berry	Shoalhaven	23 Albert Street	55	60	51	73	45	59	41
348	5	DP771829	10	Berry	Shoalhaven	24 Albert Street	50	55	46	68	45	54	44
349	5	DP870590	1	Berry	Shoalhaven	41 Edward Street	43	48	40	62	46	49	41
350	5	DP503068	7	Berry	Shoalhaven	92 North Street	61	66	56	78	44	63	46
351	5	DP331166	1	Berry	Shoalhaven	46 Queen Street	45	50	41	63	49	49	43
352	5	DP870590	2	Berry	Shoalhaven	14 Princess Street	42	47	<40	61	46	48	41
353	5	DP408003	A	Berry	Shoalhaven	19 Albert Street	58	63	53	75	50	60	46
354	5	SP76164		Berry	Shoalhaven	45 Queen Street	44	49	41	63	49	50	40
355	5	DP29513	6	Berry	Shoalhaven	90 North Street	63	68	59	81	45	65	47
356	5	DP540474	5	Berry	Shoalhaven	44 Queen Street	44	49	41	63	48	49	43
357	5	SP71027		Berry	Shoalhaven	18 Albert Street	53	58	49	71	52	57	49
358	5	SP71027		Berry	Shoalhaven	18 Albert Street	52	57	47	69	50	56	48
359	5	DP86897	1	Berry	Shoalhaven	80 North Street	65	70	61	83	47	67	43
360	5	DP377127	B	Berry	Shoalhaven	19 Princess Street	45	50	41	63	48	49	42
361	5	DP523888	8	Berry	Shoalhaven	12 Princess Street	43	48	40	62	47	48	42
362	5	DP771830	15	Berry	Shoalhaven	43 Queen Street	44	49	42	64	49	51	<40
363	5	DP603411	2	Berry	Shoalhaven	40 Queen Street	48	53	44	66	52	52	46
364	5	DP1050231	3	Berry	Shoalhaven	37 Victoria Street	42	47	<40	61	47	48	41
365	5	DP1050231	2	Berry	Shoalhaven	35 Victoria Street	43	48	41	63	46	49	41
366	5	DP377127	A	Berry	Shoalhaven	17 Princess Street	44	49	40	62	48	49	43
367	5	DP86897	1	Berry	Shoalhaven	80 North Street	66	71	62	84	44	68	51
368	5	DP771830	16	Berry	Shoalhaven	41 Queen Street	43	48	40	62	46	49	<40
369	5	DP523888	9	Berry	Shoalhaven	10 Princess Street	44	49	41	63	47	49	42
370	5	SP71027		Berry	Shoalhaven	18 Albert Street	45	50	41	63	49	49	<40

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
371	5	SP71027		Berry	Shoalhaven	18 Albert Street	45	50	40	62	48	49	<40
372	5	DP771830	17	Berry	Shoalhaven	39 Queen Street	45	50	40	62	48	49	<40
373	5	DP261483	3	Berry	Shoalhaven	15 Princess Street	45	50	40	62	48	49	<40
374	5	DP86897	1	Berry	Shoalhaven	80 North Street	62	67	59	81	46	65	45
375	5	DP603411	1	Berry	Shoalhaven	38 Queen Street	45	50	43	65	51	51	45
376	5	DP1050231	1	Berry	Shoalhaven	33 Victoria Street	44	49	40	62	47	49	41
377	5	SP71925		Berry	Shoalhaven	37 Queen Street	46	51	43	65	51	52	<40
378	5	SP71925		Berry	Shoalhaven	37 Queen Street	49	54	46	68	49	53	46
379	5	DP261483	4	Berry	Shoalhaven	13 Princess Street	48	53	44	66	49	53	43
380	5	DP261483	12	Berry	Shoalhaven	36 Queen Street	49	54	46	68	51	55	45
381	5	DP16389	8	Berry	Shoalhaven	8 Princess Street	62	67	58	80	58	64	54
382	5	SP46707		Berry	Shoalhaven	35 Queen Street	62	67	58	80	58	64	54
383	5	DP22818	5	Berry	Shoalhaven	5 Albert Street	61	66	56	78	48	63	53
384	5	DP22818	2	Berry	Shoalhaven	76 North Street	68	73	65	87	50	71	54
385	5	DP810481	20	Berry	Shoalhaven	2 Albert Street	48	53	45	67	52	54	<40
386	5	DP22818	1	Berry	Shoalhaven	72 North Street	48	53	45	67	52	54	<40
387	5	DP261483	5	Berry	Shoalhaven	11 Princess Street	51	56	47	69	50	55	47
388	5	DP22818	5	Berry	Shoalhaven	3 Albert Street	51	56	47	69	50	55	47
389	5	DP882716	12	Berry	Shoalhaven	Victoria Street	44	49	41	63	47	49	41
390	5	DP16389	7	Berry	Shoalhaven	31 Victoria Street	45	50	43	65	48	51	41
391	5	DP16389	9	Berry	Shoalhaven	6 Princess Street	47	52	44	66	48	52	43
392	5	DP22818	6	Berry	Shoalhaven	1 Albert Street	47	52	44	66	48	52	43
393	5	DP261483	13	Berry	Shoalhaven	Queen Street	49	54	45	67	50	53	45
394	5	DP810481	20	Berry	Shoalhaven	2 Albert Street	55	60	52	74	54	60	52

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
395	5	DP261483	6	Berry	Shoalhaven	9 Princess Street	49	54	45	67	48	53	44
396	5	DP840604	44	Berry	Shoalhaven	22 Rawlings Lane	49	54	45	67	48	53	44
397	5	DP16389	6	Berry	Shoalhaven	29 Victoria Street	63	68	59	81	61	66	54
398	5	DP261483	7	Berry	Shoalhaven	7 Princess Street	63	68	59	81	61	66	54
399	5	DP261483	11	Berry	Shoalhaven	26 Queen Street	51	56	47	69	52	56	47
400	5	DP28943	1	Berry	Shoalhaven	21 Queen Street	50	55	43	65	49	50	43
401	5	DP261483	10	Berry	Shoalhaven	30 George Street	52	57	49	71	51	57	46
402	5	DP16389	5	Berry	Shoalhaven	27 Victoria Street	52	57	49	71	51	57	46
403	5	DP1015829	23	Berry	Shoalhaven	21 George Street	60	65	57	79	59	65	55
404	5	DP28943	2	Berry	Shoalhaven	19 Queen Street	60	65	57	79	59	65	55
405	5	DP261483	8	Berry	Shoalhaven	34 George Street	46	51	43	65	46	51	42
406	5	DP261483	9	Berry	Shoalhaven	32 George Street	50	55	46	68	48	54	45
407	5	DP519970	1	Berry	Shoalhaven	2 Princess Street	46	51	43	65	49	52	43
408	5	DP28943	3	Berry	Shoalhaven	17 Queen Street	46	51	43	65	49	52	43
409	5	DP35498	9	Berry	Shoalhaven	24 Queen Street	51	56	46	68	54	54	46
410	5	DP882716	11	Berry	Shoalhaven	40 Victoria Street	44	49	41	63	48	50	43
411	5	DP28943	4	Berry	Shoalhaven	15 Queen Street	44	49	41	63	48	50	43
412	5	DP857059	101	Berry	Shoalhaven	2 Princess Street	44	49	41	63	48	50	43
413	5	DP35498	8	Berry	Shoalhaven	22 Queen Street	50	55	47	69	54	56	47
414	5	DP28943	5	Berry	Shoalhaven	13 Queen Street	58	63	55	77	58	64	54
415	5	DP35498	7	Berry	Shoalhaven	20 Queen Street	53	58	50	72	56	59	47
416	5	DP1039442	2	Berry	Shoalhaven	17 George Street	64	69	61	83	62	69	55
417	5	DP28943	6	Berry	Shoalhaven	11 Queen Street	59	64	56	78	55	65	51
418	5	DP365727	A	Berry	Shoalhaven	27 George Street	47	52	44	66	51	53	45

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
419	5	DP857059	102	Berry	Shoalhaven	38 George Street	47	52	44	66	51	53	45
420	5	DP365727	B	Berry	Shoalhaven	29 George Street	48	53	45	67	51	53	47
421	5	DP28943	7	Berry	Shoalhaven	9 Queen Street	48	53	45	67	51	53	47
422	5	DP519970	2	Berry	Shoalhaven	23 Victoria Street	46	51	43	65	49	52	43
423	5	DP35498	6	Berry	Shoalhaven	18 Queen Street	46	51	43	65	49	52	43
424	5	DP365727	C	Berry	Shoalhaven	31 George Street	47	52	44	66	51	52	45
425	5	DP35498	5	Berry	Shoalhaven	16 Queen Street	56	61	53	75	57	62	50
426	5	DP28943	8	Berry	Shoalhaven	7 Queen Street	56	61	53	75	57	62	50
427	5	DP28943	9	Berry	Shoalhaven	5 Queen Street	64	69	61	83	62	68	55
428	5	DP365727	D	Berry	Shoalhaven	33 George Street	47	52	43	65	50	52	45
429	5	DP853911	41	Berry	Shoalhaven	14 Queen Street	55	61	52	74	59	60	48
430	5	DP789119	202	Berry	Shoalhaven	3 Queen Street	67	72	62	84	64	69	56
431	5	DP405763	E	Berry	Shoalhaven	35 George Street	46	51	44	66	52	52	45
432	5	DP248248	23	Berry	Shoalhaven	41 Windsor Drive	49	54	46	68	51	55	47
433	5	DP853911	42	Berry	Shoalhaven	35 Windsor Drive	56	61	53	75	60	60	48
434	5	DP789119	201	Berry	Shoalhaven	1 Queen Street	69	74	66	88	69	75	53
435	6	DP840604	42	Berry	Shoalhaven	North Street	58	63	55	77	55	64	60
436	5	DP35498	3	Berry	Shoalhaven	33 Windsor Drive	59	64	56	78	63	64	50
437	5	DP405763	F	Berry	Shoalhaven	37 George Street	47	52	42	64	50	52	44
439	5	DP1007873	2	Berry	Shoalhaven	10 North Street	64	69	61	83	64	70	67
440	5	DP16389	3	Berry	Shoalhaven	21 Victoria Street	46	51	43	65	49	51	43
441	5	DP163935	B	Berry	Shoalhaven	36 Victoria Street	44	49	42	64	48	50	42
442	5	DP35498	2	Berry	Shoalhaven	31 Windsor Drive	59	64	56	78	64	65	50
443	5	DP248248	22	Berry	Shoalhaven	43 Windsor Drive	49	54	45	67	50	53	46

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
444	6	DP773489	1	Berry	Shoalhaven	Kangaroo Valley Road	53	58	51	73	52	60	56
445	6	DP1007873	1	Berry	Shoalhaven	9 Kangaroo Valley Road	66	71	63	85	57	72	68
446	5	DP35498	1	Berry	Shoalhaven	29 Windsor Drive	60	65	57	79	65	66	51
447	5	DP229774	3	Berry	Shoalhaven	39 George Street	45	50	42	64	50	52	44
448	5	DP882716	12	Berry	Shoalhaven	Victoria Street	43	48	41	63	46	49	42
449	6	DP718223	1	Berry	Shoalhaven	5 Kangaroo Valley Road	59	64	56	78	62	65	50
450	6	DP746539	3	Berry	Shoalhaven	7 Kangaroo Valley Road	59	64	56	78	64	65	46
451	6	DP360923	A	Berry	Shoalhaven	11 Kangaroo Valley Road	68	73	65	87	67	74	69
452	6	DP554419	3	Berry	Shoalhaven	1 North Street	61	66	58	80	66	67	51
453	5	DP248248	1	Berry	Shoalhaven	27 Windsor Drive	50	54	48	70	52	55	52
454	5	DP248248	21	Berry	Shoalhaven	45 Windsor Drive	46	51	44	66	51	53	42
455	5	DP248248	10	Berry	Shoalhaven	26 Windsor Drive	51	56	48	70	55	56	48
456	6	DP508508	2	Berry	Shoalhaven	3 Kangaroo Valley Road	57	62	54	76	61	63	52
457	6	DP773489	2	Berry	Shoalhaven	42 Kangaroo Valley Road	42	47	<40	62	45	48	48
458	5	DP248248	2	Berry	Shoalhaven	25 Windsor Drive	64	69	61	83	69	70	54
459	6	DP508508	1	Berry	Shoalhaven	1 Kangaroo Valley Road	56	61	53	75	60	62	52
460	6	DP773489	3	Berry	Shoalhaven	46 Kangaroo Valley Road	45	50	41	63	50	51	47
461	6	DP773489	2	Berry	Shoalhaven	42 Kangaroo Valley Road	43	48	40	62	49	49	46
462	6	DP13701	24	Berry	Shoalhaven	20 Kangaroo Valley Road	68	73	65	87	73	74	62
463	5	DP102413	G	Berry	Shoalhaven	41 George Street	46	51	43	65	50	52	44
464	5	DP719517	8	Berry	Shoalhaven	24 Windsor Drive	53	58	51	73	57	59	48

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
465	5	DP788695	14	Berry	Shoalhaven	34 Victoria Street	44	49	41	63	48	50	42
466	6	DP13701	11	Berry	Shoalhaven	10 Kangaroo Valley Road	57	62	54	76	54	63	55
467	6	DP13701	20	Berry	Shoalhaven	14 Kangaroo Valley Road	61	66	58	80	67	67	61
468	5	DP248248	20	Berry	Shoalhaven	47 Windsor Drive	47	52	45	67	51	54	45
469	5	DP248248	3	Berry	Shoalhaven	23 Windsor Drive	66	71	63	85	69	72	53
470	6	DP1071259	112	Berry	Shoalhaven	6 Kangaroo Valley Road	55	60	52	74	55	61	51
471	6	DP13701	10	Berry	Shoalhaven	8 Kangaroo Valley Road	55	60	52	74	56	61	53
472	6	DP13701	10	Berry	Shoalhaven	8 Kangaroo Valley Road	56	61	53	75	55	63	54
473	5	DP249182	8	Berry	Shoalhaven	21 Windsor Drive	68	73	65	87	72	74	51
474	5	DP248248	19	Berry	Shoalhaven	49 Windsor Drive	48	53	45	67	51	54	44
475	5	DP248248	12	Berry	Shoalhaven	30 Windsor Drive	48	53	45	67	51	54	44
476	6	DP714983	101	Berry	Shoalhaven	2 Kangaroo Valley Road	53	58	50	72	54	59	51
477	5	DP719517	7	Berry	Shoalhaven	20 Windsor Drive	58	63	55	77	59	64	48
478	5	DP102413	H	Berry	Shoalhaven	43 George Street	47	52	44	66	51	53	43
479	6	DP1079697	1	Berry	Shoalhaven	12 The Gables	47	52	44	66	51	53	43
480	6	DP13701	9	Berry	Shoalhaven	15 Ford Street	55	60	52	74	57	62	50
481	6	DP13701	19	Berry	Shoalhaven	14 Ford Street	59	64	55	77	64	64	58
482	5	DP249182	9	Berry	Shoalhaven	19 Windsor Drive	66	71	64	86	65	72	47
483	5	DP248248	11	Berry	Shoalhaven	28 Windsor Drive	66	71	64	86	65	72	47
484	5	DP248248	4	Berry	Shoalhaven	14 Windsor Drive	55	60	54	76	59	62	47
485	6	DP775733	1	Berry	Shoalhaven	65 Kangaroo Valley Road	55	60	54	76	59	62	47
486	5	DP1069056	10	Berry	Shoalhaven	19 Host Place	52	57	49	71	55	58	51

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
487	5	DP13701	8	Berry	Shoalhaven	13 Ford Street	54	59	52	74	55	61	54
488	6	DP13701	18	Berry	Shoalhaven	12 Ford Street	57	62	54	76	63	63	55
489	5	DP249182	10	Berry	Shoalhaven	17 Windsor Drive	67	72	64	86	65	72	46
490	6	DP13701	7	Berry	Shoalhaven	11 Ford Street	53	58	50	72	55	59	54
491	6	DP13701	17	Berry	Shoalhaven	10 Ford Street	56	61	54	76	60	62	52
492	5	DP248248	17	Berry	Shoalhaven	51 Windsor Drive	48	53	45	67	52	54	44
493	5	DP248248	6	Berry	Shoalhaven	18 Windsor Drive	48	53	45	67	52	54	44
494	5	DP249182	7	Berry	Shoalhaven	12 Windsor Drive	60	65	58	80	59	67	46
495	5	DP248248	18	Berry	Shoalhaven	19 Victoria Street	48	53	45	67	51	54	43
496	6	DP850734	4	Berry	Shoalhaven	65 Kangaroo Valley Road	48	53	45	67	51	54	43
497	6	DP1079697	14	Berry	Shoalhaven	17 The Gables	48	53	45	67	51	54	43
498	6	DP13701	6	Berry	Shoalhaven	9 Ford Street	51	56	49	71	57	58	50
499	6	DP13701	16	Berry	Shoalhaven	8 Ford Street	56	61	55	77	62	62	54
500	5	DP249182	11	Berry	Shoalhaven	15 Windsor Drive	66	71	64	86	66	72	46
501	6	DP1079697	12	Berry	Shoalhaven	11 The Gables	43	48	40	62	48	49	44
502	6	DP13701	4	Berry	Shoalhaven	5 Ford Street	52	57	50	72	58	58	48
503	6	DP13701	15	Berry	Shoalhaven	6 Ford Street	56	61	53	75	60	62	46
504	5	DP249182	6	Berry	Shoalhaven	10 Windsor Drive	58	63	55	77	60	64	44
505	5	DP248248	5	Berry	Shoalhaven	16 Windsor Drive	58	63	55	77	60	64	44
506	5	DP249182	5	Berry	Shoalhaven	8 Windsor Drive	57	62	54	76	58	63	45
507	6	DP1079697	17	Berry	Shoalhaven	23 The Gables	42	47	<40	60	47	47	43
508	6	DP1079697	12	Berry	Shoalhaven	11 The Gables	44	49	41	63	49	50	45
509	6	DP13701	14	Berry	Shoalhaven	4 Ford Street	58	62	58	80	64	64	46
510	5	DP249182	12	Berry	Shoalhaven	13 Windsor Drive	64	69	61	83	67	70	46

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
511	6	DP13701	3	Berry	Shoalhaven	3 Ford Street	53	58	50	72	60	59	47
512	6	DP850734	3	Berry	Shoalhaven	65 Kangaroo Valley Road	53	58	50	72	60	59	47
513	6	DP13701	13	Berry	Shoalhaven	2 Ford Street	57	61	55	77	62	65	<40
514	5	DP249182	13	Berry	Shoalhaven	11 Windsor Drive	63	68	60	82	67	69	41
515	5	DP249182	4	Berry	Shoalhaven	6 Windsor Drive	55	60	53	75	58	61	45
516	5	DP248248	16	Berry	Shoalhaven	15 Victoria Street	49	54	46	68	51	55	43
517	6	DP1063803	3	Berry	Shoalhaven	79 Kangaroo Valley Road	49	54	46	68	51	55	43
518	6	DP13701	2	Berry	Shoalhaven	1 Ford Street	53	58	51	73	56	60	47
519	5	DP249182	15	Berry	Shoalhaven	7 Windsor Drive	61	66	58	80	63	67	44
520	5	DP248248	14	Berry	Shoalhaven	11 Victoria Street	51	56	48	70	53	57	44
521	5	DP248248	15	Berry	Shoalhaven	13 Victoria Street	51	56	48	70	53	57	44
522	5	DP248248	13	Berry	Shoalhaven	9 Victoria Street	51	56	48	70	54	57	44
523	5	DP249182	3	Berry	Shoalhaven	4 Windsor Drive	57	62	54	76	57	63	<40
524	5	DP1037953	2	Berry	Shoalhaven	45 George Street	47	52	44	66	49	53	42
525	5	DP951698	1	Berry	Shoalhaven	Clarence Street	47	52	44	66	49	53	42
526	6	DP831491	2	Berry	Shoalhaven	65 Kangaroo Valley Road	47	52	44	66	49	53	42
527	5	DP249182	14	Berry	Shoalhaven	9 Windsor Drive	61	66	59	81	65	68	46
528	5	DP249182	1	Berry	Shoalhaven	7 Victoria Street	49	54	46	68	53	54	45
529	6	DP1069056	4	Berry	Shoalhaven	7 Host Place	49	54	46	68	53	54	45
530	5	DP788695	12	Berry	Shoalhaven	50 George Street	45	50	42	64	49	51	41
531	5	DP249182	16	Berry	Shoalhaven	5 Windsor Drive	59	64	56	78	60	65	45
532	5	DP249182	2	Berry	Shoalhaven	2 Windsor Drive	54	59	51	73	55	60	<40

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
533	5	DP1037953	1	Berry	Shoalhaven	28 Victoria Street	48	53	45	67	50	54	42
534	5	DP951698	1	Berry	Shoalhaven	Clarence Street	45	50	42	64	49	51	40
535	5	DP788695	11	Berry	Shoalhaven	52 George Street	45	50	42	64	49	51	41
536	5	DP249182	20	Berry	Shoalhaven	3 Victoria Street	60	65	57	79	63	66	47
537	5	DP249182	17	Berry	Shoalhaven	3 Windsor Drive	56	61	53	75	58	62	40
538	5	DP951698	1	Berry	Shoalhaven	Clarence Street	44	49	42	64	48	50	<40
539	5	DP249182	18	Berry	Shoalhaven	1 Windsor Drive	57	62	54	76	56	63	45
540	5	DP786742	16	Berry	Shoalhaven	26 Victoria Street	50	55	47	69	51	56	43
541	5	DP737105	12	Berry	Shoalhaven	47 George Street	47	52	44	66	48	53	41
542	5	DP249182	19	Berry	Shoalhaven	1 Victoria Street	59	64	56	78	61	65	45
543	5	DP786742	17	Berry	Shoalhaven	24 Victoria Street	51	56	48	70	52	57	43
544	5	DP951698	1	Berry	Shoalhaven	Clarence Street	44	49	41	63	47	50	<40
545	5	DP786742	18	Berry	Shoalhaven	22 Victoria Street	51	56	48	70	50	57	41
546	5	DP737105	13	Berry	Shoalhaven	49 George Street	46	51	44	66	48	52	40
547	5	DP786742	18	Berry	Shoalhaven	22 Victoria Street	50	55	47	69	50	56	41
548	5	DP737105	14	Berry	Shoalhaven	51 George Street	46	51	43	65	48	52	40
549	5	DP737105	14	Berry	Shoalhaven	51 George Street	46	51	43	65	47	52	40
550	5	DP786742	18	Berry	Shoalhaven	22 Victoria Street	49	54	46	68	51	55	<40
551	5	DP786742	18	Berry	Shoalhaven	22 Victoria Street	49	54	46	68	49	55	41
552	5	DP786742	18	Berry	Shoalhaven	22 Victoria Street	48	53	46	68	49	54	40
553	5	DP737105	15	Berry	Shoalhaven	53 George Street	45	50	43	65	46	51	<40
554	5	DP712508	4	Berry	Shoalhaven	37 Clarence Street	<40	43	<40	57	42	44	<40
555	5	DP712508	5	Berry	Shoalhaven	39 Clarence Street	<40	43	<40	57	42	44	<40
556	5	DP712508	6	Berry	Shoalhaven	44 Clarence Street	<40	43	<40	57	42	44	<40

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
557	5	DP1073922	2	Berry	Shoalhaven	46 Clarence Street	44	49	41	63	47	50	<40
558	6	DP596879	4	Berry	Shoalhaven	35 Princes Highway	57	62	52	74	51	60	<40
559	6	DP1073922	1	Berry	Shoalhaven	10 Victoria Street	63	68	61	83	61	69	<40
560	6	DP4468	77	Berry	Shoalhaven	B90 Princes Highway	57	62	55	77	61	64	<40
561	6	DP48603	88	Berry	Shoalhaven	13 Schofields Lane	59	64	54	76	55	61	<40
562	6	DP48603	89	Berry	Shoalhaven	9 Schofields Lane	61	66	58	80	60	65	<40
563	6	DP615284	4	Berry	Shoalhaven	109 Princes Highway	63	68	54	76	52	61	<40
564	6	DP615284	4	Berry	Shoalhaven	109 Princes Highway	64	69	57	79	57	65	<40
565	6	DP615284	5	Berry	Shoalhaven	125 Princes Highway	61	66	54	76	57	62	<40
566	6	DP1073922	1	Berry	Shoalhaven	10 Victoria Street	56	61	53	75	51	62	<40
567	6	DP1073922	1	Berry	Shoalhaven	10 Victoria Street	56	61	53	75	48	62	<40
568	6	DP1073922	1	Berry	Shoalhaven	10 Victoria Street	55	60	52	74	49	61	<40
569	6	DP1073922	1	Berry	Shoalhaven	10 Victoria Street	54	59	51	73	49	60	<40
570	6	DP1073922	1	Berry	Shoalhaven	10 Victoria Street	54	59	51	73	48	60	<40
571	6	DP1073922	1	Berry	Shoalhaven	10 Victoria Street	53	58	50	72	46	59	<40
572	6	DP1073922	1	Berry	Shoalhaven	10 Victoria Street	50	54	45	67	49	53	<40
573	6	DP1073922	1	Berry	Shoalhaven	10 Victoria Street	48	53	45	67	49	54	<40
574	6	DP1073922	1	Berry	Shoalhaven	10 Victoria Street	49	54	47	69	50	55	<40
575	6	DP1073922	1	Berry	Shoalhaven	10 Victoria Street	50	55	47	69	50	56	<40
576	6	DP1073922	1	Berry	Shoalhaven	10 Victoria Street	51	56	48	70	51	57	<40
577	6	DP1073922	1	Berry	Shoalhaven	10 Victoria Street	53	58	51	73	52	60	<40
578	6	DP1073922	1	Berry	Shoalhaven	10 Victoria Street	64	69	61	83	70	70	57
579	6	DP1085668	1	Berry	Shoalhaven	2 Huntingdale Park Road	64	69	61	83	70	70	57
580	6	DP1085668	2	Berry	Shoalhaven	4 Huntingdale Park Road	64	69	61	83	70	70	57

Receiver	NCA	Plan	Lot	Suburb	LGA	Address	Predicted construction noise level for scenario, dB(A)						
							A	B	C1	C2	D	E	F
581	6	DP1085668	3	Berry	Shoalhaven	6 Huntingdale Park Road	64	69	61	83	70	70	57
582	6	DP1085668	4	Berry	Shoalhaven	8 Huntingdale Park Road	64	69	61	83	70	70	57
583	6	DP1085668	5	Berry	Shoalhaven	10 Huntingdale Park Road	64	69	61	83	70	70	57
584	6	DP1085668	6	Berry	Shoalhaven	12 Huntingdale Park Road	64	69	61	83	70	70	57
585	6	DP1085668	7	Berry	Shoalhaven	14 Huntingdale Park Road	64	69	61	83	70	70	57
586	6	DP1085668	8	Berry	Shoalhaven	16 Huntingdale Park Road	64	69	61	83	70	70	57
587	6	DP1085668	9	Berry	Shoalhaven	18 Huntingdale Park Road	64	69	61	83	70	70	57
588	6	DP1085668	10	Berry	Shoalhaven	20 Huntingdale Park Road	64	69	61	83	70	70	57
589	6	DP1085668	11	Berry	Shoalhaven	22 Huntingdale Park Road	64	69	61	83	70	70	57
590	6	DP13701	22	Berry	Shoalhaven	16 Kangaroo Valley Road	64	69	61	83	70	70	57
591	6	DP13701	23	Berry	Shoalhaven	18 Kangaroo Valley Road	64	69	61	83	70	70	57

Address source: RMS Tender Phase Information Document 62

Appendix A

Project Specific NMLs

Residential NMLs

Table B-1 sets out the NMLs at residences and how they are to be applied based on the requirements of the ICNG. The NMLs are based on the rating background level (RBL), which is the background noise level measured in the relevant assessment period.

Table B-1 Residential Noise Management Levels

Time of day	Noise Management Level $L_{Aeq(15\text{ min})}$ *	How to apply
Standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. <ul style="list-style-type: none"> Where the predicted or measured $L_{Aeq(15\text{ min})}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. <ul style="list-style-type: none"> Where noise is above this level, the relevant authority may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: <ul style="list-style-type: none"> times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences); if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5 dB	<ul style="list-style-type: none"> A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.

* Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

The Project-specific construction NMLs for residential land uses are presented in Table B-2. These are based on the measured RBLs for each NCA, outlined in Table 3-2 of the CNVMP.

Table B-2 Project-specific NMLs (dB(A))

NCA	Day (7am -6pm)		Evening (6pm-10pm)		Night (10pm-6am)		Morning Shoulder (6am-7am Monday to Friday and 8am-9am Saturdays)	
	RBL (L_{A90})	NML ($L_{Aeq(15min)}$)	RBL (L_{A90})	NML ($L_{Aeq(15min)}$)	RBL (L_{A90})	NML ($L_{Aeq(15min)}$)	RBL (L_{A90})	NML ($L_{Aeq(15min)}$)
1	40	50	40	45	40	45	40	45
2	40	50	40	45	40	45	40	45
3	41	51	39	44	38	43	40	45
4	41	51	39	44	37	42	39	44
5	35	45	35	40	35	40	35	40
6	38	48	36	41	33	38	36	41

As specified in the EA, separate RBLs have been determined for day, evening, night and morning shoulder periods. The morning shoulder period is 6am to 7am Monday to Friday and 8am to 9am Saturdays. The RBL for the morning shoulder period is the mid-point between the night-time and daytime RBL and the NML is the RBL + 5 dB(A). Shoulder period NMLs are between 0 - 3 dB(A) less stringent than the night-time NMLs.

Non-residential sensitive land uses

Table B-3 presents the NMLs at non-residential sensitive land uses determined in accordance with the ICNG.

Table B-3 Noise management levels at sensitive land uses (other than residences)

Land use	Noise management level (when in use) $L_{Aeq(15 min)}$
<ul style="list-style-type: none"> Classrooms at schools and other educational institutions Hospitals and operating theatres Places of worship 	45 dB(A) (internal noise level)
<ul style="list-style-type: none"> Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion) 	65 dB(A) (external noise level)
<ul style="list-style-type: none"> Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example reading, meditation) 	60 dB(A) (external noise level)
<ul style="list-style-type: none"> Community centres 	Depends on the intended use of the centre Maximum internal levels recommended in AS2107 for specific uses
<ul style="list-style-type: none"> Industrial premises 	75 dB(A) (external noise level)

Land use	Noise management level (when in use)
• Offices, retail outlets	$L_{Aeq(15\text{ min})}$ 70 dB(A) (external noise level)
• Other noise sensitive businesses	Investigation to determine suitable noise levels on project-by-project basis

Source: Table 3 and Section 4.1.3 of ICNG (DECC, 2009)

Sleep disturbance criteria

In accordance with the ICNG, sleep disturbance should be assessed for night time construction works longer than two consecutive nights in duration. The ICNG references the sleep disturbance assessment method defined in NSW *Environmental Criteria for Road Traffic Noise* (EPA, 1999) (ECRTN). Although the ECRTN has now been superseded by the *Road Noise Policy*, the sleep disturbance assessment methodology in the ECRTN is still recommended for use.

The ECRTN describes two methods for the assessment of sleep disturbance:

- A screening criterion based on determining the predicted $L_{A1(1\text{min})}$ level from construction works and the number of times that this level is predicted to exceed the background level by more than 15 dB(A). Conservatively, this is equivalent to the night time NML + 10 dB(A). Where this is screening criterion exceeded then further analysis is recommended.
- The EPA's advice that '*Maximum internal noise levels below 50-55 dB(A) are unlikely to cause awakening reactions*'. Based on a typical 10 dB reduction through an open window, it is therefore reasonable to assume that external levels of 60-65 dB(A) L_{max} are unlikely to result in awakening reactions.

Note that the sleep disturbance criteria are only relevant to night time works, assessed under the *Out of Hours Work Approval Procedure* in Appendix E of the CNVMP, and are not relevant for works during standard hours.

Appendix C

Indicative Plant and Equipment Sound Power Levels

Plant and equipment sound power levels (SWL)

Activity	Typical equipment used	Typical and maximum SWL dB(A)
Site Establishment / Landscaping	Typical SWL¹	105 - 110
	Chainsaws	110 - 118
	Mulching plant and chipper	113 - 121
	Cranes	104 - 112
	Generators	101 - 109
	Bobcat	104 - 112
	Powered hand tools	108 - 116
	Air compressor	109 - 117
	Spoil	95 - 103
	Material	95 - 103
	Excavators	99 - 107
Earthworks	Typical SWL¹	112 - 120
	Compactors	104 - 112
	Grader	103 - 111
	Multi-tyred and vibratory rollers	97 - 105
	Concrete trucks	105 - 113
	Concrete vibrator	97 - 105
	Asphalt paving plant	112 - 120
	Backhoe	103 - 111
	Sweeper	104 - 112
	Compressor	109 - 117
	Generators	101 - 109
	Rock crushing	112 - 120
	Road trucks	95 - 103
Piling	Bored piling rig	100 – 110
	CFA piling rig	98 – 108
Bridge works	Typical SWL¹ (bored or CFA piling)	112 - 115
	Cranes	104 – 112
	Bored piling rig	100 – 110
	CFA piling rig	98 – 108
Paving	Typical SWL¹	113 - 118
	Compactor	104 - 112
	Jackhammers	108 - 116
	Multi-tyred vibratory roller	97 - 105
	Concrete truck	105 - 113
	Concrete vibrator	97 - 105
	Asphalt paving plant	112 - 120
Backhoe	108 - 116	

Activity	Typical equipment used	Typical and maximum SWL dB(A)
	Concrete saw	111 - 119
	Profiler	108 - 116
	Sweeper	104 - 112
	Compressor	109 - 117
	Generator	101 - 109
	Road trucks	95 - 103
Site compounds / stockpile sites	Typical SWL¹	112 - 120
	Loaders	107 - 115
	Excavators	99 - 107
	Truck	102 - 110
	Air compressors	109 - 117
	Cranes	104 - 112
	Compactors	104 - 112
	Rollers	97 - 105
	Sweepers	104 - 112
	Generators	101 - 109
Processing plants	Typical SWL¹	116 - 124
	Impact crusher	115 - 122
	Jaw crusher	112 - 121
	Cone crusher	112 - 121
	Reclaimer screen	103 - 112
	Mobile screen	103 - 112
Temporary concrete batching plant	Typical SWL¹	110 - 115

Source: EA Appendix E and UK DEFRA construction noise database.

Note 1: The Typical SWL is for a 'typical site'. It represents a range of the equipment listed at various distances around the site with varying duty cycles. The levels have been refined from predictions and measurements undertaken at similar sites over many different projects. The typical levels are not a summation of all the equipment listed in this table.

Appendix D
Blast Management Plan

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Definitions

<i>Airblast/Overpressure</i>	An airborne shock wave resulting from detonation of explosives. An Airblast may be caused by overburden movement or the release of expanding gas into the air.
<i>Bench</i>	A horizontal ledge from which holes can be drilled vertically down into the material to be blasted.
<i>Blast, Blasting</i>	The firing of explosive materials for such purposes as breaking rock or other material
<i>Blast Controller</i>	Coordinates and takes overall control of the blasting and associated activities on the day of the blast.
<i>Blast Guard</i>	Controls access at designated areas to ensure the blast area is clear of members of the public and the workforce leading up to and at the time of the blast.
<i>Burden</i>	The distance from the drill hole to the nearest free face.
<i>Drill hole</i>	A hole drilled into the material to be blasted for the purpose to contain the explosive charge.
<i>Flyrock</i>	Rocks propelled from the blast area by the force of an explosion.
<i>Ground Vibration</i>	Movement of the ground by elastic waves emanating from a blast, measured by particle velocity.
<i>Initiation</i>	Detonation in an explosive material
<i>Misfire</i>	A blast, drill hole or explosive material that failed to detonate as planned.
<i>MIC</i>	Maximum Instantaneous Charge. Measured in kilograms, is the maximum amount of explosive charge to be fired in any one instant of the shot.
<i>Overburden</i>	Material of any nature lying on top of a deposit that is to be blasted.
<i>Particle Velocity</i>	A measure of the intensity of ground vibration, specifically the velocity of motion of the ground particles as they are excited by the wave energy.
<i>Sensitive Receiver</i>	People, property, environment and infrastructure susceptible to the effects from blasting.
<i>Shotfirer</i>	The qualified person responsible for the loading and firing of a blast.
<i>Spacing</i>	Distance between drill holes.
<i>Stemming</i>	Inert material placed into the drill hole on top of or between separate charges of explosive material. Used to confine the explosives.
<i>Subdrill</i>	The practice of drilling holes below floor level or working elevations to ensure breakage of rock to work elevation.
<i>VMS</i>	Variable Message Signs

1 INTRODUCTION

This Blast Management Plan (BMP) outlines the risks, responsibilities and procedures to be used by Fulton Hogan to effectively manage the anticipated blasting during construction of the Foxground and Berry bypass Project (the Project).

This BMP has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), the RMS Statement of Commitments (SoC), the mitigation measures listed in the *Foxground and Berry bypass Environmental Assessment* (EA) (AECOM, 2012) and applicable legislation.

2 LEGAL AND OTHER REQUIREMENTS

Refer to Chapter 2 of the *Construction Noise and Vibration Management Sub-plan* (CNVMP) for *Legal and other requirements*, including the Minister's Conditions of Approval.

3 EXISTING ENVIRONMENT

3.1 Sensitive Receivers

The locations of sensitive receivers in the vicinity of blasting at Cuts 2a and 2b; Cut 3 and Cut 4; and Cut 5 and Cut 6 are shown in Appendix A. These sensitive receivers are also identified in Table 1 below. Two sensitive receivers (W1 and A1) are located in the vicinity of blasting at Cuts 2a and 2b. At Cut 3, there are six sensitive receivers (S1, B1, B2, B3, B4, B5) and at Cut 4 there are two sensitive receivers (S2 and B6).

Cut 5 will have 6 receivers (S3 to S6, B7, B8), and Cut 6 will have 11 receivers (S7 to S10, B9 to B15).

Table 1: Sensitive receivers in the vicinity of blasting

ID	Sensitive Receiver
Cut 2a and 2b	
W1	Dry Stone Wall – Local Heritage
A1	Residential Dwelling – Occupied
Cut 3	
S1	Overhead Power Lines
B1	Residential Dwelling – Occupied
B2	Residential Dwelling – Occupied
B3	Residential Dwelling – Occupied
B4	Residential Dwelling – Local Heritage – Occupied
B5	Residential Dwelling – Local Heritage – Occupied
Cut 4	
S2	Optus Optic Fibre
B6	Vacant Structure
Cut 5	
S3	Jemena – EGP Gas Line
S4	Telstra & Optus (Optic Fibre)
S5	Telstra
S6	Underground Power Supply

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B7	Residential Dwelling - Occupied
B8	Residential Dwelling - Occupied
	<i>Cut 6</i>
S7	Jemena – EGP Gas Line
S8	Overhead Power Lines
S9	Telstra
S10	Telstra
B9	Residential Dwelling - Occupied
B10	Residential Dwelling - Occupied
B11	Residential Dwelling - Occupied
B12	Residential Dwelling - Occupied
B13	Residential Dwelling - Occupied
B14	Residential Dwelling - Occupied
B15	Residential Dwelling - Occupied

BLAST CRITERIA

Further to Section 4.3 of the CNVMP, Table 2 shows the Project limits for Vibration and Air Blast for the sensitive receivers shown in Appendix A.

Table 2: Project Vibration and Air Blast Limits for Blasting

ID	Receiver	Nearest Distance (m)	Peak Particle Velocity (mm/s)	Air Blast (dBL)	MIC ⁽²⁾ (kg)
	Cut 2a and 2b				
W1	Dry Stone Wall – Local Heritage	18	3	NA	TBA
A1	Residential Dwelling – Occupied	70	5	115	TBA
	Cut 3				
S1	Overhead Power Lines	45	100 ⁽¹⁾	NA	TBA
B1	Residential Dwelling – Occupied	205	25	125	TBA
B2	Residential Dwelling – Occupied	100	25	125	TBA
B3	Residential Dwelling – Occupied	75	25	125	TBA
B4	Residential Dwelling – Local Heritage – Occupied	230	25	125	TBA
B5	Residential Dwelling – Local Heritage – Occupied	140	25	125	TBA
	Cut 4				
S2	Optus Optic Fibre	30	100 ⁽¹⁾	NA	TBA
B6	Vacant Structure	250	50	NA	TBA
	Cut 5				
S3	Jemena – EGP Gas Line	270	20	N/A	TBA
S4	Telstra & Optus (Optic Fibre)	40	100 ⁽¹⁾	NA	TBA
S5	Telstra	40	100 ⁽¹⁾	NA	TBA
S6	Underground Power Supply	140	100 ⁽¹⁾	NA	TBA
B7	Residential Dwelling - Occupied	180	5	115	TBA
B8	Residential Dwelling – Occupied	130	5	115	TBA
	Cut 6				
S7	Jemena – EGP Gas Line	160	20	N/A	TBA
S8	Overhead Power Lines	100	100 ⁽¹⁾	NA	TBA
S9	Telstra	70	100 ⁽¹⁾	NA	TBA
S10	Telstra	100	100 ⁽¹⁾	NA	TBA
B9	Residential Dwelling - Occupied	120	5	115	TBA
B10	Residential Dwelling - Occupied	210	5	115	TBA
B11	Residential Dwelling - Occupied	230	5	115	TBA
B12	Residential Dwelling - Occupied	280	5	115	TBA
B13	Residential Dwelling - Occupied	330	5	115	TBA

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B14	Residential Dwelling - Occupied	360	5	115	TBA
B15	Residential Dwelling - Occupied	400	5	115	TBA

Notes: (1) Limit not approved - To be agreed with asset owner
 (2) MIC to be calculated using the Nearest Distance and the initial site factors prescribed by RMS Specification D&C R44 Clause 4.7.5 when blast designs are developed.

4 ENVIRONMENTAL ASPECTS AND IMPACTS

The results of the blasting risk assessment are included in Appendix A3 of the CEMP.

4.1 Risks Associated with Blasting

The following discusses key risks, mostly related to safety, associated with the planned blasting activities on the Project.

Plant or Personnel in Blast Zone

At the time of handing over to the shotfirer, all personnel and plant will be clear of the blast zone. Initially, an exclusion limit will be set to a 150m radius. This exclusion zone will be documented within the Blast Procedure. After a sufficient number of blasts have been completed, a risk assessment may be undertaken considering the performance of the completed blasts with the intention of reducing this radius.

Flyrock

Blast designs are completed for every blast to ensure that the explosive is correctly proportioned to the rock type and the explosive energy upon detonation is contained within the rock mass. Contributing blast parameters that can lead to a flyrock event are:

- Insufficient stemming length
- Poor stemming type / particle size / particle shape
- Insufficient front burden
- Weak rock seams or broken ground
- Overloaded blast hole
- Powder Factor too high, and
- Excessive ground water.

Drillers will record any geological features encountered while drilling the blast holes on the drill sheet and these records will be used to adjust explosive quantities as required i.e. Holes where broken ground or seams are encountered will be down loaded to ensure that the explosive gases do not cause weak rock to be ejected from these areas.

Blasts will be recorded by video to ensure that reviews of blast performance and trends of potential flyrock incidents are identified and refinements made for future blasts.

Vibration exceedance

The level of vibration will be controlled by adjusting the amount of explosive that is detonated at any instant (MIC). Site relationships between the distance to the receiver and the MIC will be established for each blast site based on conservative trial blast results and vibration results obtained and analysed during further blast operations.

This will enable vibration calculations to be completed prior to blasting, to ensure compliance with the project vibration limit.

Airblast exceedance

Airblast is the pressure wave produced by the blast and transmitted through the atmosphere. Airblast exceedances are a result of explosive gases venting from the blast (i.e. a flyrock event will most likely be an airblast exceedance).

Weather conditions also contribute to the airblast result from a blast. On a cloudy day with wind blowing in the direction of nearby residents it may be decided to delay the blast or increase the stemming length to avoid exceedance issues.

Free face – fall from heights

Blasting to a free face will assist with fragmentation and excavation by allowing maximum swell to the blasted rock. Blasting to a free face will also assist with vibration levels as the rock has more relief and ability to move, therefore dissipating vibration. The risk that requires controlling when a free face is exposed for blasting is the potential for workers to fall. Suitable control measures will be addressed in the Safe Work Method Statement (SWMS) consisting of barricading, bunds or other method to remove the potential for workers to fall.

Explosives on site

Explosive products are to be kept in the explosive delivering vehicle within the certified storage magazines until they are required. It is important that detonators or explosive product is not carelessly placed on the ground during loading as there is the potential that it is lost and will remain a risk of detonation following the blast. The shotfirer will ensure that only the required explosives are placed at each hole to be loaded and the quantity checked against the blast design to ensure that all explosives are accounted for.

Excavation of blasted rock – potential to discover undetonated explosives

Following each blast, the shotfirer will inspect all surface detonators and the movement of the blasted rock to determine that all explosives have detonated prior to giving the 'All-clear' call. Toolbox talks will be developed to familiarise personnel with the different products utilised in blasting so they are able to identify potentially dangerous materials. A SWMS will be developed for the excavation of blasted material to address the specific control measures.

Interaction with Road Users

Due to the proximity of the Princes Highway and other local roads, traffic control will be deployed for road closures on several occasions. While this will control the proximity of motorists, additional controls will be put in place to ensure there is no damage to pavements from fly rock or debris on the road prior to releasing traffic.

5 BLAST DESIGN AND EXECUTION

5.1 Scope of Blasting

Thorough analysis of the available geotechnical data within the project boundary shows significant masses of High Strength rock belonging to either the Sandstone or Latite units. The defect spacing, extent of fractures found naturally in the rock mass and the seismic velocities have been reviewed to estimate the most suitable excavation method. The estimated volume of material to be blasted and the approximate number of blasts for each Cut is identified in Table 3 below. Blasting activities will include pre-splitting for the formation and protection of cut batters, and burden blasting for the mass excavation of the cut.

Table 3: Estimated volume of material to be blasted and approximate number of blasts

Location	Approximate Chainage		Estimated Volume to Be Blasted (m³)	Approximate Number of Blasts ⁽¹⁾
	From	To		
Cut 2a	8,500	8,880	160,000	25
Cut 2b	9,100	9,360	105,000	15
Cut 3	11,420	11,600	30,000	5
Cut 4	12,340	12,550	40,000	10
Cut 5	12,075	13175	50,000	6
Cut 6	13,875	14,025	40,000	5

Notes: (1) These are approximate values only and are subject to change. Production calculations are yet to be finalised.

Blasting may be required in additional areas if rock masses encountered vary from what is expected. This BMP will be revised to include any additional areas prior to commencement of blasting.

5.2 Blast Program

Table 4 below shows the programmed blasting periods in each of the cuttings.

Table 4: Blast Program

Location	Quarter 1 2015	Quarter 2 2015	Quarter 3 2015	Quarter 4 2015	Quarter 1 2016	Quarter 2 2016	Quarter 3 2016
Cut 2a		X	X	X	X		
Cut 2b				X	X	X	
Cut 3			X	X			
Cut 4			X	X			
Cut 5			X	X	X	X	
Cut 6			X	X			

5.3 Approved Times for Blasting

Blasting is permitted during the following hours:

- 9:00am to 5:00pm, Monday to Fridays, inclusive,
- 9:00am to 1:00pm on Saturdays, and
- at no time on Sundays or Public Holidays.

The timing of each blast will consider the approval times for any traffic control associated with the blast, time required to load and fire the shot and any contingency time required to manage any specific risks.

5.4 Planning

CoA specific to blasting and noise and vibration in general are listed in Section 2.3. Blast criteria is detailed in Section 4.3 of the CNVMP.

Prior to commencement of Blasting, the following approvals will be obtained (in addition to other approvals required as detailed in Section 3.3 of the CEMP):

- Approval of each Blast Procedure in accordance with *RMS Specification D&C R44* Clause 4.7.1 and
- Approval of a specific *Traffic Control Plan* (TCP) if required to control the exclusion zone for a blast.

5.5 Dilapidation Reports

A Dilapidation Report will be completed for all properties within 250m of the blast area prior to commencement of blasting. Surveys of buildings and structures will also be undertaken immediately following a monitored exceedance of the relevant vibration criteria where applicable.

A copy of the relevant Dilapidation Report will be provided to each resident prior to commencement of blasting.

5.6 Traffic Control

To ensure the safety of local and highway traffic, roads will be closed when they are within the blast exclusion zone. This will occur in regard to Cut 2a, Cut 3, Cut 4, Cut 5 and Cut 6.

TCP's will be developed in accordance with Chapter 9 of the *Construction Traffic Management Sub-plan*. Consultation and notification will be carried out in accordance with the Road Occupancy License requirements and the *Community Communication Strategy*. Traffic disruptions will be conveyed to the travelling public by use of Variable Message Signs (VMS) set up on the Princes Highway at a location to be determined as suitable.

5.7 Blast Procedure

Each location requiring blasting will have its own Blast Procedure, which will include but not necessarily be limited to:

- A Risk Assessment for Drill and Blast activities for the specific location
- A SWMS for drill and blast activities
- A Blast Design
- A restricted access sketch showing Blast Sentry locations and the area to be evacuated
- Specific community notifications required including the Project Blast Board and VMS requirements
- Detailed site procedure to:
 - Ensure Sentries are in place and site is controlled
 - Area is free from personnel (excluding shotfirer and assistants)
 - Traffic control is in place where required
 - Hand over to shotfirer
 - Shot Firing sequence including specific warning sounds, radio calls and the procedure to follow in the event of a misfire
 - Release of the site from the shotfirer, and
 - Assessment of the shot to ensure stability prior to releasing traffic and removing sentries

5.8 Blast Designs

Blast designs will be developed for each blast by experienced and qualified personnel to ensure that the required blast outcomes are achieved. The objectives for each blast design are to ensure:

- Flyrock is not produced from the blast
- Vibration and Airblast Limits are not exceeded
- Damage to batters is prevented
- Required fragmentation of shot rock is achieved, and
- No community complaints.

Blast designs will be finalised following trial blasting and establishment of site constants in each area.

Blast designs for all blasts will include the following information which will be submitted as Hold Points in accordance with *RMS Specification D&C R44* Clause 4.7.1:

- Details of the quantity and type of explosive to be detonated
- The blasting pattern
- Vibration sensitive receivers for the specific blast and noise monitoring locations
- Measures to limit noise / airblast overpressure
- The calculated Maximum Instantaneous Charge (MIC) of explosives and the predicted vibration levels at the sensitive receivers
- Location and Time of blast
- Shotfirer name and copy of License

5.9 Trial Blasting

Trial blasting will be carried out at each blasting location using the following methodology:

- A single charge will be detonated in a confined blast hole at the blast site with monitors set to record the vibration. This charge will be approximately 20% of the charge calculated using the Australian Standard *AS2187* Appendix J7.3 vibration equation to comply with the vibration limit for the nearby residences. The monitor will then be checked and calculations made to determine the site relationship between charge mass, distance and vibration level.
- If appropriate, the charge will then be increased by small increments on the required number

of occasions to obtain the required information to develop the specific site laws which will be used to determine the MIC permitted for future blasting.

5.10 Transport and Use of Explosives

There will be no storage of explosive on site other than on the day of loading. The explosives will be kept in the licensed explosive delivery vehicle until required for loading into blast holes. Explosive material will be under the instruction of the shotfirer.

Transport of explosives will be by a licensed explosive supplier on the day of each blast. Transport will be carried out in accordance with relevant legislation and Australian Standard AS2187.

5.11 Sleeping of Shots

If blasts are required to be fired on the day following loading, a specific Risk Assessment must be completed with suitably qualified personnel. As a minimum, the following controls will be implemented:

- A security guard will be used to guard the blast to prevent interference
- All blast holes with explosives loaded into them will be stemmed off to prevent the removal of any explosive product, and
- The surface detonator will not be connected until the blast day.

6 BLASTING IMPACT ASSESSMENT

A blasting impact assessment is being prepared for the discussion of impacts due to blasting within the project. The Blast Management Plan will be revised when it is finalised

7 ENVIRONMENTAL MITIGATION MEASURES

Specific mitigation measures to address potential blasting impacts are outlined in Table 5.

Foxground and Berry bypass

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Table 5: Blast mitigation measures

ID	Mitigation Measure	Timing		Responsibility
		PC ¹	C ²	
BMM1	Conduct dilapidation surveys on dwellings, surrounding assets and heritage items prior to blasting operation commencing	✓		Project Engineer
BMM2	Identify key dwellings near blasting operations and develop a communication strategy for opening and maintaining communication with them throughout the blasting operations	✓		Project Engineer
BMM3	Engage a suitably qualified and experienced subcontractor to perform the drill and blast works	✓		Project Manager
BMM4	Engage a suitably qualified and experienced Drill and Blast consultant to be available for blast designs and verification of subcontractor works	✓		Project Manager
BMM5	Program blasts to occur on Monday to Friday between the hours of 9am-5pm		✓	Superintendent, Project Engineer
BMM6	Conduct a trial blast of limited size to determine site constants for future blast designs		✓	Superintendent, Project Engineer
BMM7	Ensure correct stemming length is designed for and verified on site at the time of loading		✓	Foreman / Site Engineer
BMM8	Monitor and record drilling depths and drilling conditions encountered to ensure overloading of holes does not occur and any weak seam can be identified and managed for venting or fly rock		✓	Foreman / Site Engineer
BMM9	Audit hole diameters and drill bit diameters		✓	Foreman / Site Engineer
BMM10	Ensure blast monitoring is undertaken in accordance with the blast design and instruments are suitably verified as in good working order		✓	Foreman / Site Engineer
BMM11	Fire presplit before production blasts to reduce vibration transfer		✓	Superintendent, Project Engineer
BMM12	Fire shots to a free face to reduce contained energy when possible		✓	Superintendent, Project Engineer
BMM13	Load shots to a charge weight unless the hole depth and diameter is verified and the rise of charge required is calculated.		✓	Foreman / Site Engineer

Foxground and Berry bypass

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ID	Mitigation Measure	Timing		Responsibility
		PC ¹	C ²	
BMM14	Review weather forecasts and consider the weather and its potential effects on the airblast readings for the shot		✓	Foreman / Site Engineer
BMM15	Put in place an exclusion zone of not less than 150 metres for shot firing. This is to include appropriate traffic control measures to detour traffic or close roads as necessary.		✓	Superintendent, Project Engineer
BMM16	Record each blast on video to assess the performance of the blast and refine the design where appropriate		✓	Foreman / Site Engineer

¹ PC means pre-construction

² C means construction

8 COMPLIANCE MANAGEMENT

8.1 Roles and Responsibilities

The roles outlined below will control and ensure the safety of the drill and blast operations.

<i>Shotfirer</i>	Qualified and Licensed person to ensure the safety of blasting works by carrying out best practice blast designs, blast hole loading, stemming, tie-in and initiation of each blast.
<i>Drill and Blast Manager</i>	Ensure that required resources are available to safely carry out blasting works.
<i>Drill and Blast Engineer</i>	Review blast designs, coordinate blasting operations, ensure subcontractor is performing works in accordance with the project Safety, Environmental and Quality requirements. Ensure that project blasting objectives are achieved.
<i>Drill and Blast Supervisor</i>	Coordinate the blast and site personnel for each blast. This includes establishing blast clearance zone, setting blast sentries and traffic controllers, coordinating clearance of the blast zone post shot.
<i>Safety Coordinator</i>	Ensuring that the blasting works are performed safely and in accordance with the safe work method statement.
<i>Environmental Manager</i>	Review blast designs to ensure vibration and airblast limits have been accurately calculated to ensure compliance with license limits for each blast.
<i>Community Relations Manager</i>	Community notification prior to blasting and addressing community concerns or complaints relating to blasting. Coordinate Dilapidation Surveys prior to blasting.
<i>Traffic Manager</i>	Ensure <i>Traffic Control Plans</i> are completed in accordance with the <i>Construction Traffic Management Sub-plan</i> and in a timely manner for blasting works.

8.2 Monitoring and Inspections

All blasts will be monitored at the nearest sensitive receivers for vibration and airblast in accordance with *RMS Specification D&C R44* Clause 4.7.1 and Clause 4.7.5. There will be a minimum of 3 monitoring locations for each blast with exception of the first Trial Blast, which will have a minimum of 5. The Blast Design will indicate the locations for monitoring for each blast.

As required by *RMS Specification D&C R44* Clause 4.7.3, the following information will be recorded and kept with the lot records in accordance with the Project Quality Plan:

- Date, identification number and time of blast
- Location, number and diameter of blast holes loaded
- Depth of each drill hole loaded
- Inclination of drill holes
- Burden(s) and spacing(s)
- Types and amount of explosives used
- Maximum instantaneous charge
- Initiation plan

- Length and type of stemming in each blast hole, and
- Ground vibration and noise levels at measuring locations.

These records will be taken at the time of loading and verified by the shotfirer.

In addition to the above, Blast videos will be recorded for each shot. They are an important tool in reviewing the flyrock potential of blasts. The face and crest of the blasts will be captured in the video to determine if there is any explosive energy that was not contained within the rock mass. This information will then be used when completing future blast designs to control the risk of flyrock.

8.3 Non-conformances

In the event of an exceedance to the project vibration limits, a non-conformance will be recorded in accordance with the Section 8.5 of the CEMP. This will include the following actions as a minimum:

- a. Survey of buildings and structures immediately following a monitored exceedance of the relevant vibration criteria by suitably qualified project staff, and
- b. Review of the site constant to ensure its suitability for continued use, or amend accordingly.

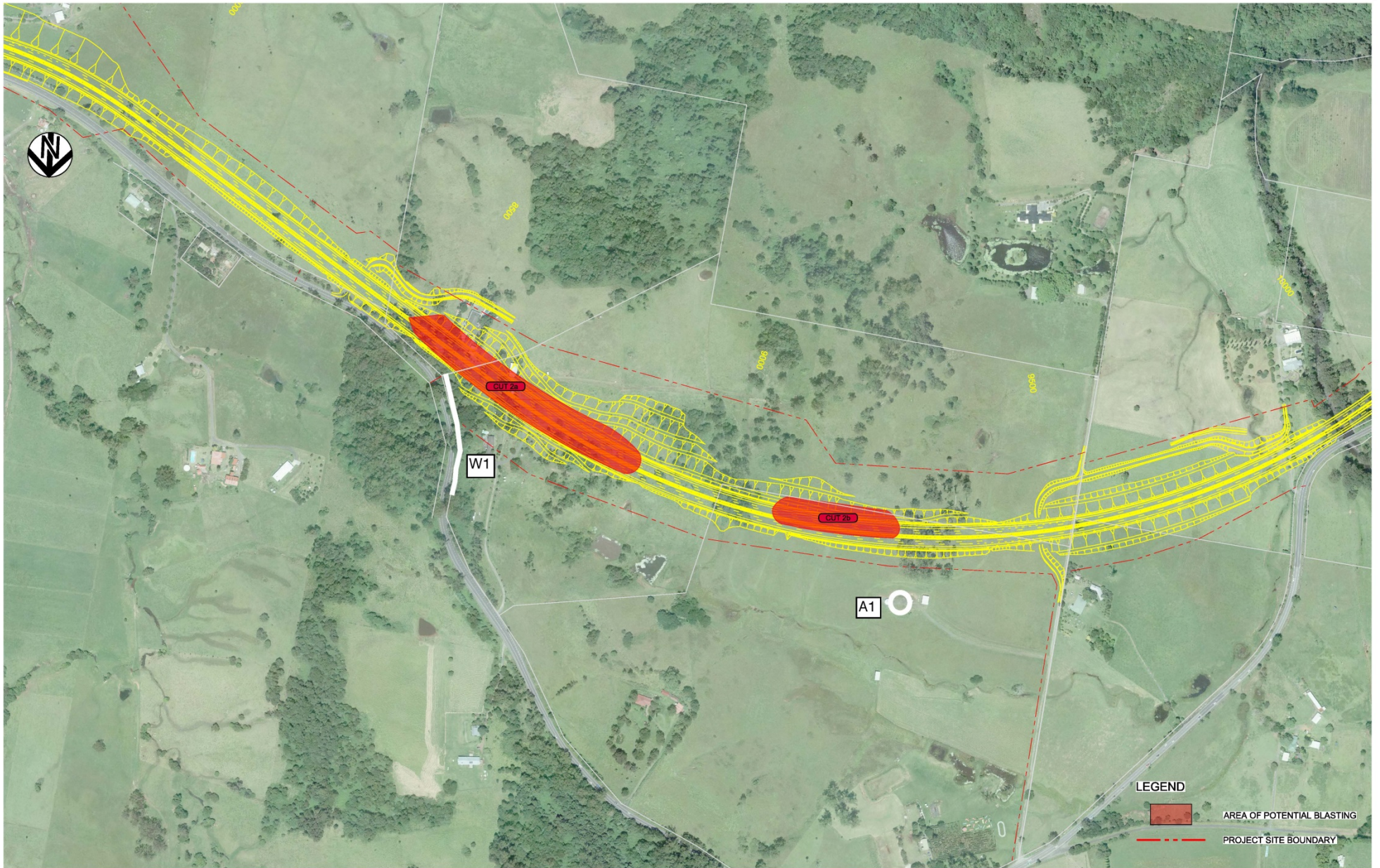
8.4 Complaints

Complaints will be recorded and addressed in accordance with Section 6.3 of the CEMP and the *Community Communication Strategy*.

9 REVIEW AND IMPROVEMENT OF BMP

Refer to Section 9 of the CNVMP.

Appendix A – SENSITIVE RECEIVERS AT BLAST LOCATIONS
(Vibration contours to be developed)



LEGEND

 AREA OF POTENTIAL BLASTING

 PROJECT SITE BOUNDARY

NOT FOR CONSTRUCTION

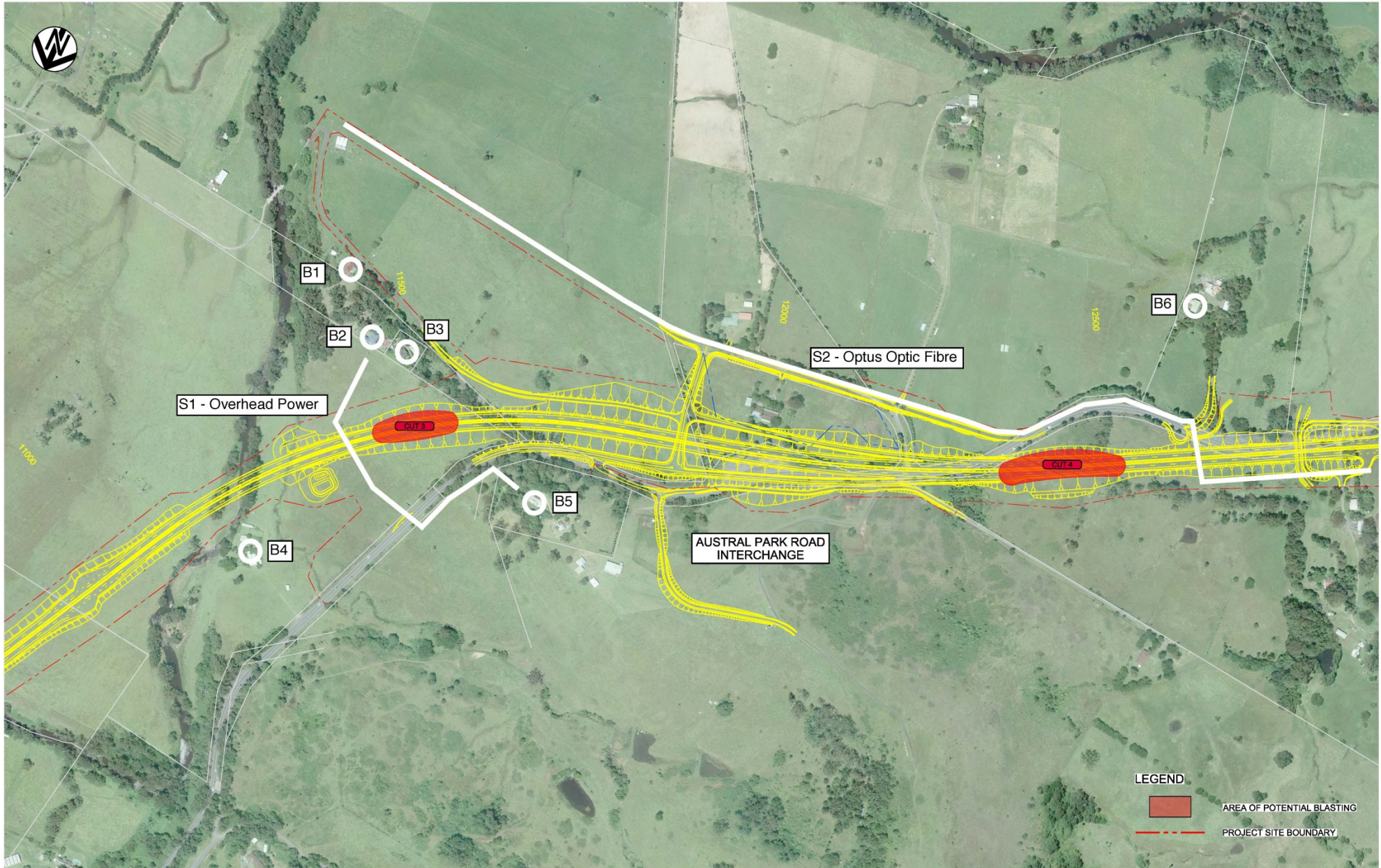
SCALE 1:5000
 25 0 50 100
 AT A3 SIZE DRAWING

**FOXGROUND AND BERRY BYPASS
 VIBRATION CONTOUR MAPS
 BLASTING AND DRILLING - CUT 2a & CUT 2b**

INFORMATION DOCUMENT
FBB-K-VIBRA_CONTOUR_PLAN_01-140729



DRAWING FILE LOCATION / NAME
 N:\Detailed Design\008 CAD\CAD\Info_Docs\Enviro\140729_VIBRATION_CONTOUR_MAPS\FBB-K-VIBRA_CONTOUR_PLAN_01-140729_1001.dwg



NOT FOR CONSTRUCTION

SCALE 1:5000
 25 0 50 100
 AT A3 SIZE DRAWING

**FOXGROUND AND BERRY BYPASS
 VIBRATION CONTOUR MAPS
 BLASTING AND DRILLING - CUT 3 & CUT 4**

**INFORMATION DOCUMENT
 FBB-K-VIBRA_CONTOUR_PLAN_02-140729**





Google earth

feet
meters





Appendix B – TRIAL BLAST PROCEDURE
(to be developed)

Appendix E
Out of Hours Work Approval Procedure

Out of Hours Work (OOHW) Approval Procedure

Purpose

This procedure provides the approval process to work outside of the standard construction hours identified in CoA C3. This procedure has been developed to ensure compliance with the conditions of approval for the project including EPL requirements.

Out Of Hours work approval process

The OOH work approval process is shown in Figure E-1.

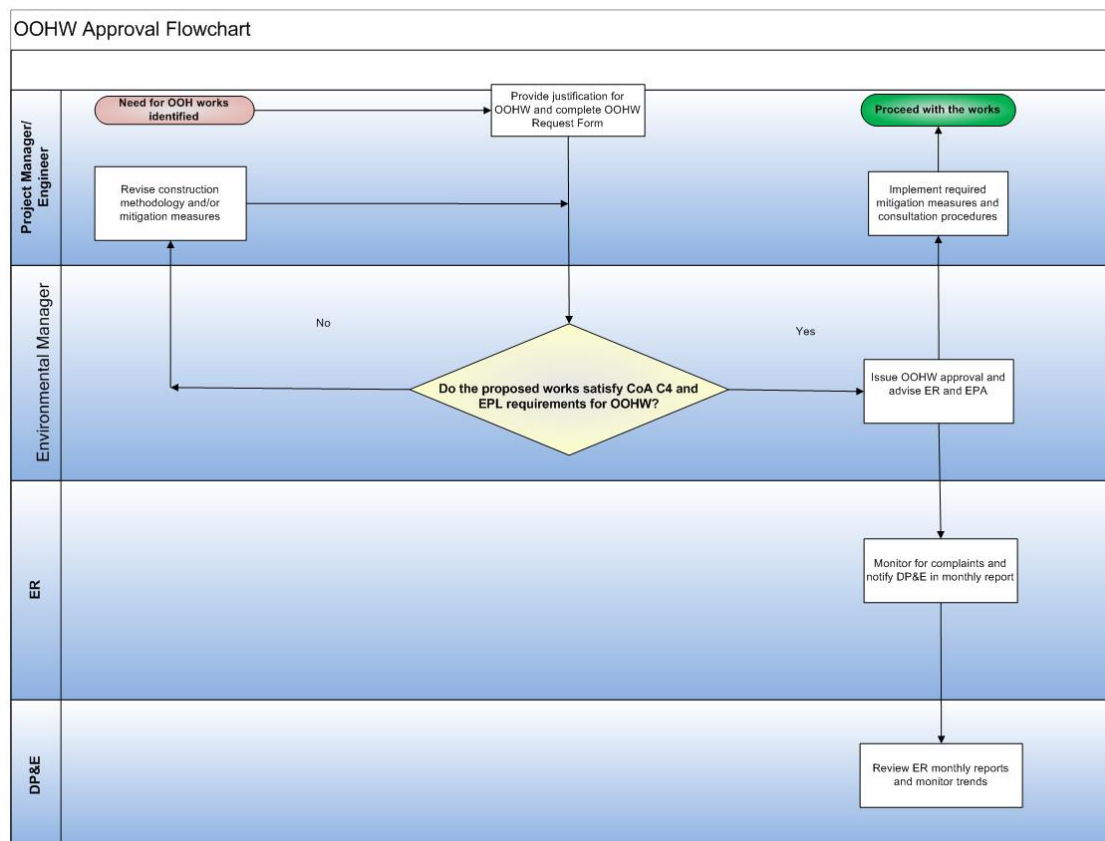
For OOHW approval to be granted, the Out of Hours Work Request Form will be completed by the engineering team representative, with assessment and approvals undertaken by the community team and environmental management team.

Generally, the following information is required to enable assessment and approval of the proposed works:

- Details of the planned work including justification with reference to the categories of OOH work described in Section 2.3 of the ICNG.
- Identification of noise sensitive land uses potentially affected by the works, plant type and anticipated periods of use.
- Mitigation measures that will be implemented on site during the works.
- Details of consultation that will be carried out prior to the works. This will include consultation with potentially affected sensitive receivers, the EPA and local councils.
- Any noise or vibration monitoring that will be carried out during the works.

OOH work will only commence with the written approval of the Project Environmental Manager or delegate, who is also responsible for informing the ER and EPA of the OOH work.

Figure E-1 Out of Hours Work Approval Flow Chart



Appendix E2

Out of Hours Work Request Form

This form must be submitted to Environment Team minimum 15 business days before the work.

Sections to be completed by:	Engineering Team	Environment Team	Community Team
------------------------------	------------------	------------------	----------------

Project: Foxground and Berry Bypass	
Application name:	Application date:

Contact details *24 hour contacts			
Role	Name	Mobile	Email
Project Director*	Andrew McRae	0429 368 562	andrew.mcrae@fultonhogan.com.au
Construction Manager	Michael Spencer	0419 717 630	michael.spencer@fultonhogan.com.au
Superintendent*	Kevin Keays	0419 858 298	kevin.keays@fultonhogan.com.au
Traffic Manager	Louis Peau	0417 286 277	louis.peau@fultonhogan.com.au
Safety Manager	Erik Heineback	0437 207 739	erik.heineback@fultonhogan.com.au
Environmental Manager*	Shannon Chisholm	0400 459 769	shannon.chisholm@fultonhogan.com.au
Community Relations Manager*	Wendy Carlson	0409 935 343	wendy.carlson@fultonhogan.com.au
RMS Contact	Ron de Rooy	0411 409 185	Ron.DE.ROOY@rms.nsw.gov.au

Details of work:
Location:
Description:
<input type="checkbox"/> A map has been attached that shows work area and distance to sensitive receivers. Sensitive land uses: <input type="checkbox"/> Residences <input type="checkbox"/> School <input type="checkbox"/> Church <input type="checkbox"/> Hospital <input type="checkbox"/> Recreation area <input type="checkbox"/> Community centre
Dates:
<input type="checkbox"/> Preliminaries <input type="checkbox"/> Demolition <input type="checkbox"/> Earthworks <input type="checkbox"/> Paving <input type="checkbox"/> Finishing Times: <input style="width: 100px;" type="text"/> <input style="width: 100px;" type="text"/> <input style="width: 100px;" type="text"/> <input style="width: 100px;" type="text"/> <input style="width: 100px;" type="text"/>
Justification for OOHW: <i>(Attach additional details if required)</i>

Environment Protection Licence condition L 4.2 (exempt after hours work): Yes No

- a) The delivery of oversized plant or structures that police or other authorised authorities determine requires special arrangements to transport along public roads;
- b) Emergency work to avoid the loss of lives or property, or to prevent environmental harm;
- c) Works that are not more than 5 dB(A) over the rating background level at the nearest noise sensitive receiver as assessed by acoustic investigation;
- d) For the area between Toolijooa Road and Tindalls Lane, encompassing Toolijooa cut, Broughton Creek floodplain and major bridgeworks (outside of Berry township) low noise impact activities and works may be carried out during the operating hours specified in the table below:

Day Time

Monday to Friday 6.00am to 7.00am

6.00pm to 7.00pm

Saturday 1.00pm to 5.00pm

Sunday NIL

Day preceding a Public Holiday long weekend No time after 6.00pm

- e) Where disruption to essential services and/or considerations of worker safety do not allow work within standard hours (*requires written confirmation from RMS that dispensation is not allowed & confirmation from EPA that the works are in accordance with Section 2.3 of ICNG*).

Environment Protection Licence condition L 4.4 - Community agreement required : Yes

Acoustic Impact Assessment

i. Identify time period when each item of plant is to be used, from reference table below.

ii. Tick which plant to be used in table below and record in which period it is to be used.

Reference Table

	Standard hours	Period 1	Period 2
Weekdays	No OOHW application required	1800-2200	2200-0700 overnight
Saturdays	No OOHW application required	1300-2200	2200-0800 overnight
Sundays and public holidays	N/A	0800-1800	1800-0700 overnight

Plant Required and Anticipated Work Period

Plant	Sound Level dB(A)		Period 1 or 2 above	Plant	Sound Level dB(A)		Period 1 or 2 above
	at 7m	at 30m			at 7m	at 30m	
<input type="checkbox"/> Impact Piling Rig	109	97		<input type="checkbox"/> Concrete pump	84	72	
<input type="checkbox"/> Excavator Hydraulic Hammer	97	85		<input type="checkbox"/> Powered Hand Tool	84	72	
<input type="checkbox"/> Dozer (equiv. CAT D9)	95	83		<input type="checkbox"/> Dump/Tip truck (~15 t)	83	71	
<input type="checkbox"/> Concrete Saw (hard concrete cut)	93	81		<input type="checkbox"/> Compactor	82	70	

<input type="checkbox"/> Asphalt Paving Machine	89	77		<input type="checkbox"/> Smooth Drum Roller	82	70	
<input type="checkbox"/> Handheld Jackhammer	88	76		<input type="checkbox"/> Truck Mounted Shotcrete Pump	81	69	
<input type="checkbox"/> Articulated Dump truck	88	76		<input type="checkbox"/> Chainsaw	81	69	
<input type="checkbox"/> Sheet Piling Rig	87	75		<input type="checkbox"/> Forklift	81	69	
<input type="checkbox"/> Semi trailer	87	75		<input type="checkbox"/> Mulcher	81	69	
<input type="checkbox"/> Concrete Batching Plant	87	75		<input type="checkbox"/> Excavator (~20 t) or Bobcat	80	68	
<input type="checkbox"/> Concrete Truck	87	75		<input type="checkbox"/> Road Trucks	80	68	
<input type="checkbox"/> Front End Loader	86	74		<input type="checkbox"/> Concrete Vibrator	80	68	
<input type="checkbox"/> Water Cart	85	73		<input type="checkbox"/> Tower Crane	80	68	
<input type="checkbox"/> Bored Piling Rig	85	73		<input type="checkbox"/> Generator	79	67	
<input type="checkbox"/> Grader	85	70		<input type="checkbox"/> Fuel Truck (at idle)	77	65	
<input type="checkbox"/> Mobile Crane	85	73		<input type="checkbox"/> Air Compressor (~ 600 CFM)	75	63	
<input type="checkbox"/> Excavator (~30 t)	85	73		<input type="checkbox"/> Kerbing Machine	74	62	
<input type="checkbox"/> Lighting Tower	65			<input type="checkbox"/> Traffic Management	60		
List Other Plant							

Are there any natural or man-made barriers or shielding between source & sensitive receiver(s)? No Yes (*Describe any barriers/shielding*)

Associated impacts of proposed OOHW:

- | | |
|---|--|
| <input type="checkbox"/> Dust <i>e.g. heavy trucks; soil clearance</i> | <input type="checkbox"/> Lighting <i>e.g. floodlit residential areas</i> |
| <input type="checkbox"/> Traffic <i>e.g. deliveries, lane closures</i> | <input type="checkbox"/> Parking <i>e.g. closure of spaces</i> |
| <input type="checkbox"/> Pedestrian access <i>e.g. pavements closed</i> | <input type="checkbox"/> Property access |
| <input type="checkbox"/> Vibration <i>e.g. rollers, damage to heritage properties</i> | |
| <input type="checkbox"/> Public transport <i>e.g. schedule changes</i> | <input type="checkbox"/> Others (<i>specify</i>) |

Mitigation measures *e.g. temporary noise barriers. Refer to CNVP Table 7-1.*

The following noise mitigation measures are to be implemented:

1. Generators and lighting towers will be positioned as far from sensitive receivers as practicable
2. Lighting towers will be placed to limit light spillage and glare for residential receivers
3. All vehicles used will use 'smart' reversing safety devices
4. Excessively noisy works will be completed as quickly as possible and where possible will be

undertaken during daytime hours or during normal construction hours or programmed to occur in Period 1 with completion by 10pm.

5. Staff, subcontractors and truck drivers will be toolboxed to minimise unnecessary noise generation during their activities
6. Engines will be turned off rather than left idling.
7. Additional Specific Measures:

Has acoustic assessment been prepared? No Yes – see attached

Agreement is required with residents within radius of: _____m under **EPL condition L4.4**

Number of identified potential receivers = _____

Stakeholder Consultation

Details of community consultation carried out:

Resident agreement

Resident notification

PDF copy issued to Councils

PDF copy issued to RMS for web upload

Fulton Hogan approvals: *Community Relations Team to carry out consultation and Environmental Manager to consult with EPA*

Work has been agreed to by potentially affected community: No Yes

Comment:

Community Relations Manager:

Date:

EPA notification - *EPA has been consulted & works are compliant with EPL provisions:*

Environmental Manager:

No

Yes

Date:

ER notification Date:

Noise or vibration monitoring required:

No

Yes

Applicant has notified RMS / PV:

No

Yes

Date:

Appendix F

Noise Monitoring Locations



**FOXGROUND BERRY BYPASS
FIGURE F1**

**Standard construction noise
monitoring locations**

- Legend**
- Monitoring Locations
 - Road alignment

N

0 500 1000 m

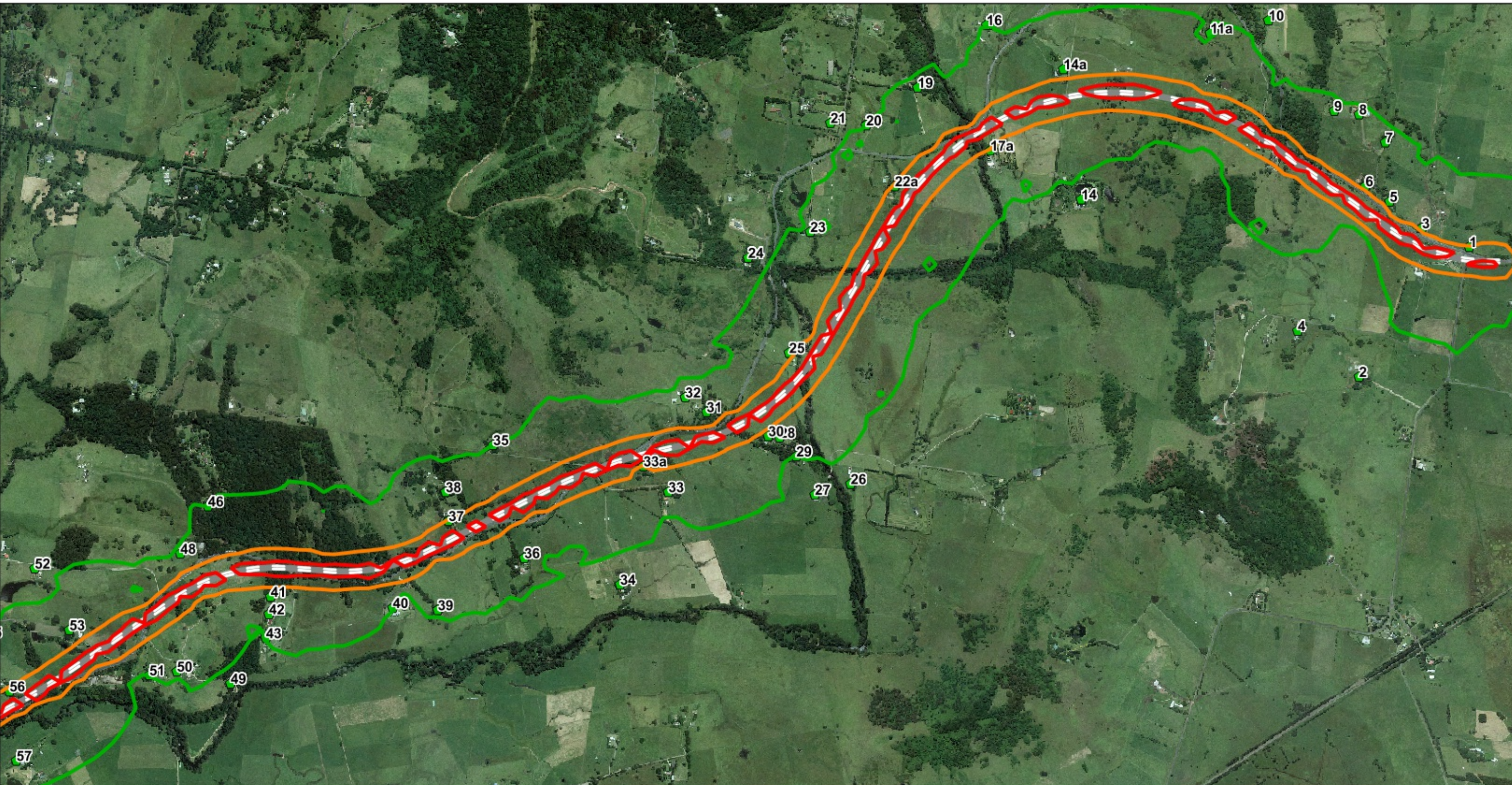
Datum WGS 84, Projection UTM ZONE 56S

Date: 21 August 2014
 Client: Fulton Hogan
 Drawn by: TRE
 Report reference: NVMP



Appendix G

Construction Noise Contours



FOXGROUND BERRY BYPASS
FIGURE G1
Predicted construction noise levels
Scenario A: Site establishment works

SECTION 1: Toolijoola Road to Tindalls Lane

Date: 13 May 2014
 Client: Fulton Hogan
 Drawn by: TRE
 Report reference: NVMP

Legend

- ◆ Receivers
- Road alignment

Predicted construction noise levels, Leq,15min

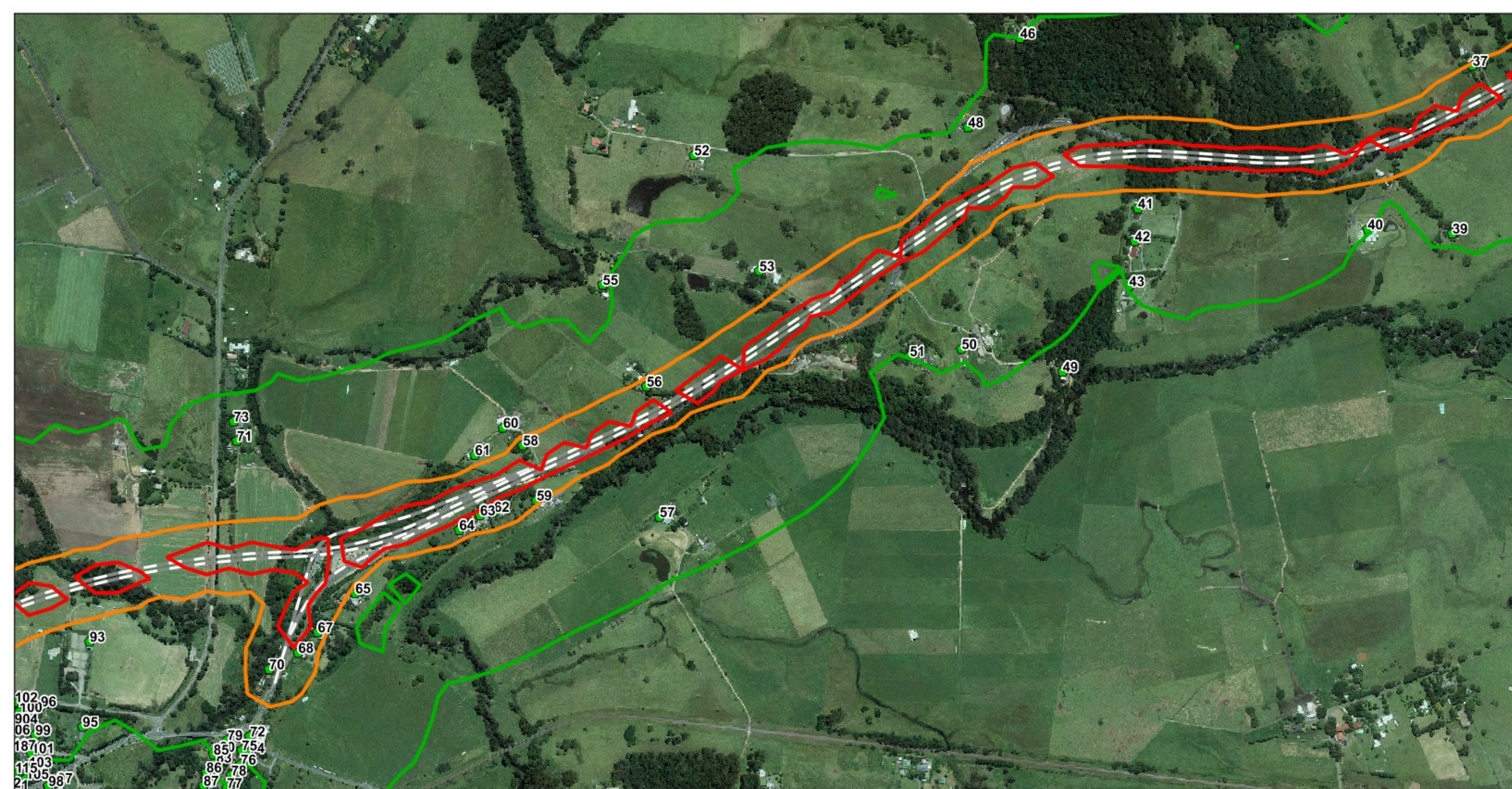
- 45 dB(A)
- 60 dB(A)
- 75 dB(A)

N

0 500 1000 m

Datum WGS 84, Projection UTM ZONE 56S





**FOXGROUND BERRY BYPASS
FIGURE G2
Predicted construction noise levels
Scenario A: Site establishment works**

SECTION 2: Berry North Interchange

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

Legend

◆ Receivers

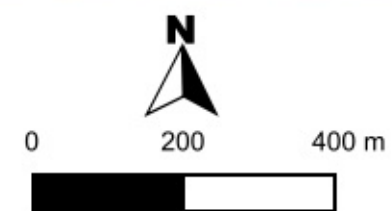
— Road alignment

Predicted construction noise levels, Leq,15min

— 45 dB(A)

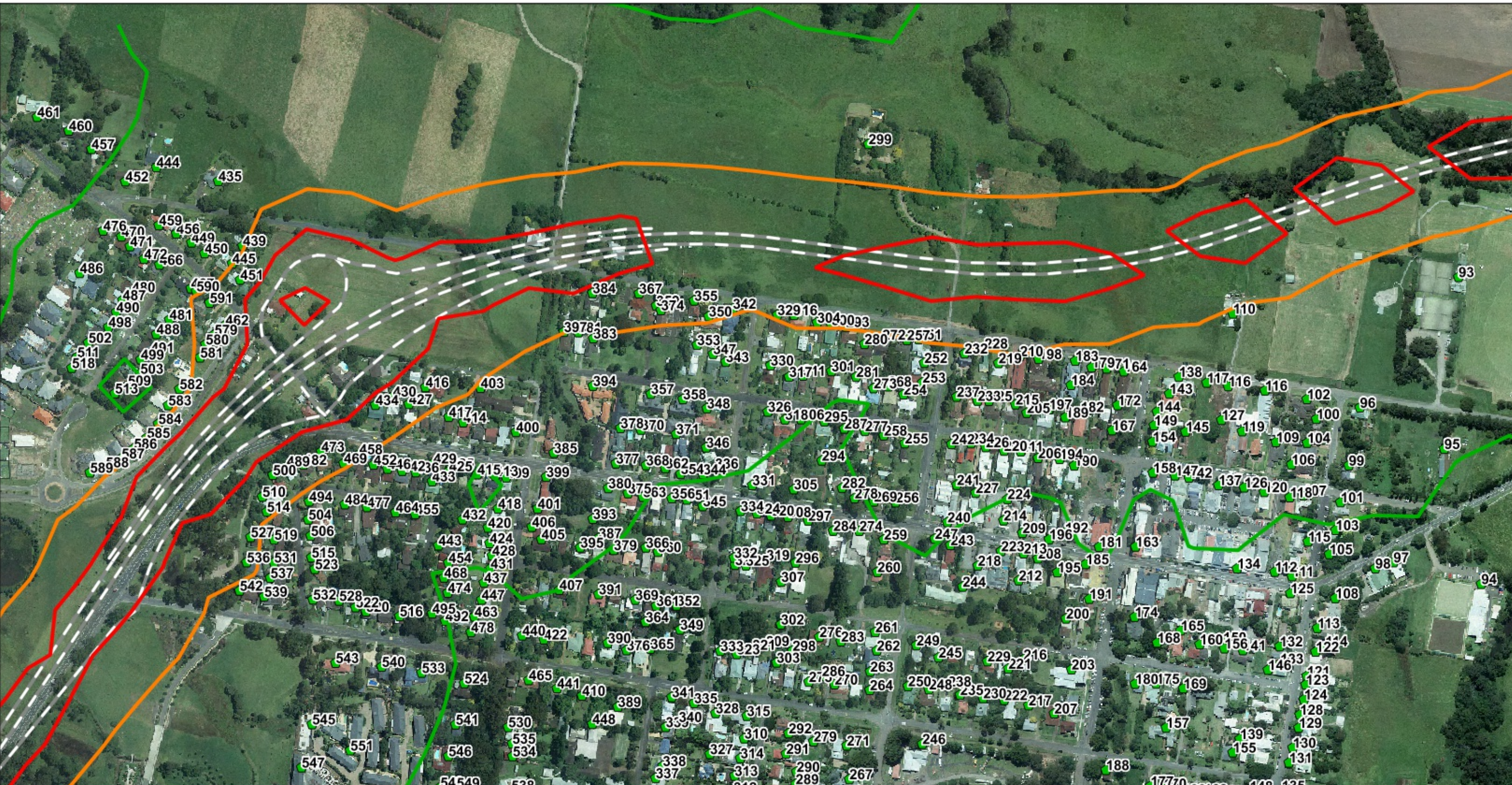
— 60 dB(A)

— 75 dB(A)



Datum WGS 84, Projection UTM ZONE 56S





**FOXGROUND BERRY BYPASS
FIGURE G3
Predicted construction noise levels
Scenario A: Site establishment works**

SECTION 3: Berry

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

Legend

- Receivers
- Road alignment

Predicted construction noise levels, Leq,15min

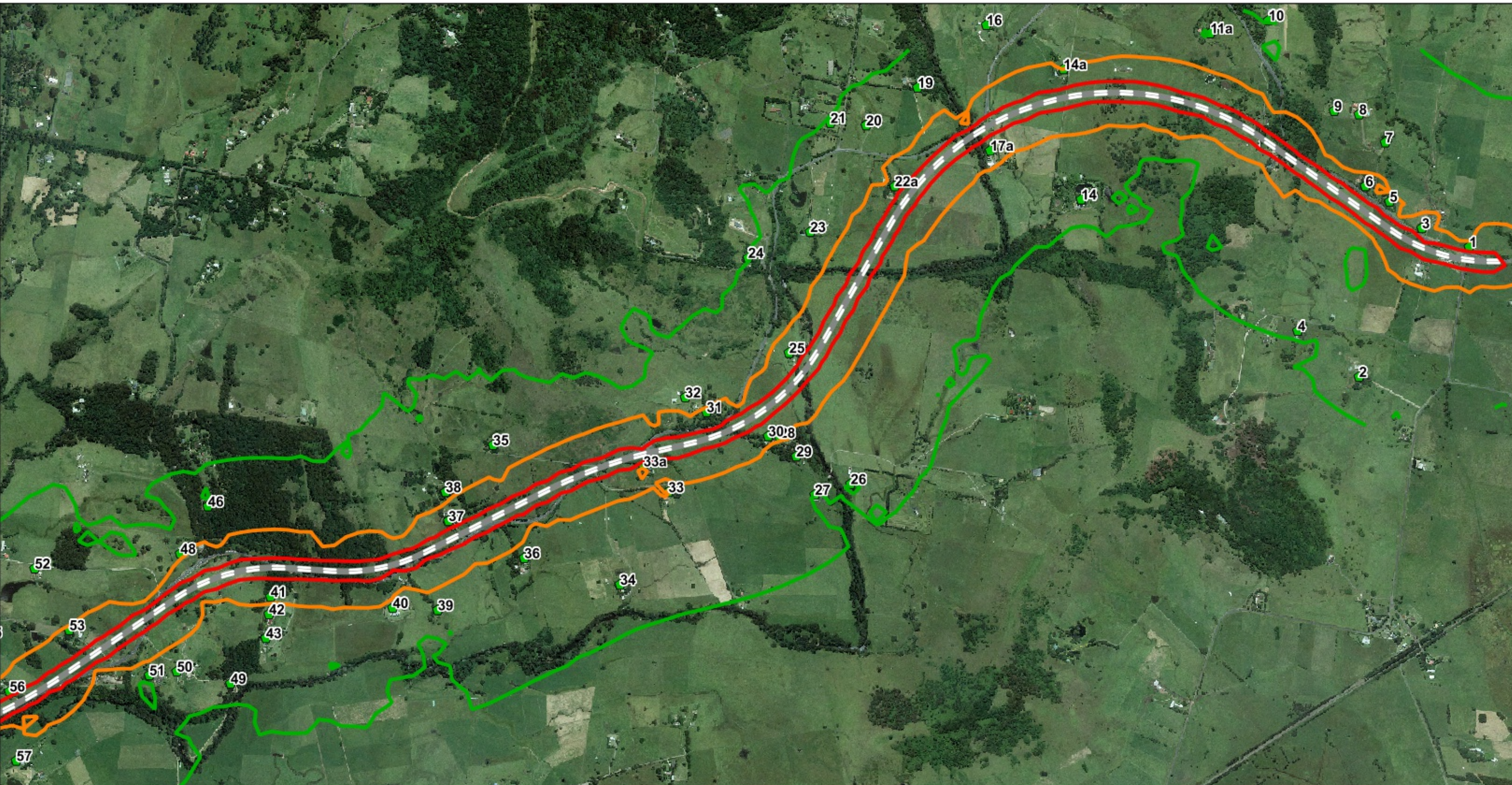
- 45 dB(A)
- 60 dB(A)
- 75 dB(A)

N

0 100 200 m

Datum WGS 84, Projection UTM ZONE 56S





**FOXGROUND BERRY BYPASS
FIGURE G5
Predicted construction noise levels
Scenario B: Earthworks**

**SECTION 1: Toolijoola Road to
Tindalls Lane**

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

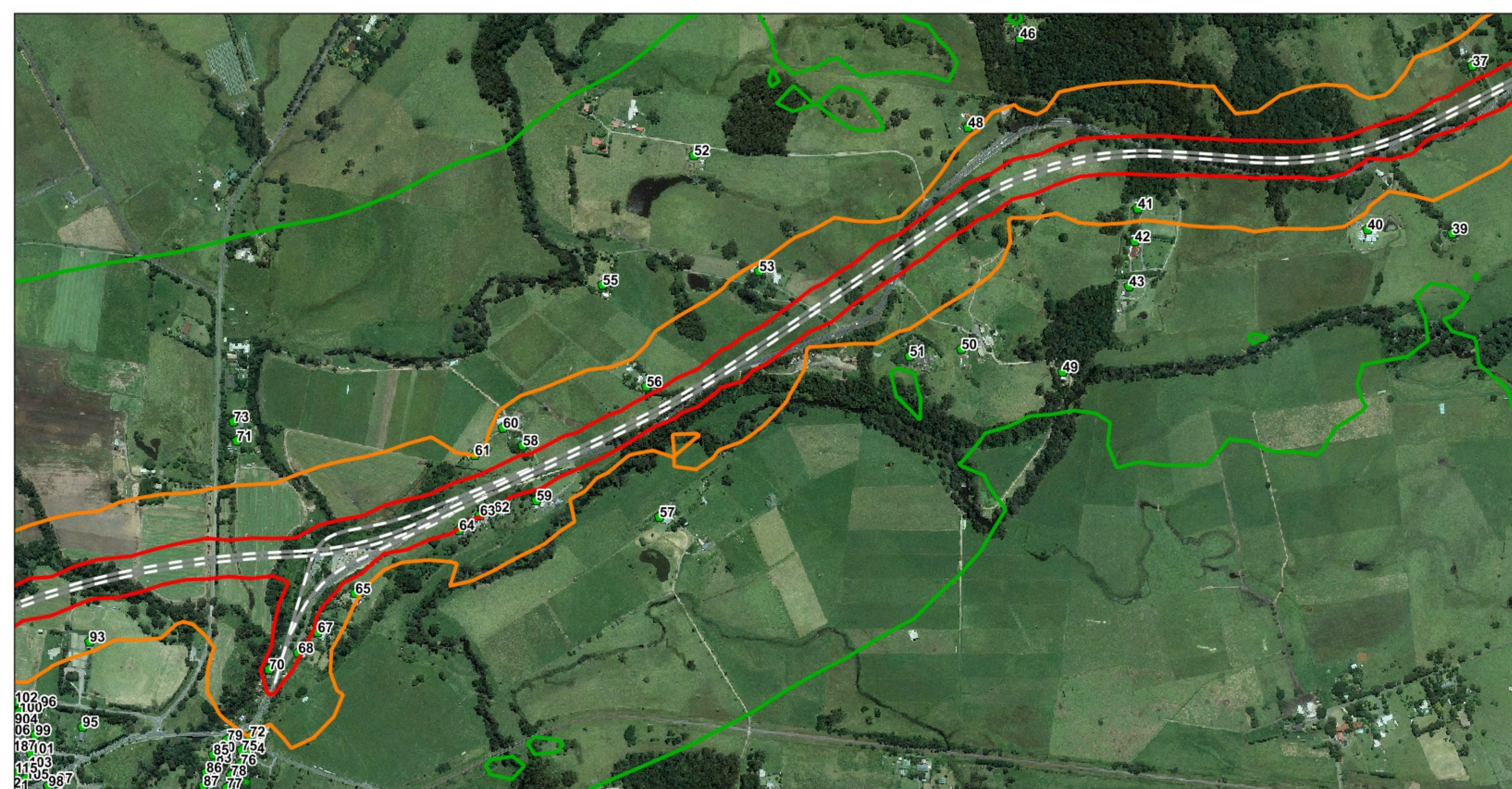
- Legend**
- ◆ Receivers
 - Road alignment
- Predicted construction noise levels, Leq, 15min
- 45 dB(A)
 - 60 dB(A)
 - 75 dB(A)

N

0 500 1000 m

Datum WGS 84, Projection UTM ZONE 56S





**FOXGROUND BERRY BYPASS
FIGURE G6
Predicted construction noise levels
Scenario B: Earthworks**

SECTION 2: Berry North Interchange

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

Legend

◆ Receivers

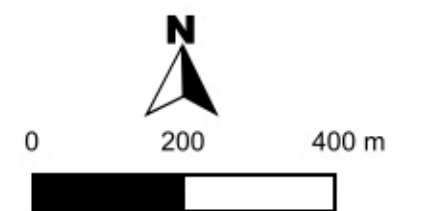
— Road alignment

Predicted construction noise levels, Leq,15min

— 45 dB(A)

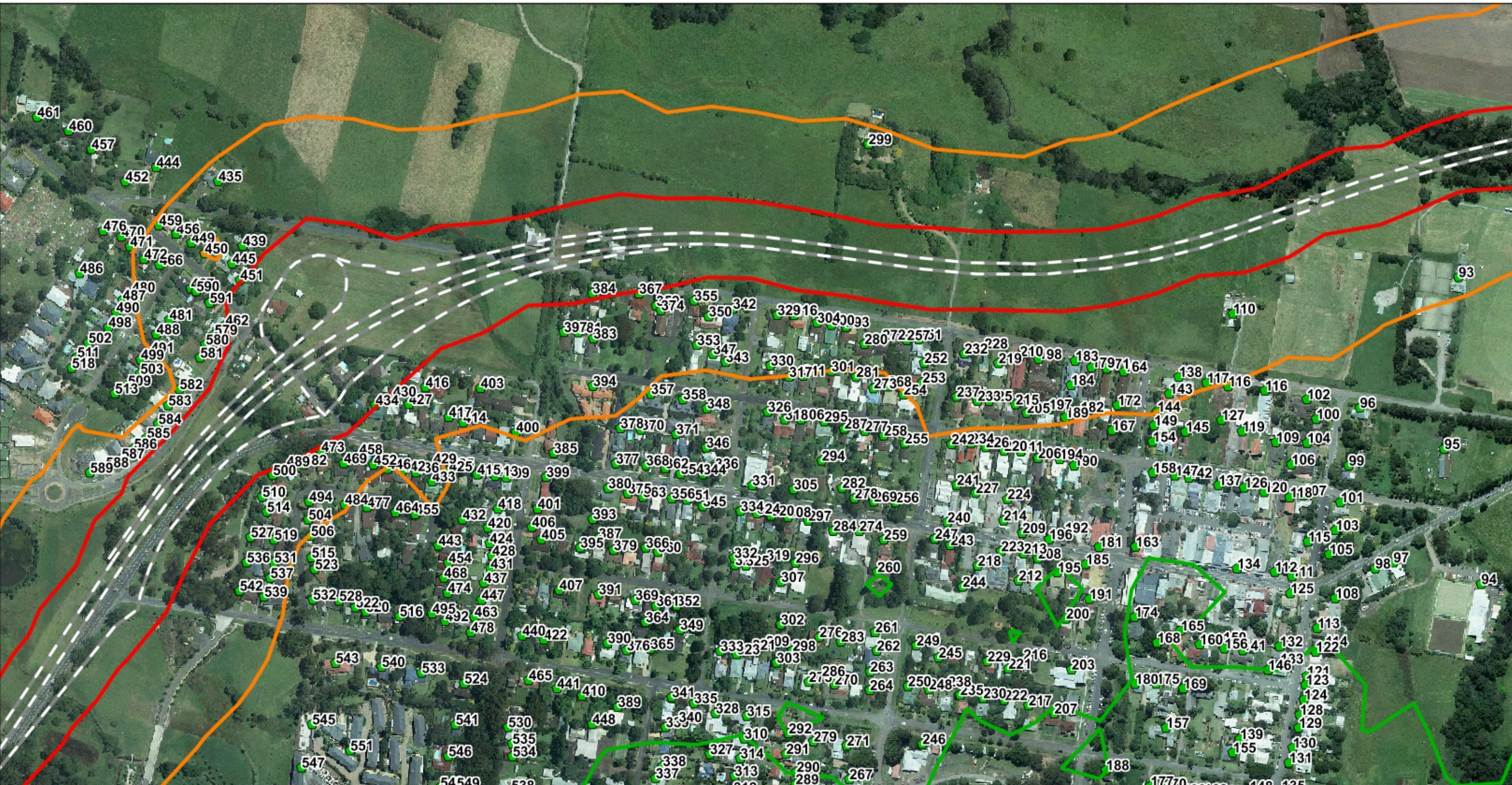
— 60 dB(A)

— 75 dB(A)



Datum WGS 84, Projection UTM ZONE 56S





**FOXGROUND BERRY BYPASS
FIGURE G7
Predicted construction noise levels
Scenario B: Earthworks**

SECTION 3: Berry

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

Legend

- Receivers
- Road alignment

Predicted construction noise levels, Leq,15min

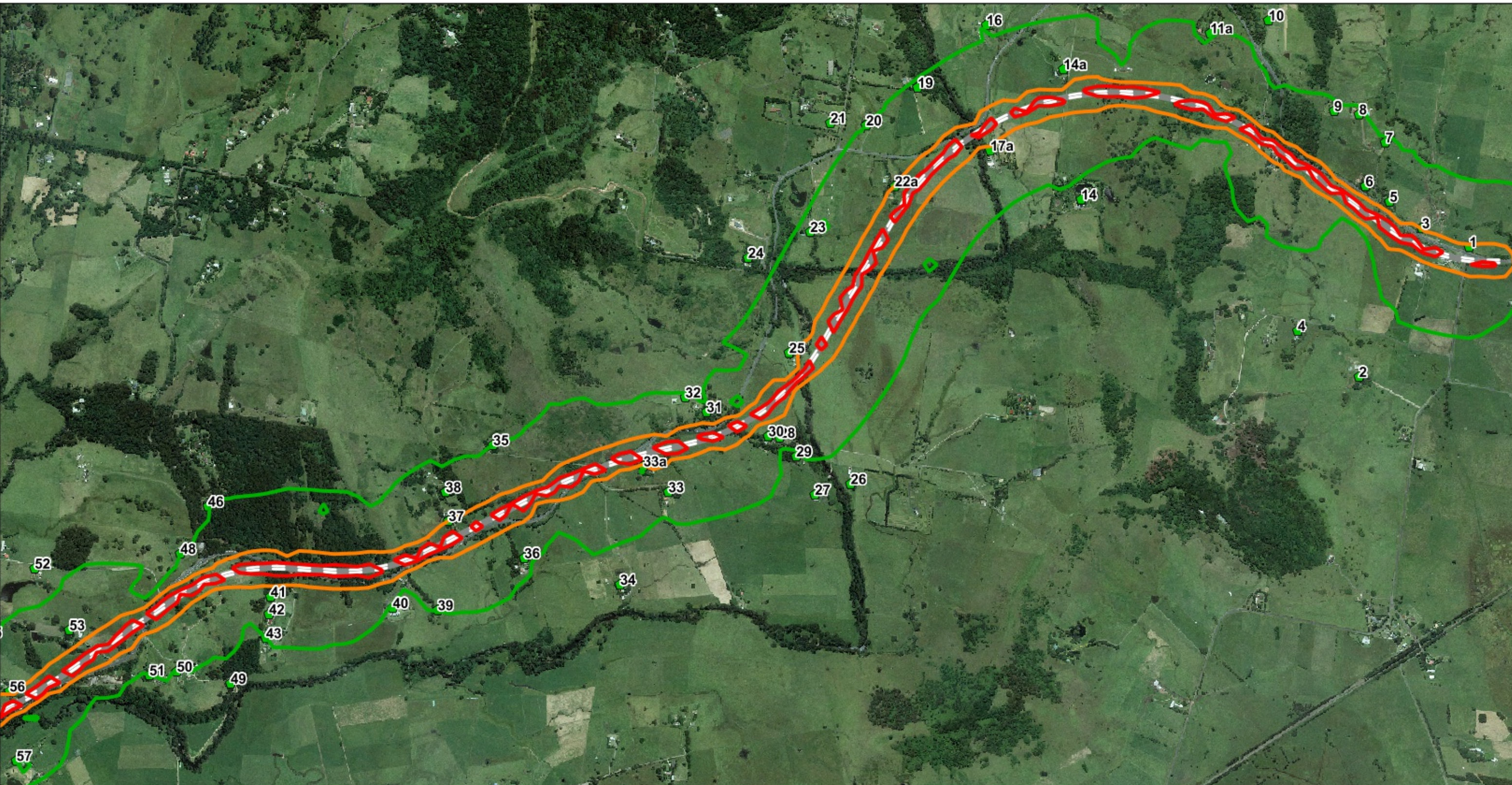
- 45 dB(A)
- 60 dB(A)
- 75 dB(A)

N

0 100 200 m

Datum WGS 84, Projection UTM ZONE 56S





FOXGROUND BERRY BYPASS
FIGURE G9
Predicted construction noise levels
Scenario C: Bored piling

SECTION 1: Toolijoola Road to
Tindalls Lane

Date: 13 May 2014
 Client: Fulton Hogan
 Drawn by: TRE
 Report reference: NVMP

Legend

- ◆ Receivers
- Road alignment

Predicted construction noise levels, Leq,15min

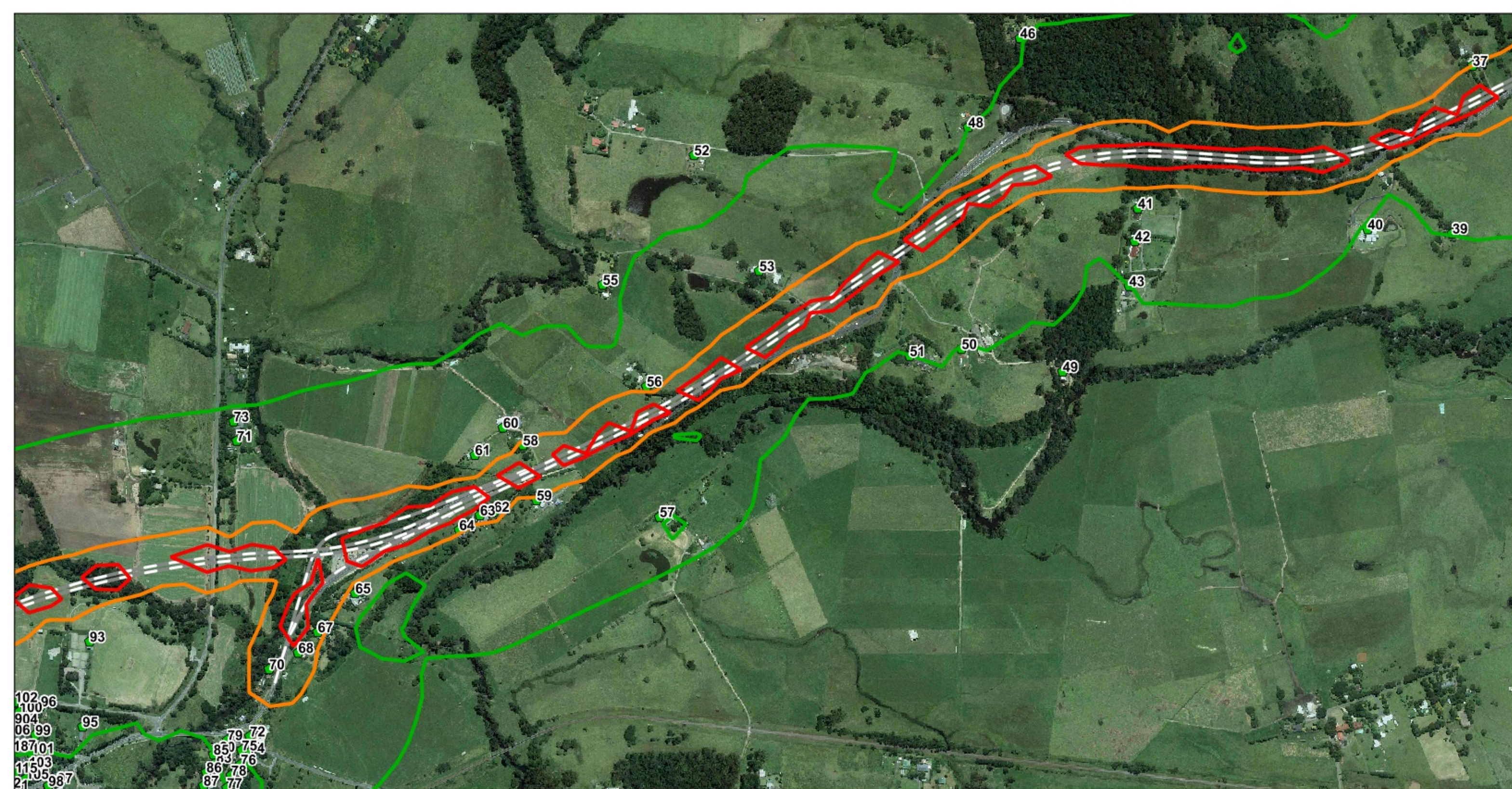
- 45 dB(A)
- 60 dB(A)
- 75 dB(A)

N

0 500 1000 m

Datum WGS 84, Projection UTM ZONE 56S





**FOXGROUND BERRY BYPASS
FIGURE G10
Predicted construction noise levels
Scenario C: Bored Piling**

SECTION 2: Berry North Interchange

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

Legend

◆ Receivers

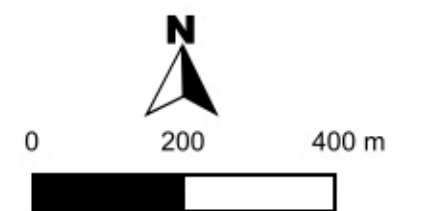
— Road alignment

Predicted construction noise levels, Leq,15min

— 45 dB(A)

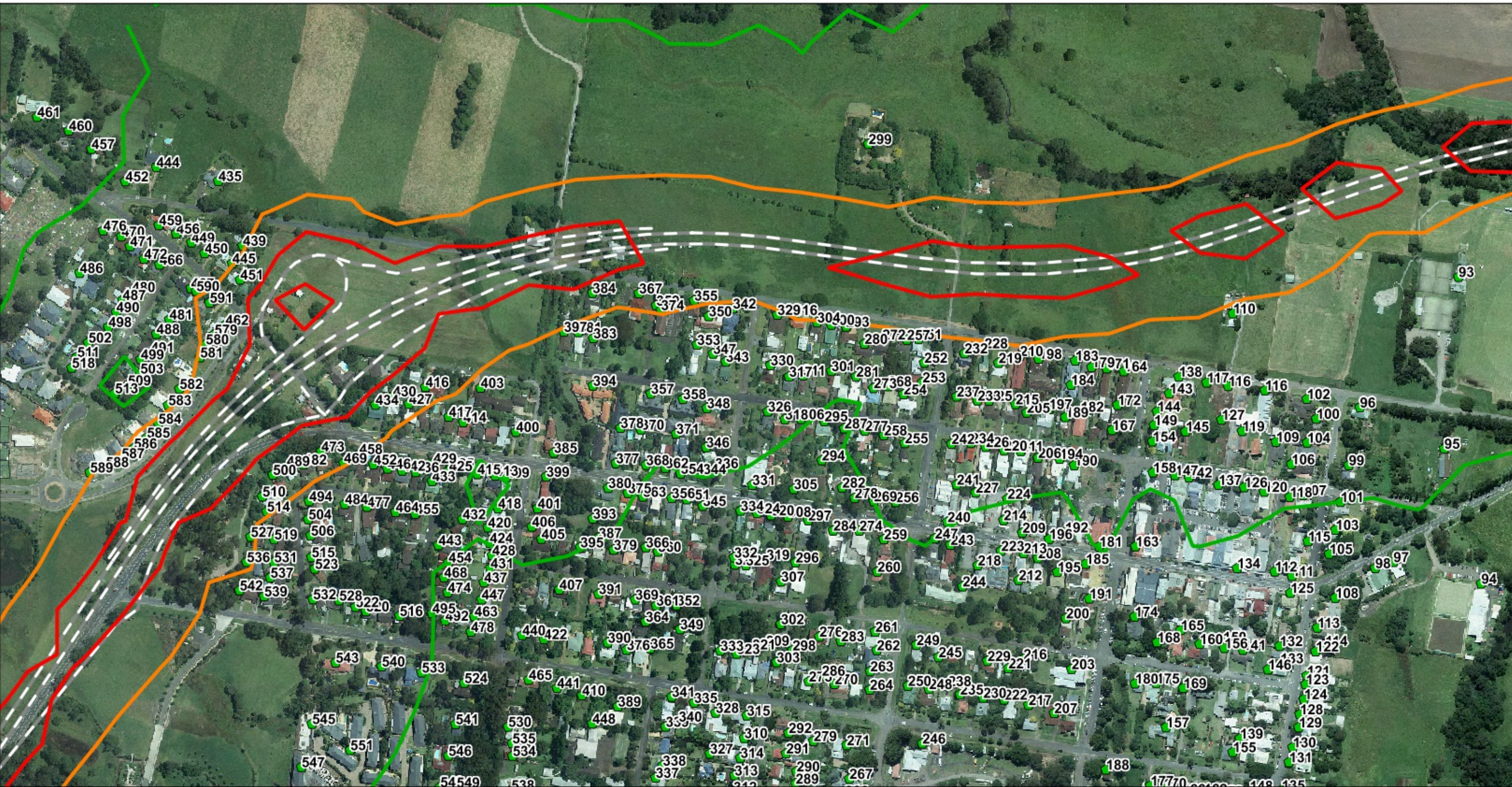
— 60 dB(A)

— 75 dB(A)



Datum WGS 84, Projection UTM ZONE 56S





**FOXGROUND BERRY BYPASS
FIGURE G11
Predicted construction noise levels
Scenario C: Bored Piling**

SECTION 3: Berry

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

Legend

- ◆ Receivers
- Road alignment

Predicted construction noise levels, Leq,15min

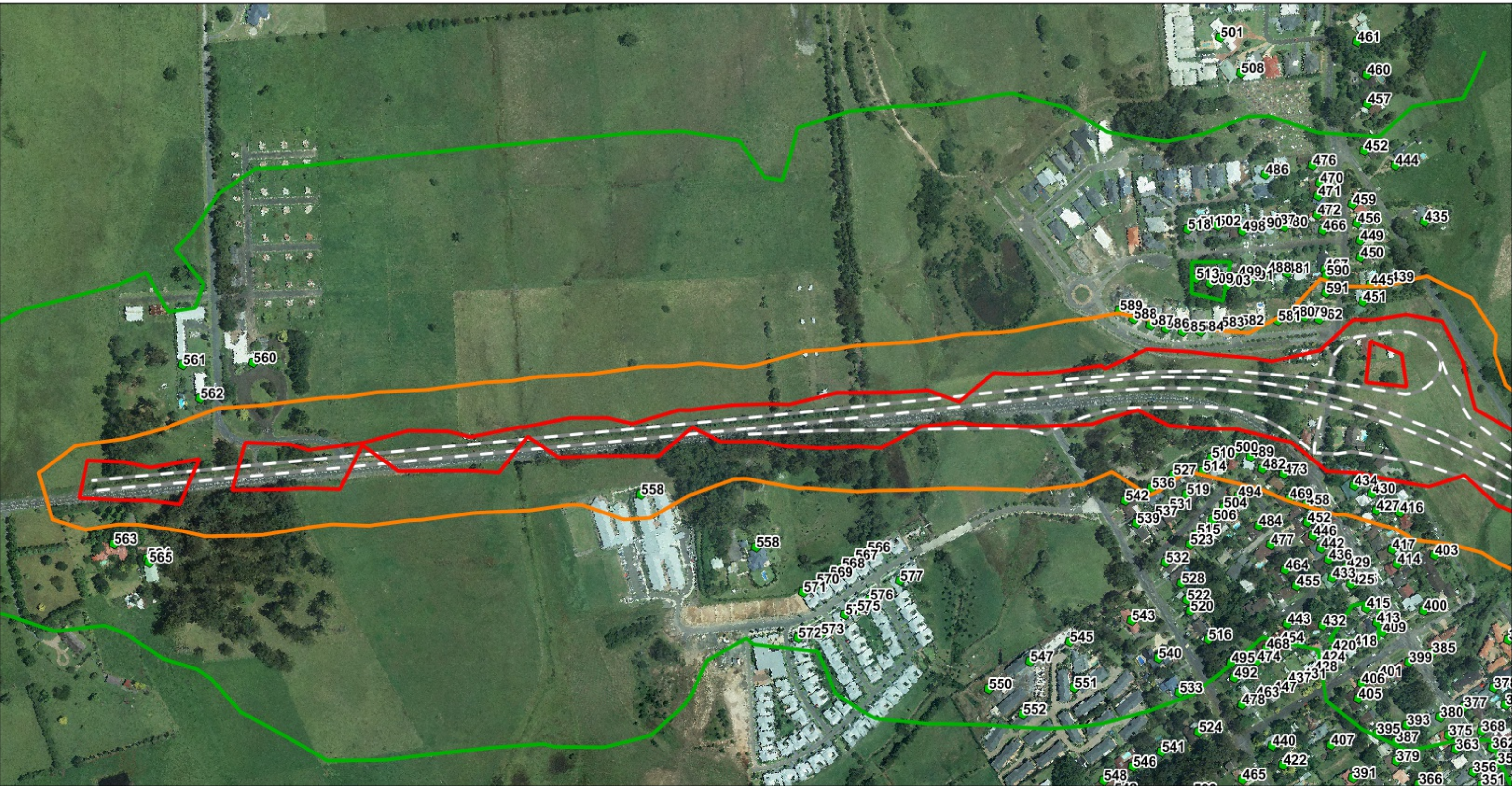
- 45 dB(A)
- 60 dB(A)
- 75 dB(A)

N

0 100 200 m

Datum WGS 84, Projection UTM ZONE 56S





**FOXGROUND BERRY BYPASS
FIGURE G12
Predicted construction noise levels
Scenario C: Bored Piling**

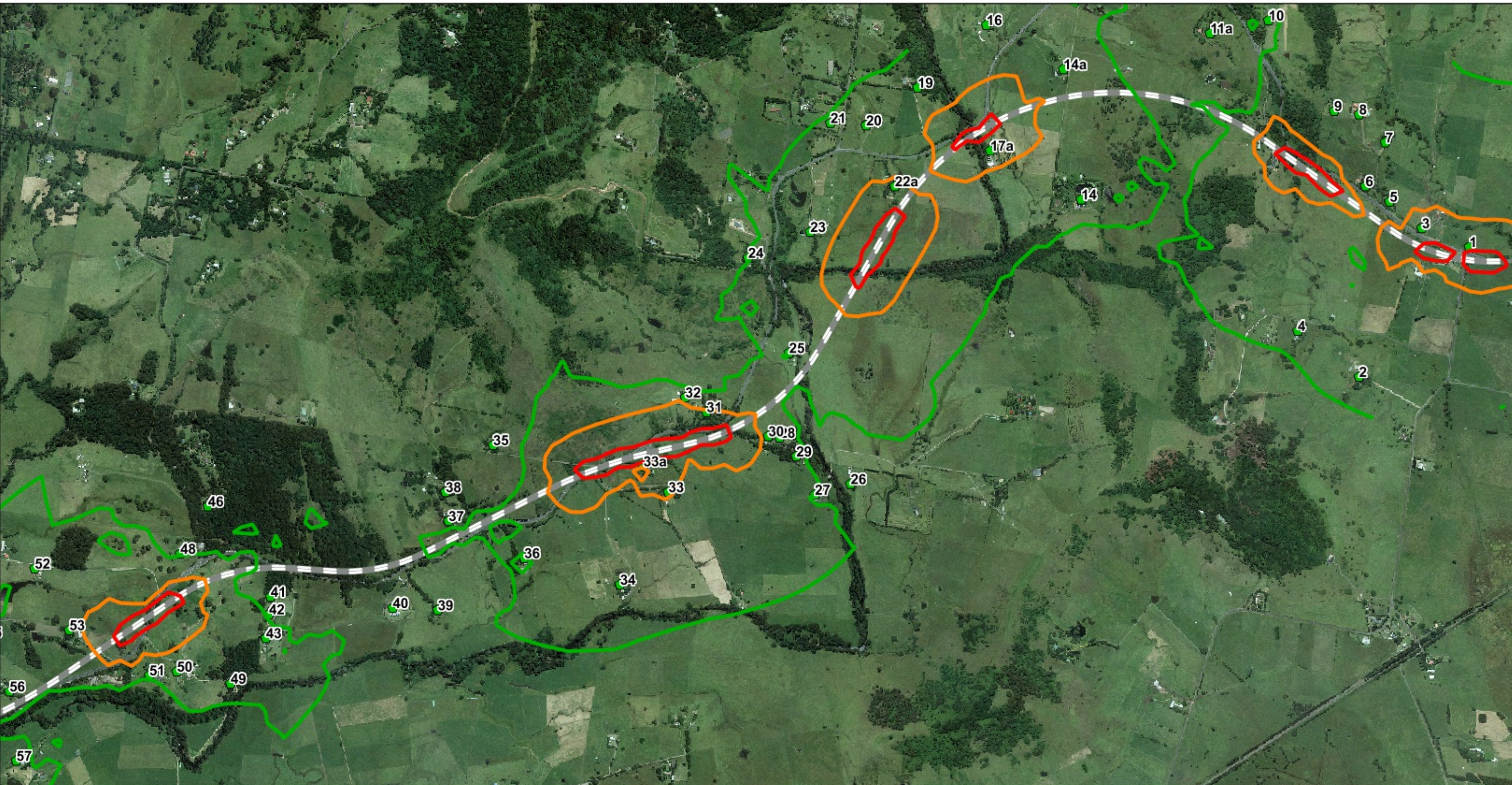
SECTION 4: South of Berry

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

- Legend**
- ◆ Receivers
 - Road alignment
- Predicted construction noise levels, Leq,15min
- 45 dB(A)
 - 60 dB(A)
 - 75 dB(A)

Datum WGS 84, Projection UTM ZONE 56S





FOXGROUND BERRY BYPASS
FIGURE G13
Predicted construction noise levels
Scenario D: Bridgeworks

SECTION 1: Toolijoola Road to
Tindalls Lane

Date: 13 May 2014
 Client: Fulton Hogan
 Drawn by: TRE
 Report reference: NVMP

- Legend**
- ◆ Receivers
 - Road alignment
- Predicted construction noise levels, Leq,15min
- 45 dB(A)
 - 60 dB(A)
 - 75 dB(A)

N

0 500 1000 m

Datum WGS 84, Projection UTM ZONE 56S





**FOXGROUND BERRY BYPASS
FIGURE G14
Predicted construction noise levels
Scenario D: Bridgeworks**

SECTION 2: Berry North Interchange

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

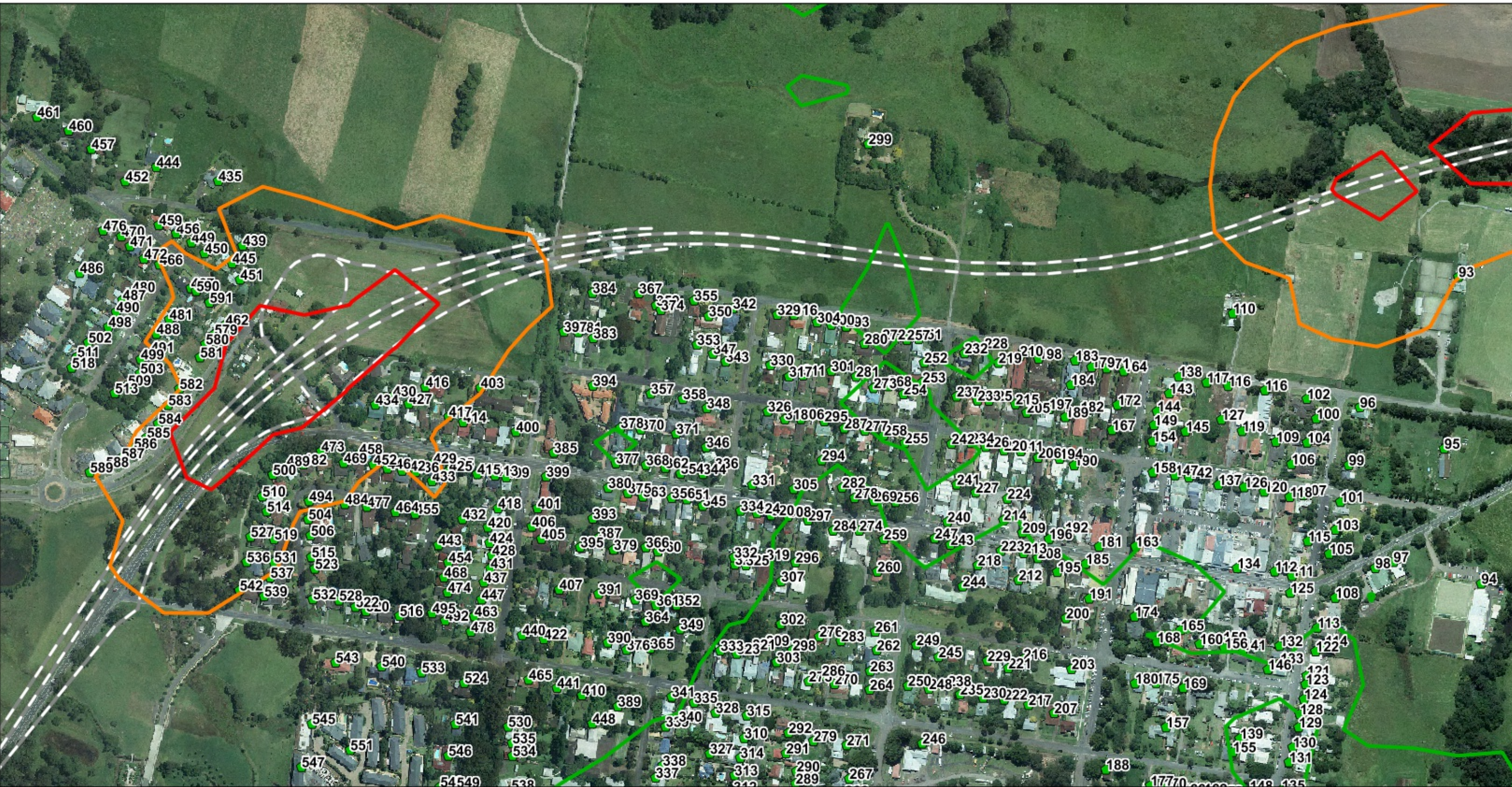
Legend

- ◆ Receivers
- Road alignment
- Predicted construction noise levels, Leq,15min
- 45 dB(A)
- 60 dB(A)
- 75 dB(A)



Datum WGS 84, Projection UTM ZONE 56S



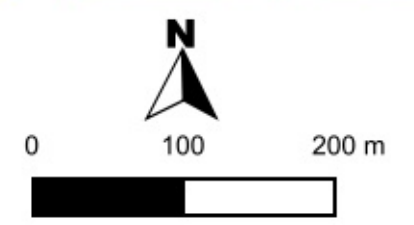


**FOXGROUND BERRY BYPASS
FIGURE G15
Predicted construction noise levels
Scenario D: Bridgeworks**

SECTION 3: Berry

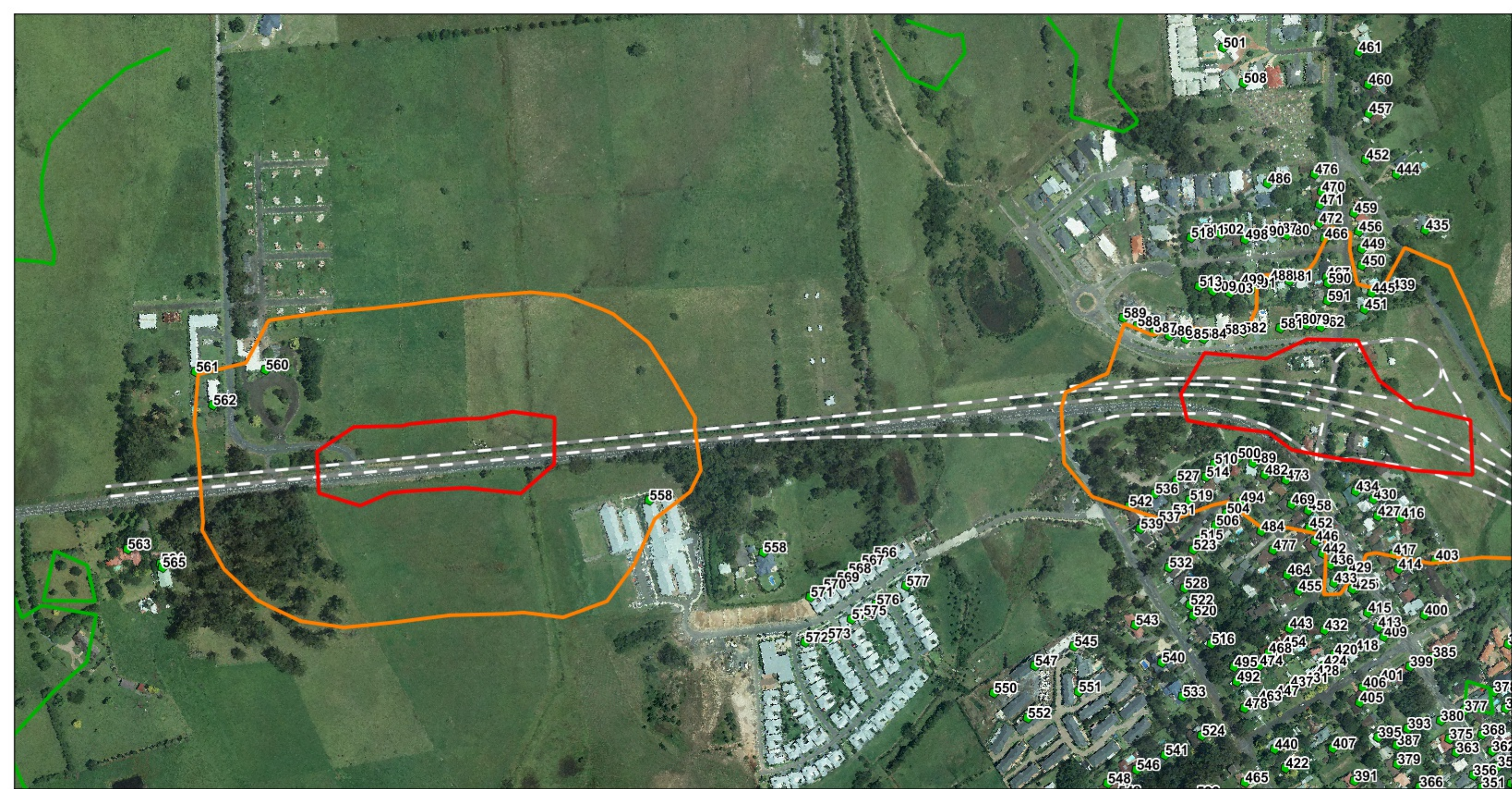
Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

- Legend**
- ◆ Receivers
 - Road alignment
- Predicted construction noise levels, Leq,15min
- 45 dB(A)
 - 60 dB(A)
 - 75 dB(A)



Datum WGS 84, Projection UTM ZONE 56S



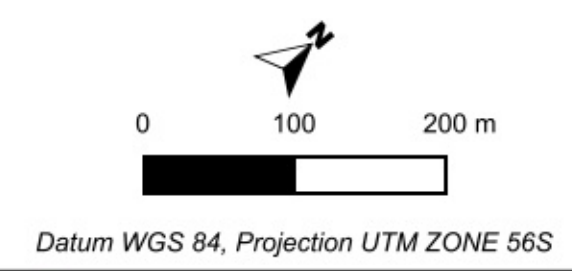


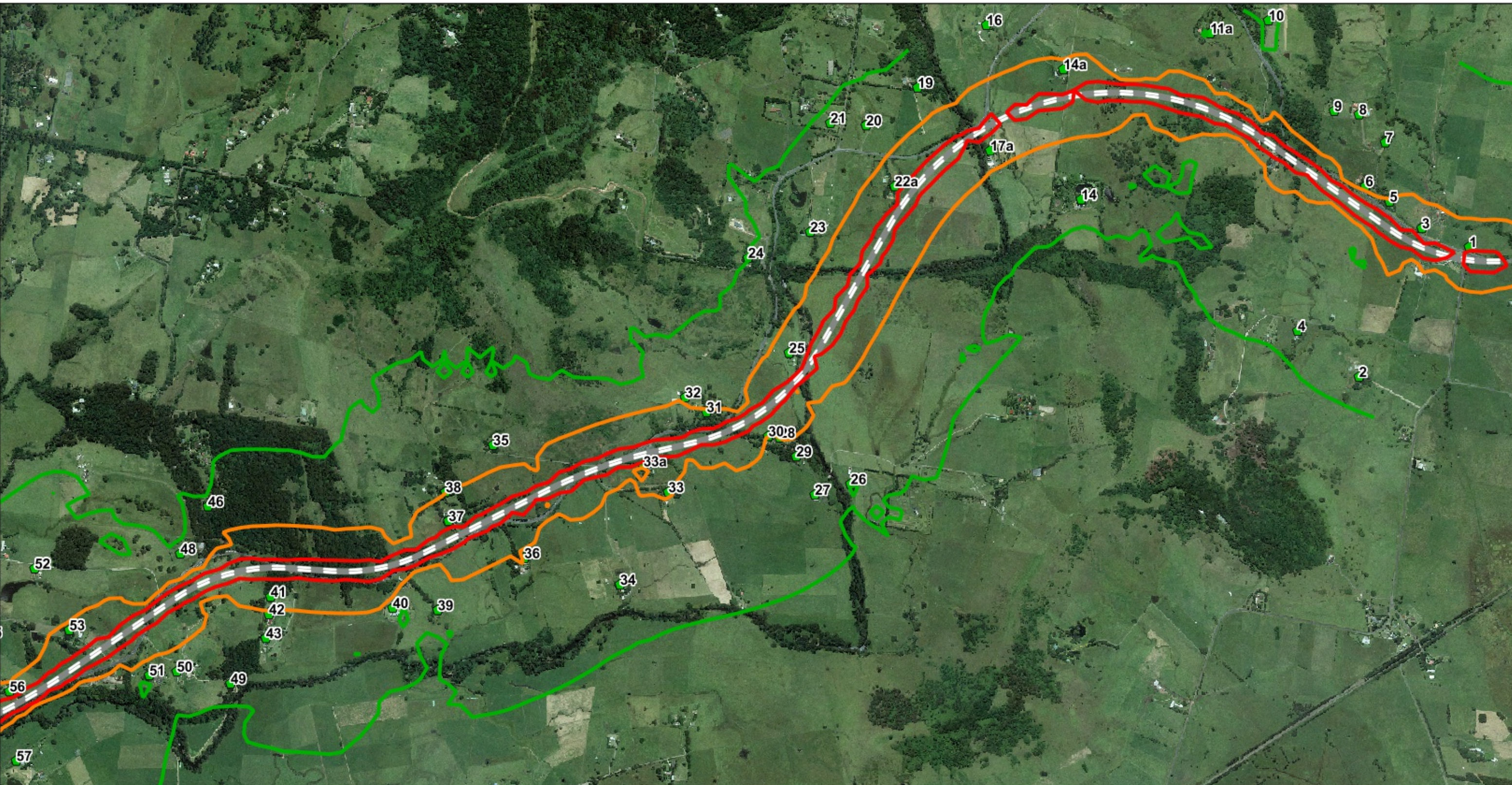
**FOXGROUND BERRY BYPASS
FIGURE G16
Predicted construction noise levels
Scenario D: Bridgeworks**

SECTION 4: South of Berry

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

- Legend**
- Receivers
 - Road alignment
- Predicted construction noise levels, Leq,15min
- 45 dB(A)
 - 60 dB(A)
 - 75 dB(A)





**FOXGROUND BERRY BYPASS
FIGURE G17
Predicted construction noise levels
Scenario E: Paving**

**SECTION 1: Toolijoola Road to
Tindalls Lane**

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

Legend

- ◆ Receivers
- Road alignment

Predicted construction noise levels, Leq, 15min

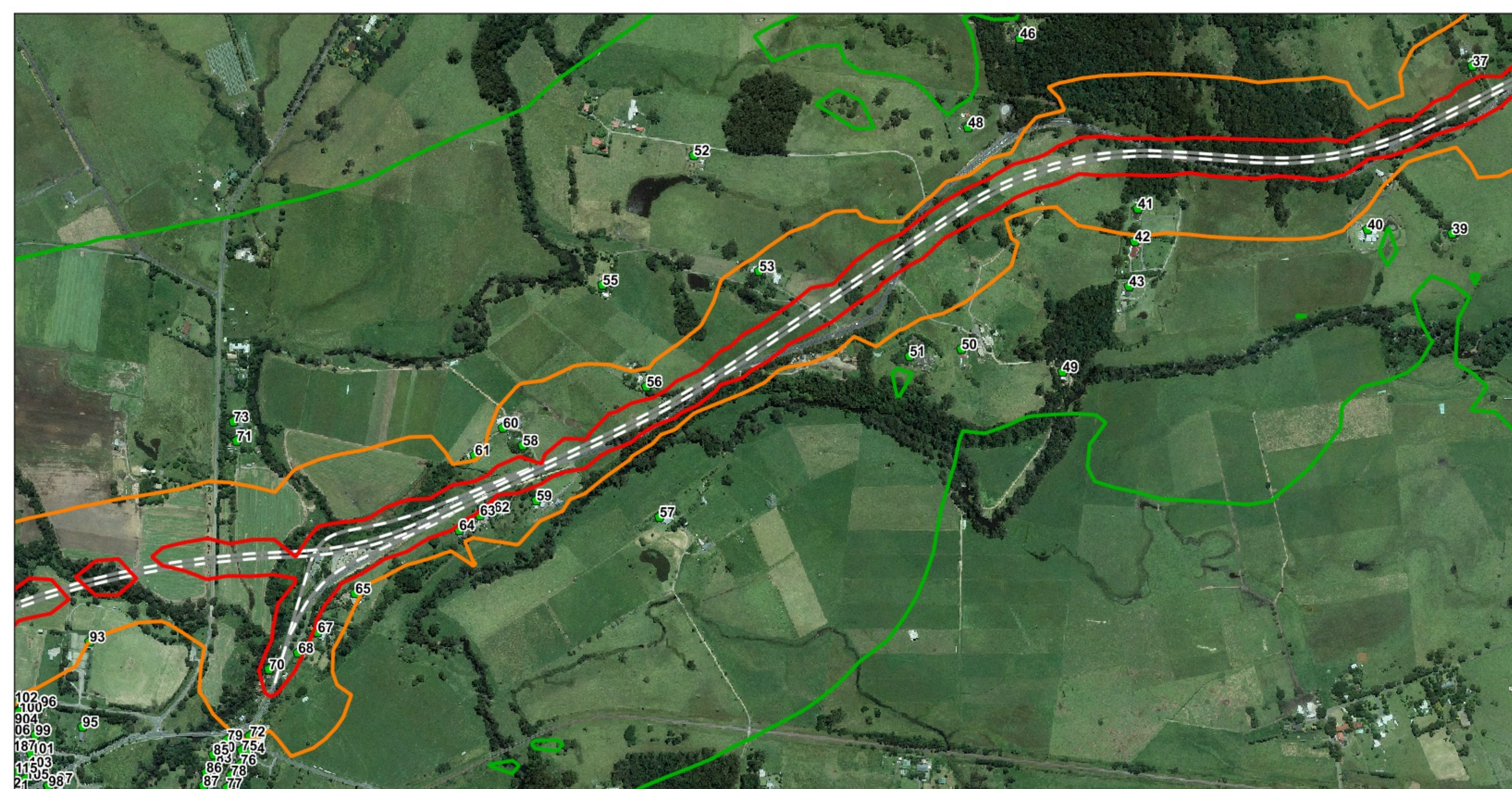
- 45 dB(A)
- 60 dB(A)
- 75 dB(A)

N

0 500 1000 m

Datum WGS 84, Projection UTM ZONE 56S





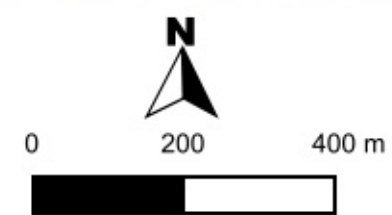
**FOXGROUND BERRY BYPASS
FIGURE G18
Predicted construction noise levels
Scenario E: Paving**

SECTION 2: Berry North Interchange

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

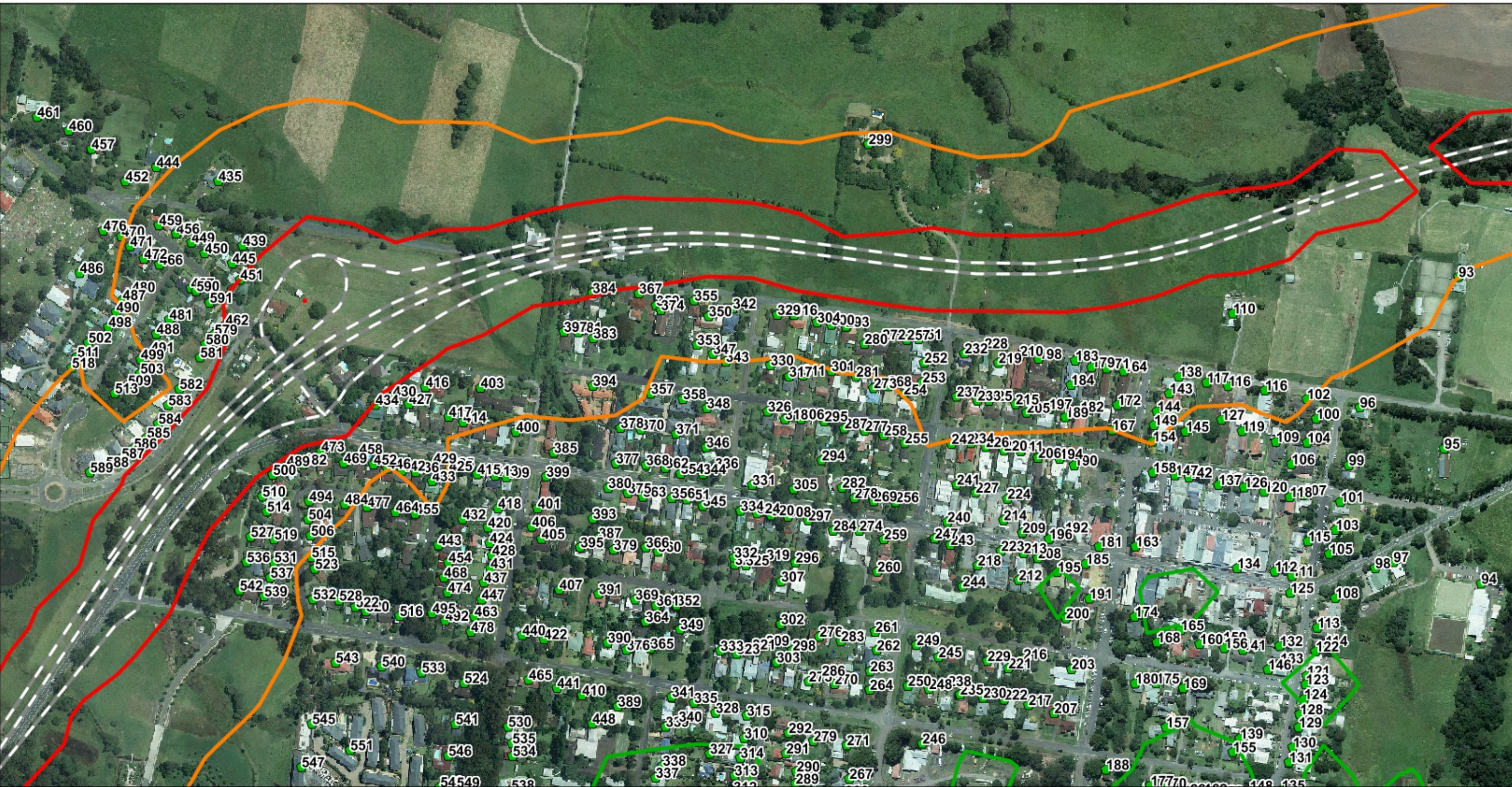
Legend

- ◆ Receivers
- Road alignment
- Predicted construction noise levels, Leq,15min
- 45 dB(A)
- 60 dB(A)
- 75 dB(A)



Datum WGS 84, Projection UTM ZONE 56S





FOXGROUND BERRY BYPASS
FIGURE G19
Predicted construction noise levels
Scenario E: Paving

SECTION 3: Berry

Date: 13 May 2014
 Client: Fulton Hogan
 Drawn by: TRE
 Report reference: NVMP

Legend

- Receivers
- Road alignment

Predicted construction noise levels, Leq,15min

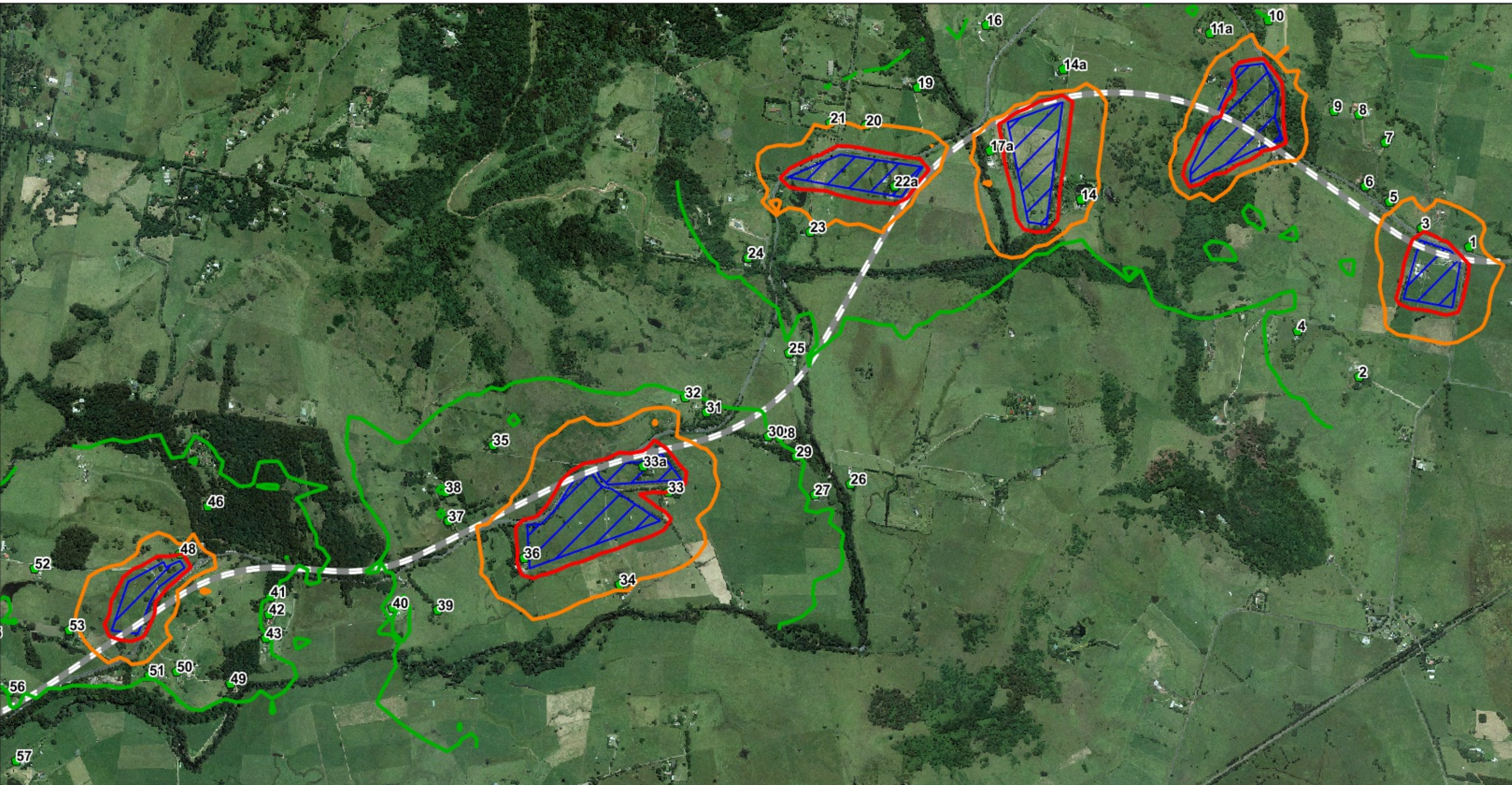
- 45 dB(A)
- 60 dB(A)
- 75 dB(A)

N

0 100 200 m

Datum WGS 84, Projection UTM ZONE 56S





**FOXGROUND BERRY BYPASS
FIGURE G21
Predicted construction noise levels
Scenario F: Ancillary facilities**

**SECTION 1: Toolijoola Road to
Tindalls Lane**

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

Legend

- ◆ Receivers
- Road alignment
- Ancillary facilities

Predicted construction noise levels, Leq, 15min

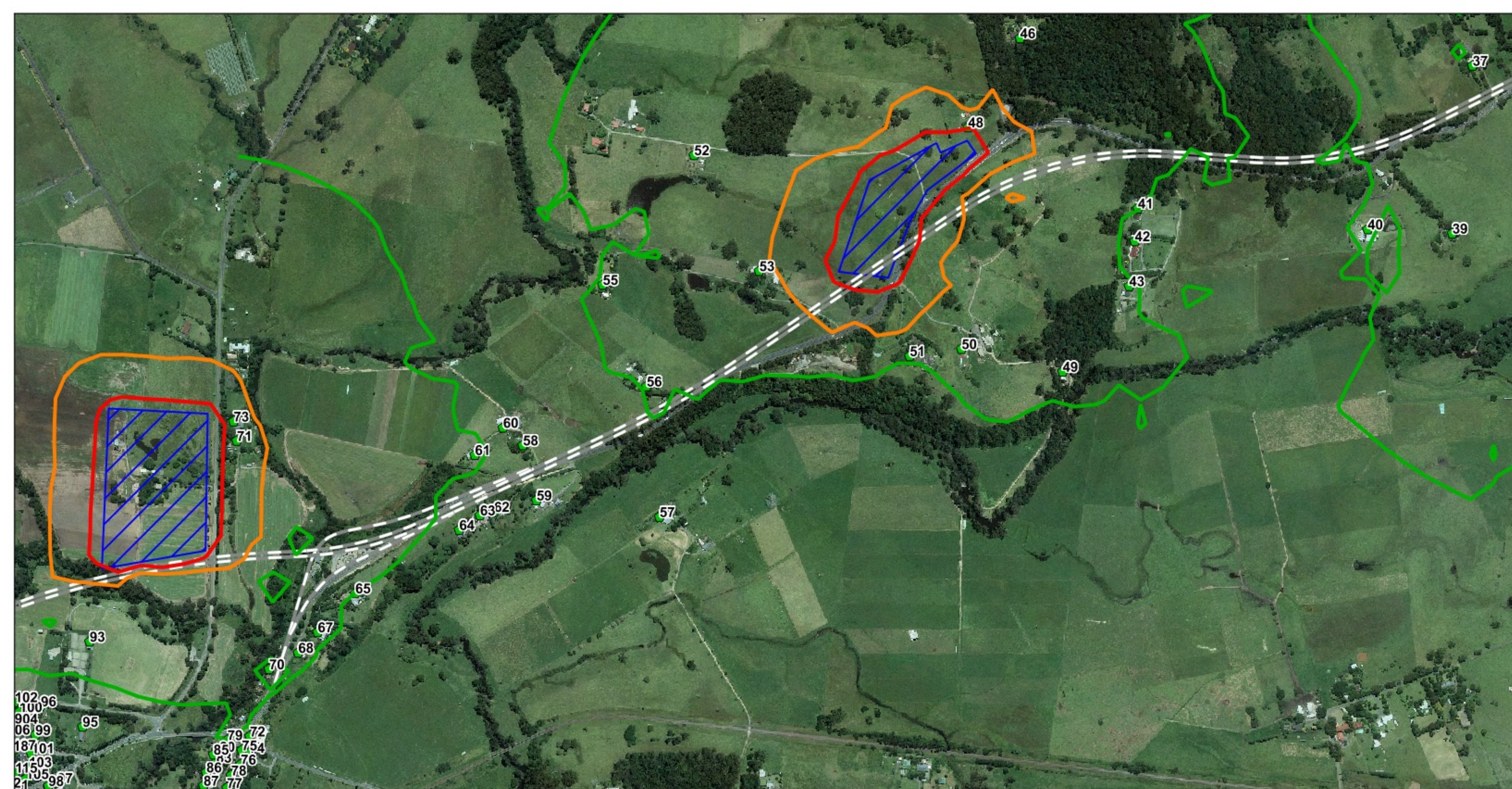
- 45 dB(A)
- 60 dB(A)
- 75 dB(A)

N

0 500 1000 m

Datum WGS 84, Projection UTM ZONE 56S





**FOXGROUND BERRY BYPASS
FIGURE G22
Predicted construction noise levels
Scenario F: Ancillary facilities**

SECTION 2: Berry North Interchange

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

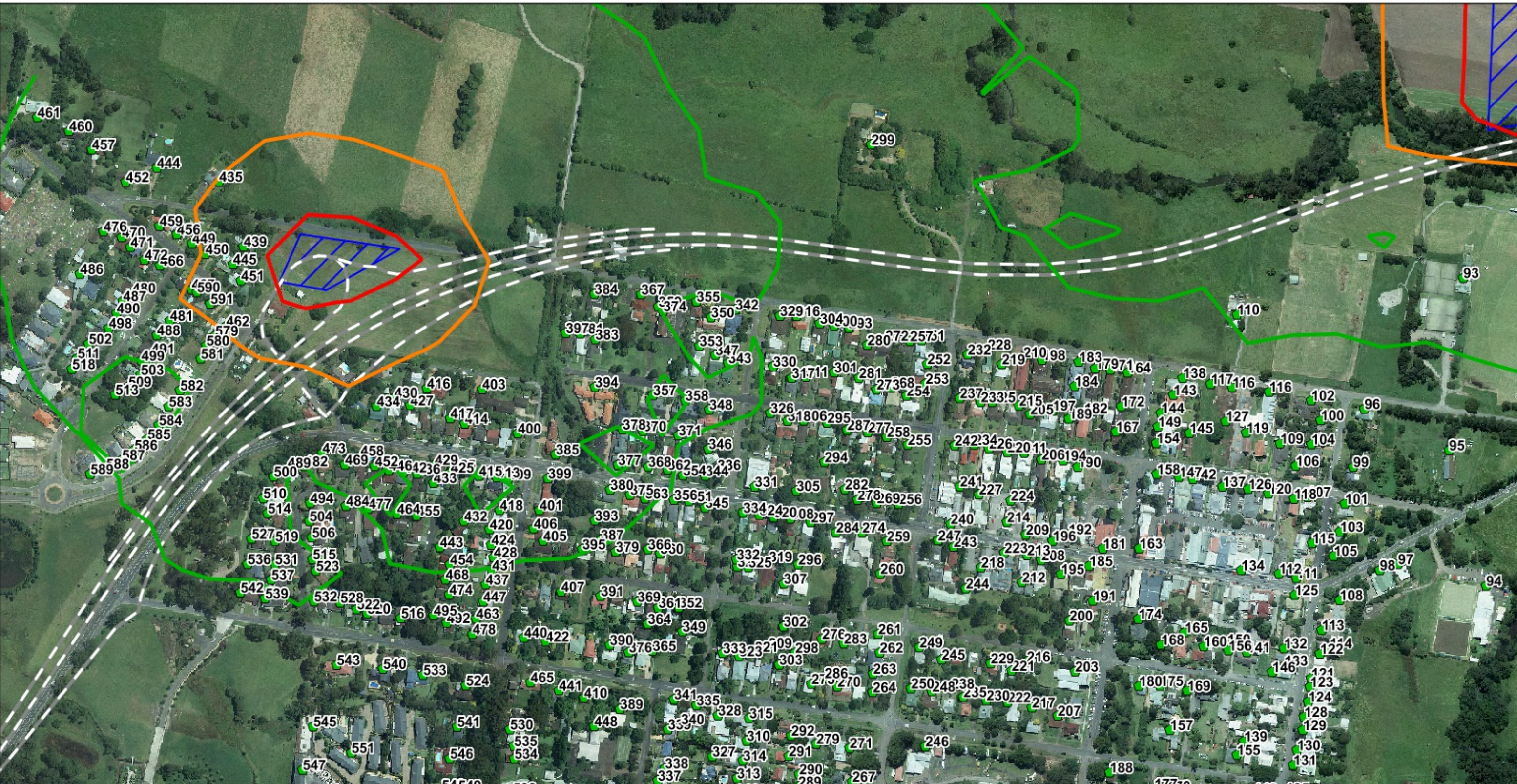
Legend

- ◆ Receivers
 - Road alignment
 - Ancillary facilities
- Predicted construction noise levels, Leq, 15min
- 45 dB(A)
 - 60 dB(A)
 - 75 dB(A)



Datum WGS 84, Projection UTM ZONE 56S





**FOXGROUND BERRY BYPASS
FIGURE G23
Predicted construction noise levels
Scenario F: Ancillary facilities**

SECTION 3: Berry

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

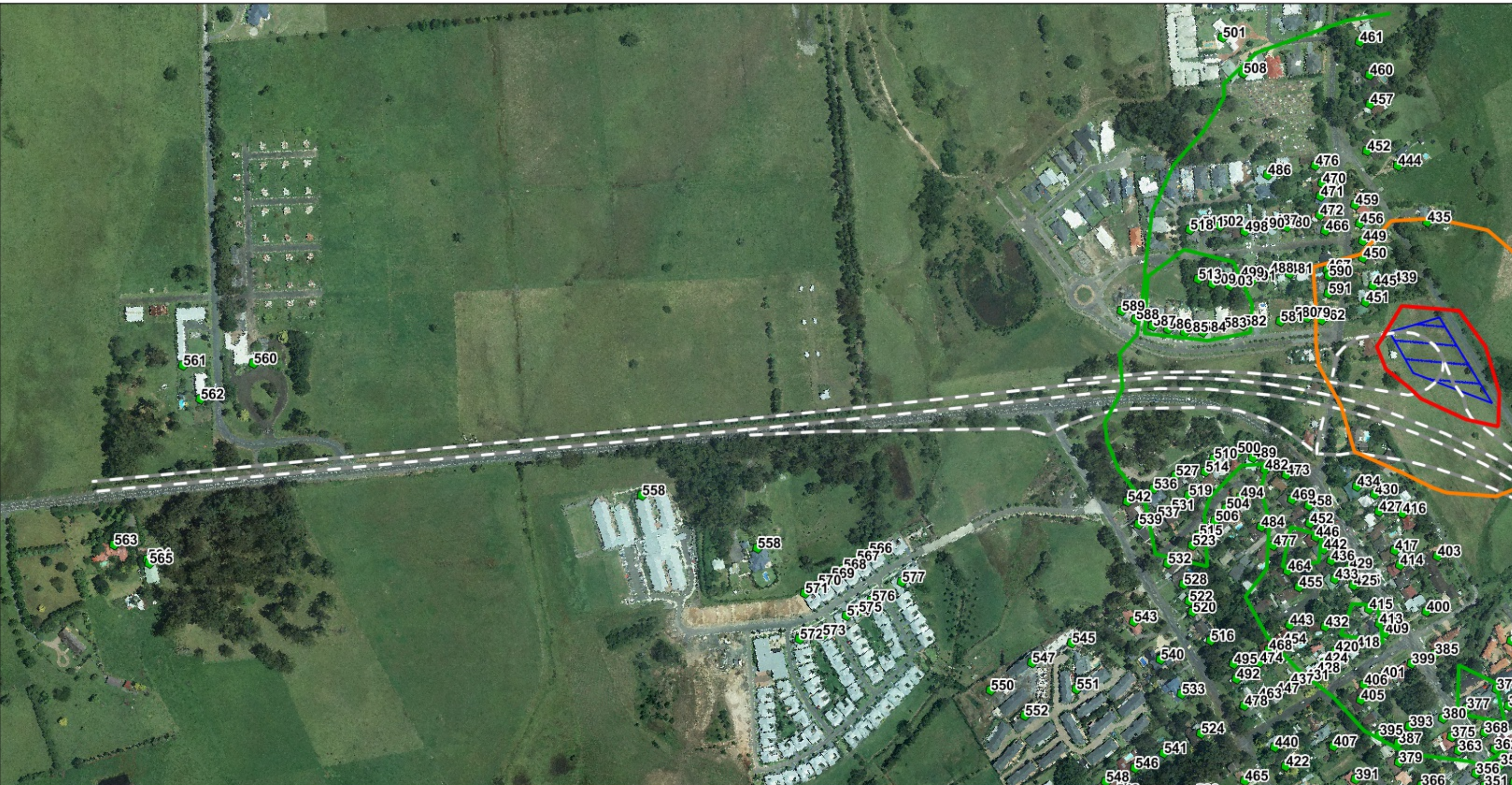
- Legend**
- Receivers
 - Road alignment
 - Ancillary facilities
- Predicted construction noise levels, Leq,15min
- 45 dB(A)
 - 60 dB(A)
 - 75 dB(A)

N

0 100 200 m

Datum WGS 84, Projection UTM ZONE 56S





FOXGROUND BERRY BYPASS
FIGURE G24
Predicted construction noise levels
Scenario F: Ancillary facilities

SECTION 4: South of Berry

Date: 13 May 2014
 Client: Fulton Hogan
 Drawn by: TRE
 Report reference: NVMP

Legend

- Receivers
- Road alignment
- Ancillary facilities

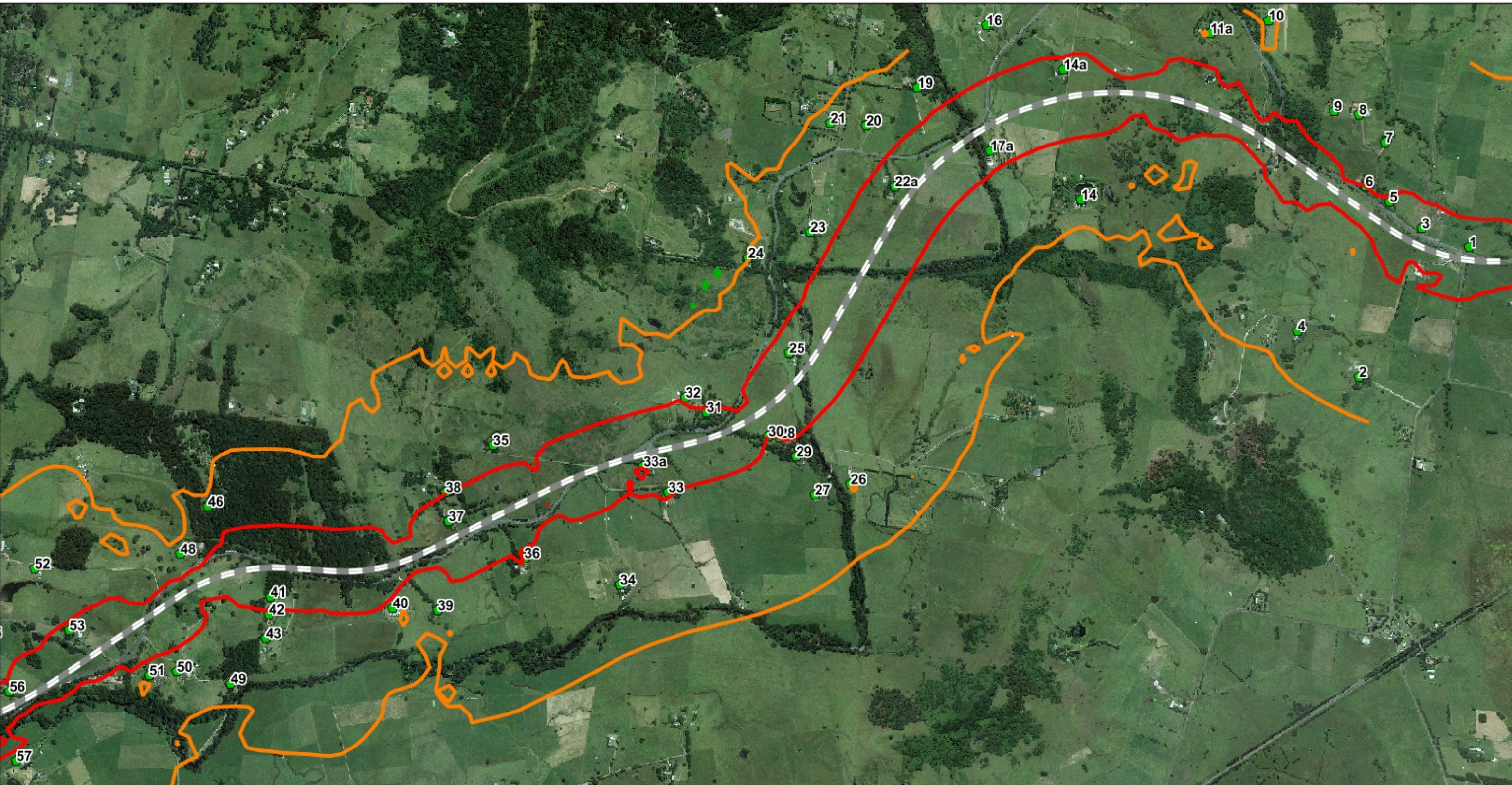
Predicted construction noise levels, Leq, 15min

- 45 dB(A)
- 60 dB(A)
- 75 dB(A)

0 100 200 m

Datum WGS 84, Projection UTM ZONE 56S





**FOXGROUND BERRY BYPASS
FIGURE G25**
Predicted construction noise levels
Scenario C1: Impact Piling*
***Not expected as part of Project**

**SECTION 1: Toolijoola Road to
Tindalls Lane**

Date: 20 June 2014
 Client: Fulton Hogan
 Drawn by: TRE
 Report reference: CNVMP

Legend

- ◆ Receivers
- Road alignment

Predicted construction noise levels, Leq, 15min

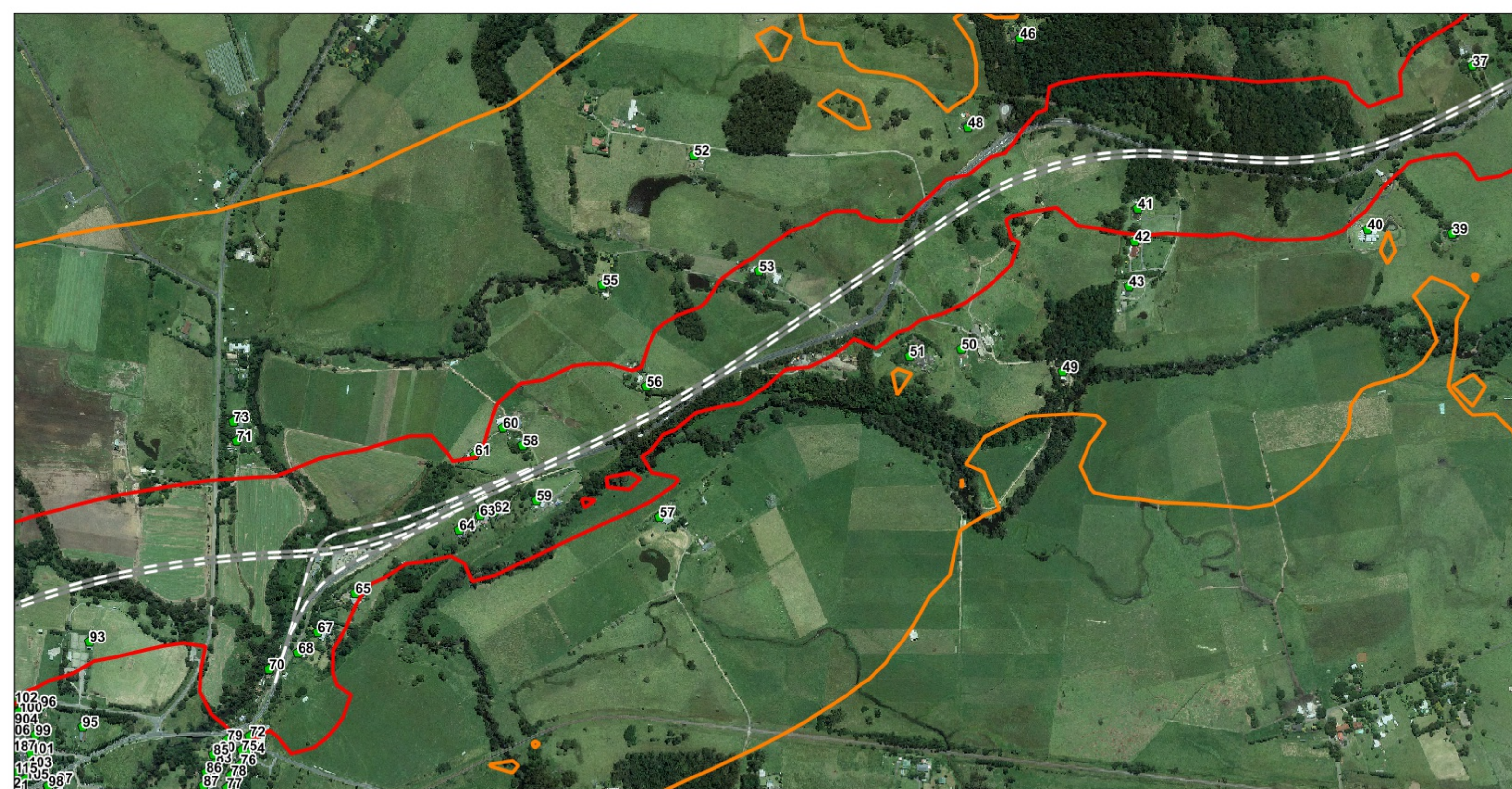
- 45 dB(A)
- 60 dB(A)
- 75 dB(A)

N

0 500 1000 m

Datum WGS 84, Projection UTM ZONE 56S





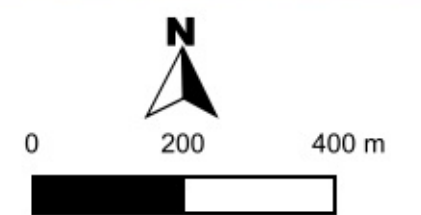
FOXGROUND BERRY BYPASS
FIGURE G26
Predicted construction noise levels
Scenario C1: Impact Piling*
*** Not expected as part of Project**

SECTION 2: Berry North Interchange

Date: 20 June 2014
 Client: Fulton Hogan
 Drawn by: TRE
 Report reference: CNVMP

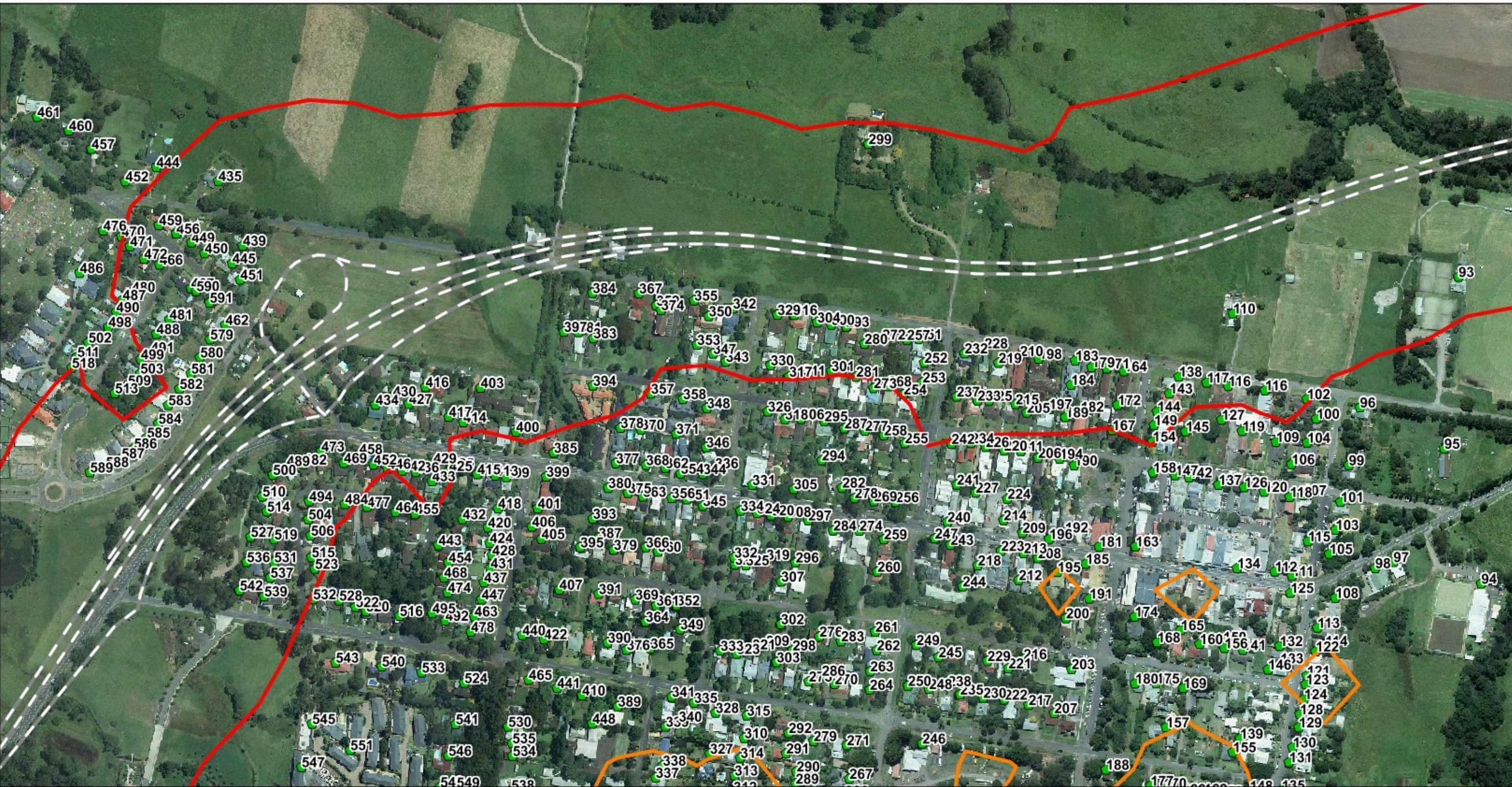
Legend

- ◆ Receivers
- Road alignment
- Predicted construction noise levels, Leq,15min
- 45 dB(A)
- 60 dB(A)
- 75 dB(A)



Datum WGS 84, Projection UTM ZONE 56S





FOXGROUND BERRY BYPASS
FIGURE G27
Predicted construction noise levels
Scenario C1: Impact Piling*
 * Not expected as part of project

SECTION 3: Berry

Date: 20 June 2014
 Client: Fulton Hogan
 Drawn by: TRE
 Report reference: CNVMP

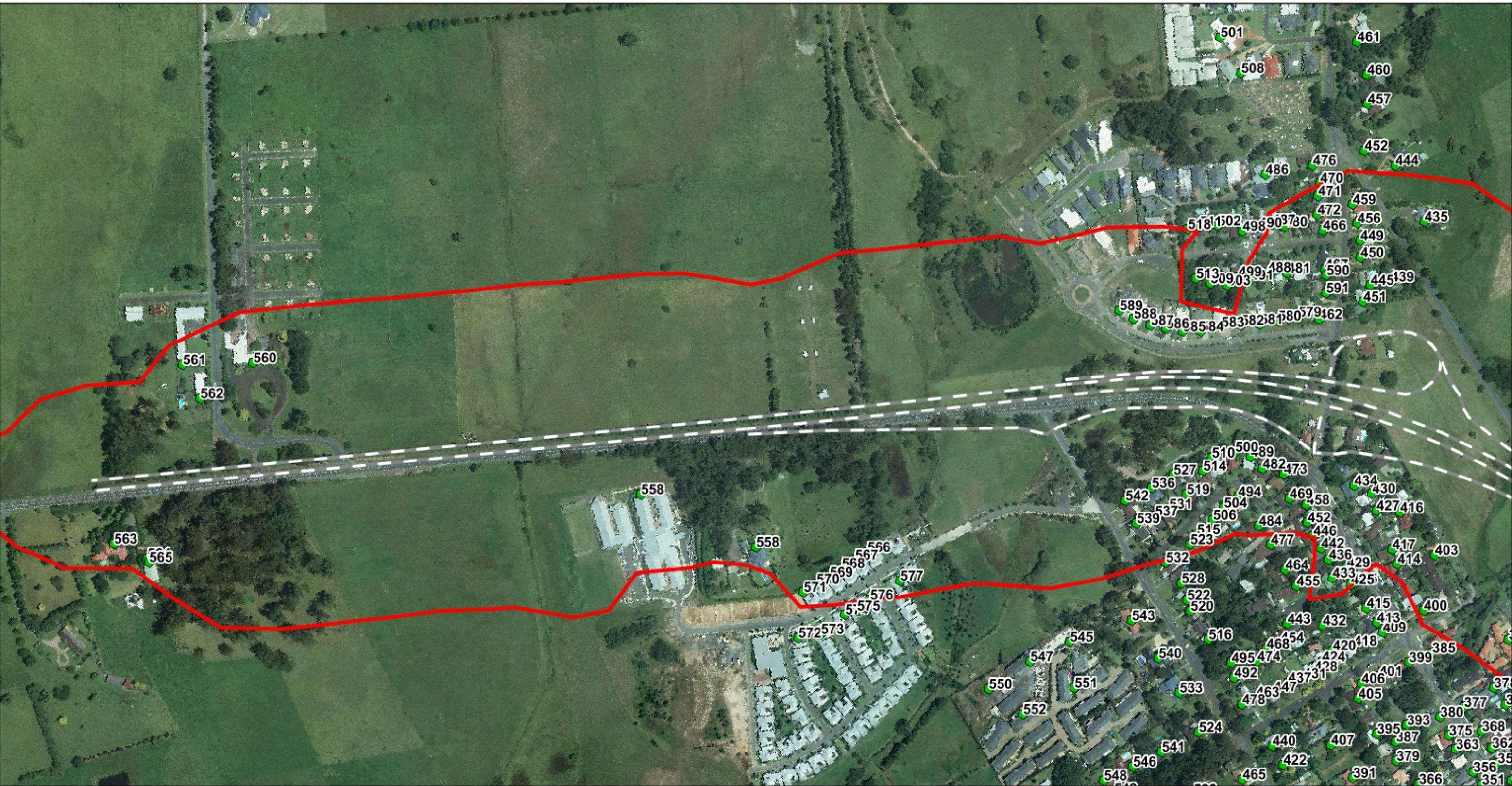
- Legend**
- Receivers
 - Road alignment
- Predicted construction noise levels, Leq,15min
- 45 dB(A)
 - 60 dB(A)
 - 75 dB(A)

N

0 100 200 m

Datum WGS 84, Projection UTM ZONE 56S





FOXGROUND BERRY BYPASS
FIGURE G28
Predicted construction noise levels
Scenario C1: Impact Piling*
*** Not expected as part of Project**

SECTION 4: South of Berry

Date: 20 June 2014
 Client: Fulton Hogan
 Drawn by: TRE
 Report reference: CNVMP

Legend

- ◆ Receivers
- Road alignment

Predicted construction noise levels, Leq,15min

- 45 dB(A)
- 60 dB(A)
- 75 dB(A)

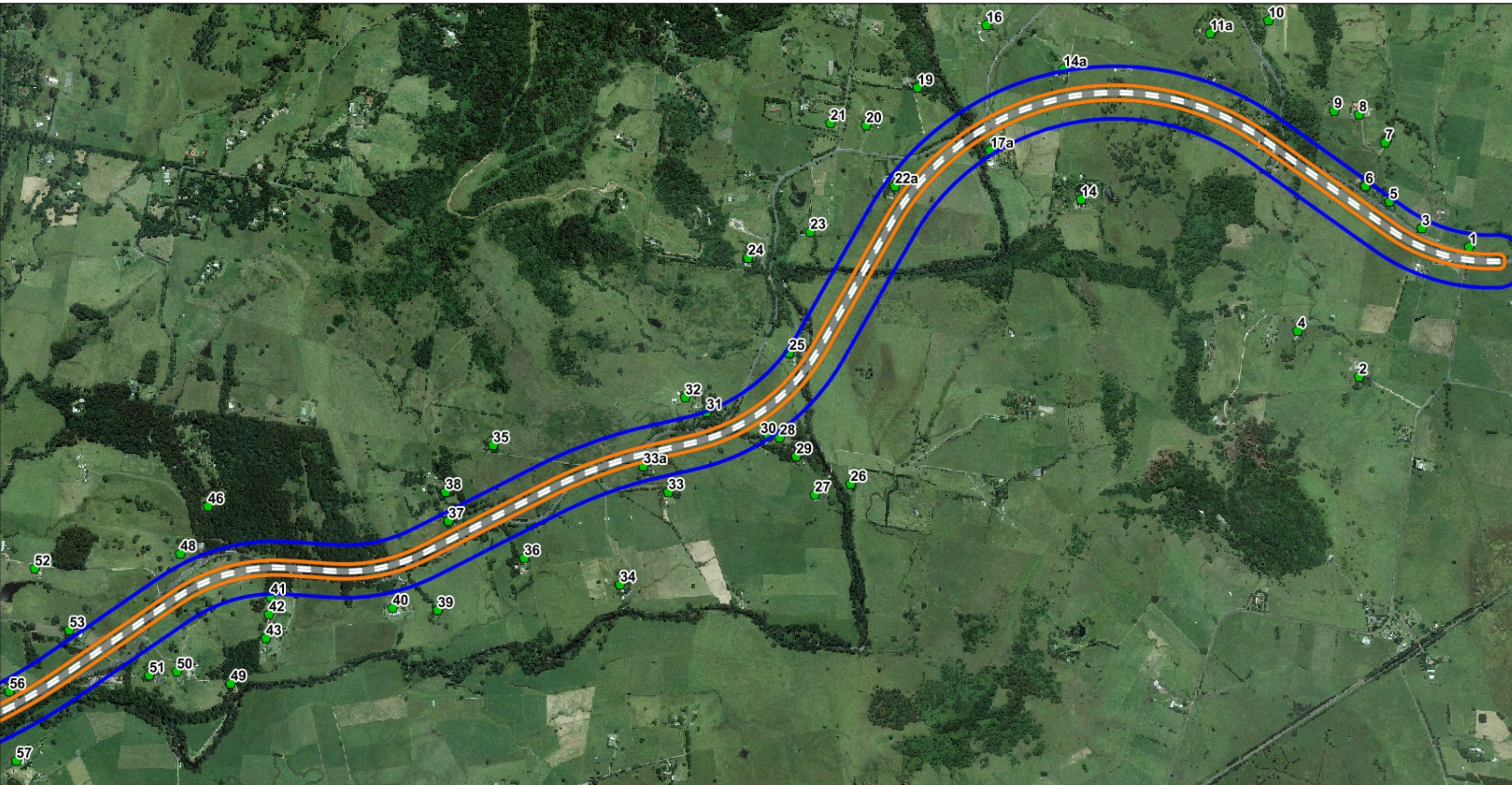
0 100 200 m

Datum WGS 84, Projection UTM ZONE 56S



Appendix H

Construction Vibration Safe Working Distances



FOXGROUND BERRY BYPASS
FIGURE H1
Safe working distances - vibration
13T-18T Vibratory Roller

SECTION 1: Toolijoola Road to
Tindalls Lane

Date: 13 May 2014
 Client: Fulton Hogan
 Drawn by: TRE
 Report reference: NVMP

Legend

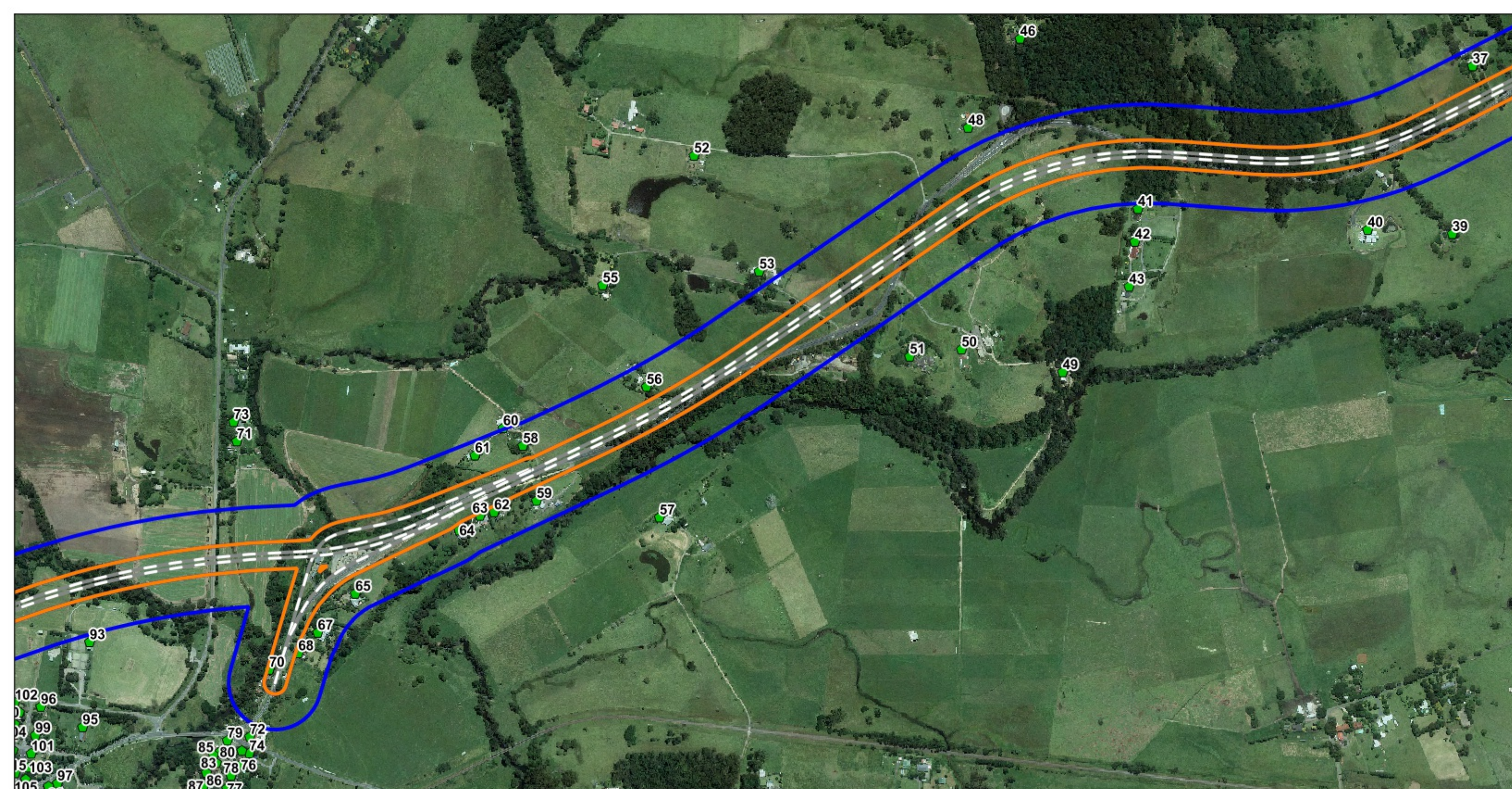
- ◆ Receivers
- Safe working distance - cosmetic damage
- Safe working distance - human response
- Road alignment

N

0 500 1000 m

Datum WGS 84, Projection UTM ZONE 56S

Resonate
acoustics



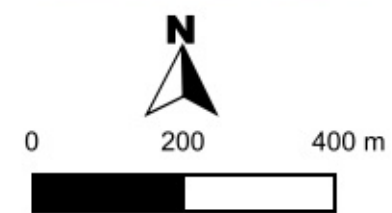
**FOXGROUND BERRY BYPASS
FIGURE H2
Safe working distances - vibration
13T-18T Vibratory Roller**

SECTION 2: Berry North Interchange

Legend

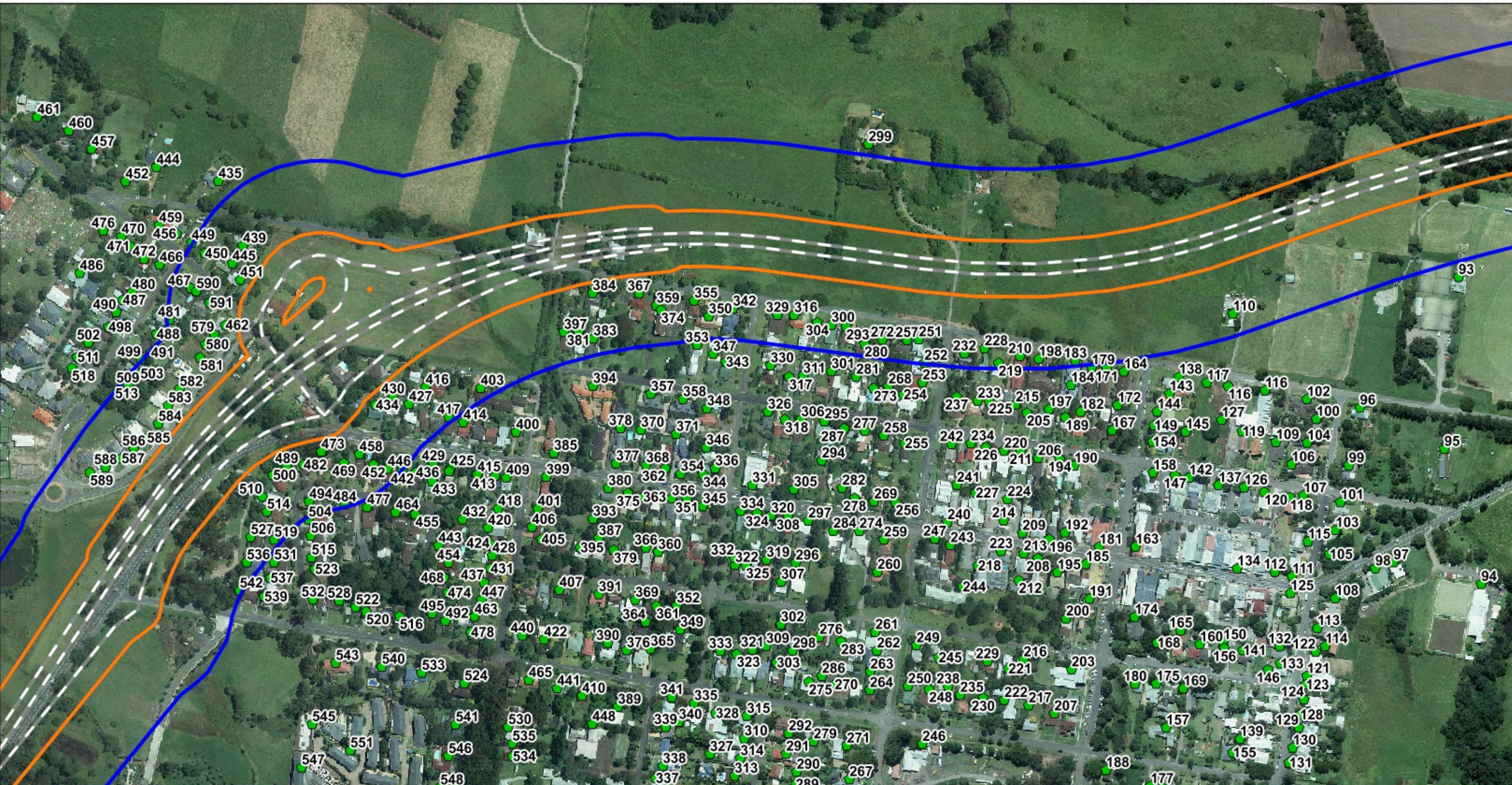
- ◆ Receivers
- Safe working distance - cosmetic damage
- Safe working distance - human response
- Road alignment

Date: 13 May 2014
 Client: Fulton Hogan
 Drawn by: TRE
 Report reference: NVMP



Datum WGS 84, Projection UTM ZONE 56S





**FOXGROUND BERRY BYPASS
FIGURE H3**
Safe working distances - vibration
13T-18T Vibratory Roller

SECTION 3: Berry

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

Legend

- ◆ Receivers
- Safe working distance - cosmetic damage
- Safe working distance - human response
- Road alignment

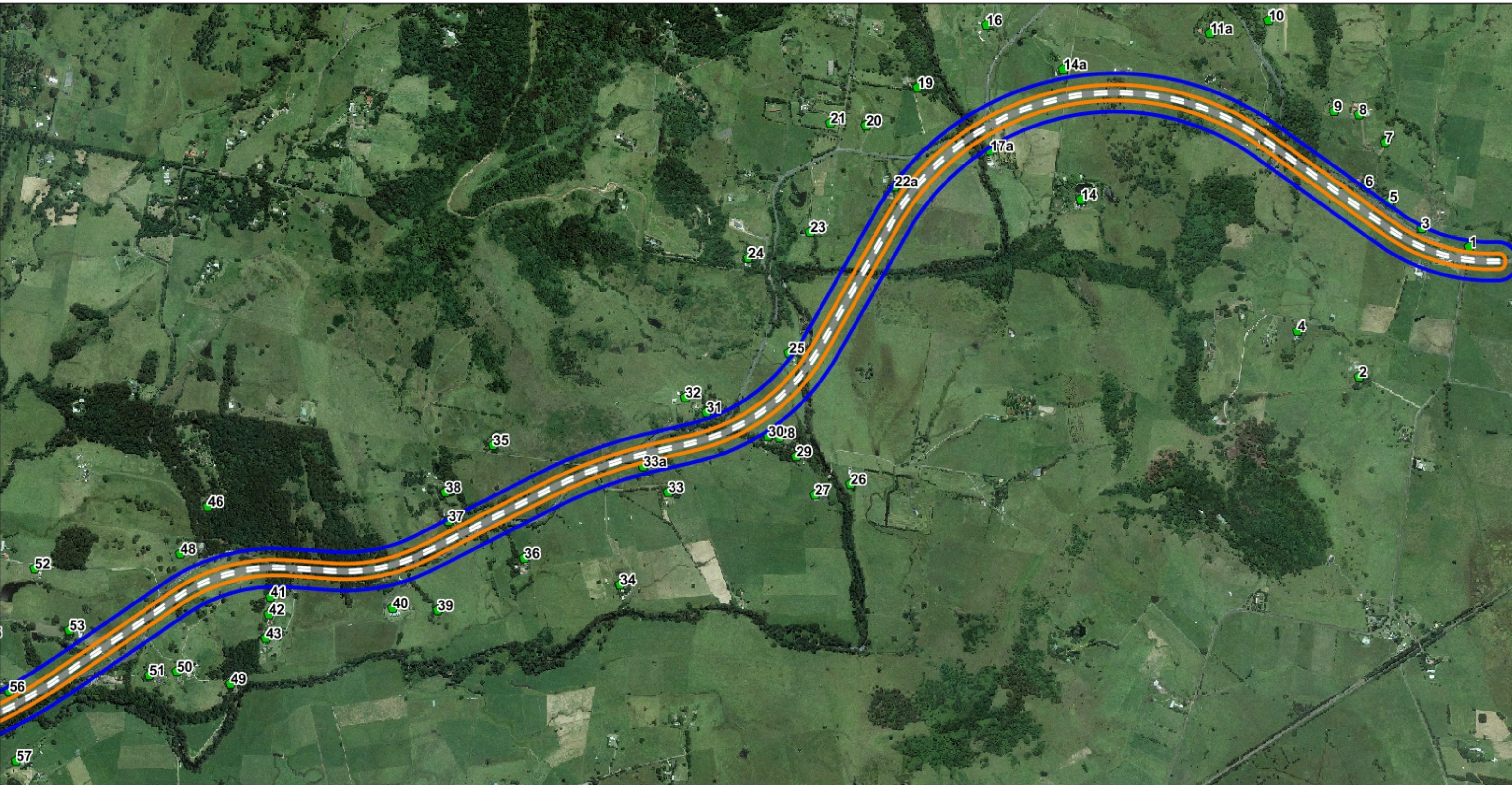
N

0 100 200 m

Datum WGS 84, Projection UTM ZONE 56S

Resonate

acoustics



FOXGROUND BERRY BYPASS
FIGURE H5
Safe working distances - vibration
Large hydraulic hammer

SECTION 1: Toolijoola Road to
Tindalls Lane

Date: 13 May 2014
 Client: Fulton Hogan
 Drawn by: TRE
 Report reference: NVMP

Legend

- ◆ Receivers
- Safe working distance - cosmetic damage
- Safe working distance - human response
- Road alignment

N

0 500 1000 m

Datum WGS 84, Projection UTM ZONE 56S

Resonate
acoustics



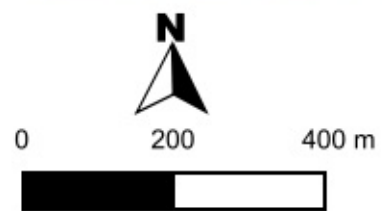
**FOXGROUND BERRY BYPASS
FIGURE H6
Safe working distances - vibration
Large hydraulic hammer**

SECTION 2: Berry North Interchange

Legend

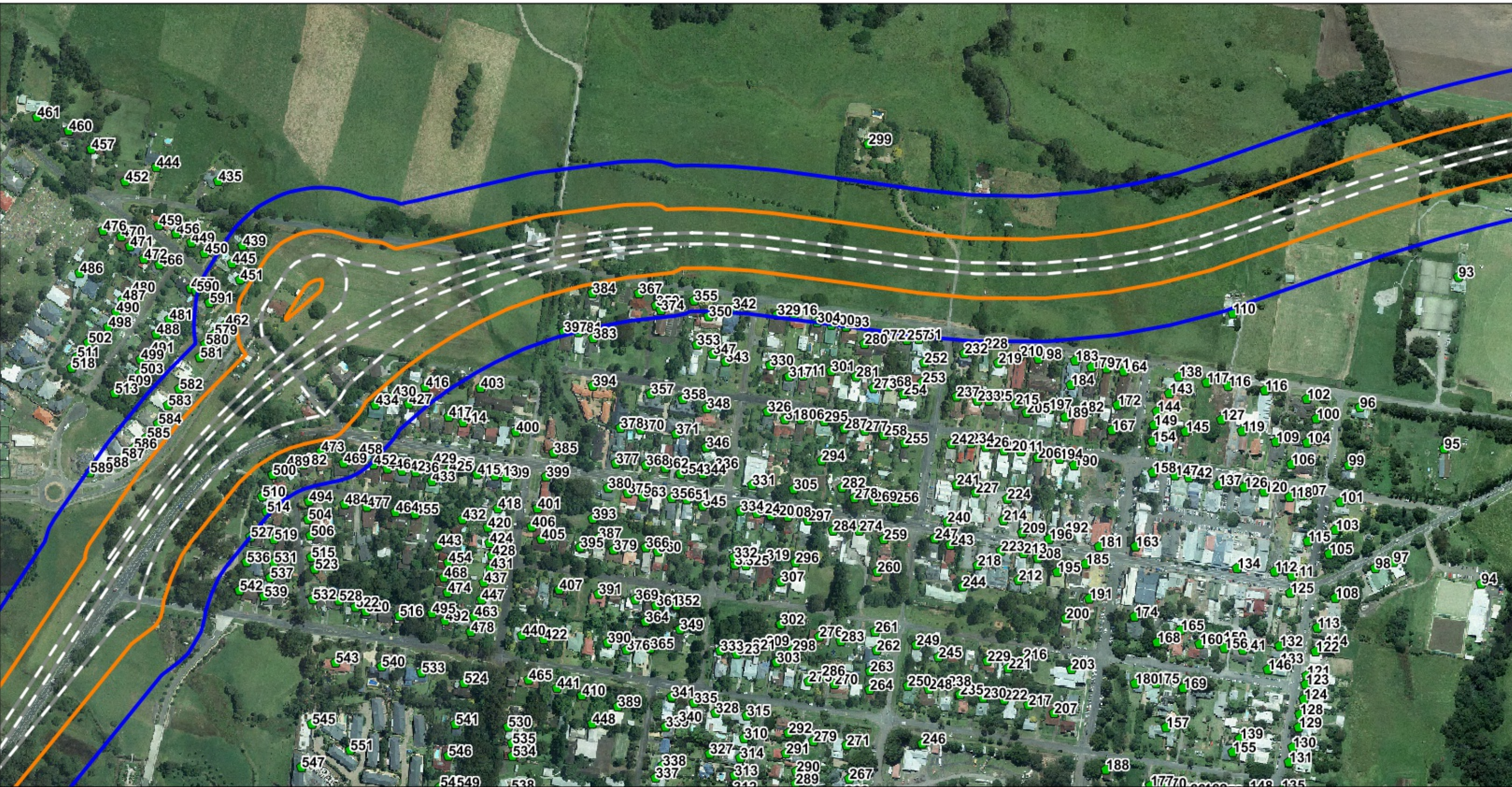
- ◆ Receivers
- Safe working distance - cosmetic damage
- Safe working distance - human response
- Road alignment

Date: 13 May 2014
 Client: Fulton Hogan
 Drawn by: TRE
 Report reference: NVMP



Datum WGS 84, Projection UTM ZONE 56S





**FOXGROUND BERRY BYPASS
FIGURE H7
Safe working distances - vibration
Large hydraulic hammer**

SECTION 3: Berry

Date: 13 May 2014
Client: Fulton Hogan
Drawn by: TRE
Report reference: NVMP

Legend

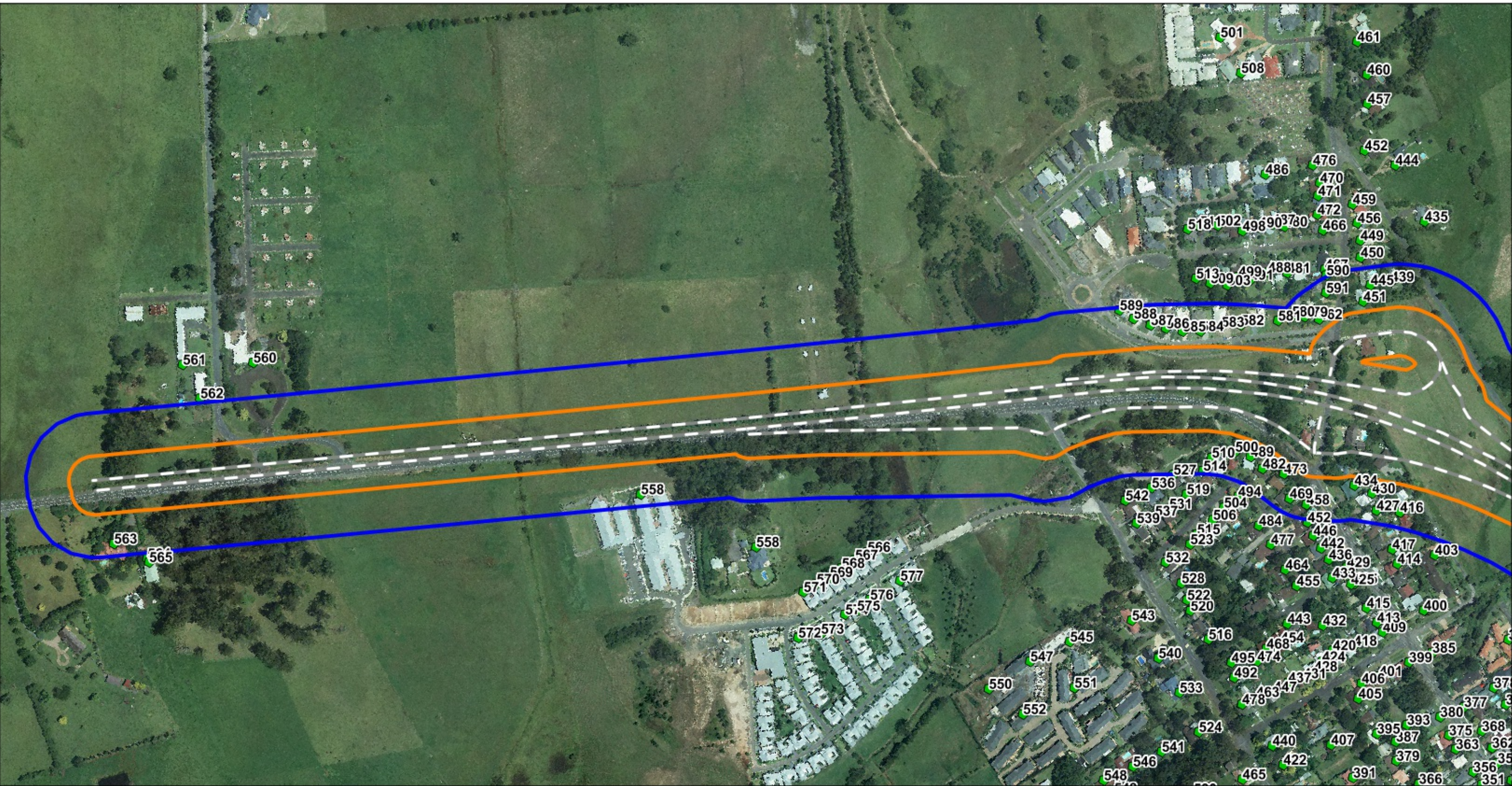
- Receivers
- Safe working distance - cosmetic damage
- Safe working distance - human response
- Road alignment

N

0 100 200 m

Datum WGS 84, Projection UTM ZONE 56S






FOXGROUND BERRY BYPASS
FIGURE H8
Safe working distances - vibration
Large hydraulic hammer

SECTION 4: South of Berry


Date: 13 May 2014
 Client: Fulton Hogan
 Drawn by: TRE
 Report reference: NVMP

Legend

- Receivers
- Safe working distance - cosmetic damage
- Safe working distance - human response
- Road alignment



0 100 200 m



Datum WGS 84, Projection UTM ZONE 56S

