APPENDIX B3

Construction Noise and Vibration Management Plan

Whytes Lane to Pimlico Road Early Works – Wave 2

Woolgoolga to Ballina Pacific Highway Upgrade

OCTOBER 2015

Document control

File name	05-A1-00-B3_WB2 Wave2_Appendix B3_Rev6
Report name	Whytes Lane to Pimlico Road Early Works – Wave 2 Construction Noise and Vibration Management Plan
Revision number	6

Plan approved by:

[signed]	*[signed]*	*[signed]*
Name	*Name*	*Name*
Contractor PM	Contractor EM	RMS representative

Revision history

Revision	Date	Description	Approval
0	01/07/2015	Initial for Client Review	Carly McCormack – SMEC
1	03/07/2015	For Roads and Maritime Review	Ryan Buckley – SEE Civil
1.1	21/07/2015	Internal Review	Ryan Buckley – SEE Civil
2	30/08/2015	For Roads and Maritime Review	Ryan Buckley – SEE Civil
3	23/9/2015	For Roads and Maritime Review	Ryan Buckley – SEE Civil
4	25/09/2015	For Agency Review	Ryan Buckley – SEE Civil
5	20/10/2015	Response to Agency Comments	Ryan Buckley – SEE Civil
6	20/10/2015	For Approval	Ryan Buckley – SEE Civil

Distribution of controlled copies

Copy no.	Issued to	Version
1		
2		
3		
4		
5		

Contents

Tables

Appendices

Glossary / Abbreviations

CEMP	Construction Environmental Management Plan
CoA	Condition of Approval
dBA	Decibels using the A-weighted scale measured according to the frequency of the human ear.
DECC	NSW Department of Environment and Climate Change (now OEH and EPA)
DP&E	NSW Department of Planning and Environment
EIS	Woolgoolga to Ballina Pacific Highway Upgrade Environmental Impact Statement (December, 2012)
EMS	Environmental management system
ENMM	Environmental Noise Management Manual (Roads and Maritime, 2001)
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPA	NSW Environment Protection Authority
EPL	NSW Environment Protection Licence under the Protection of the Environment Operations Act 1997.
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	NSW Environment Protection Authority (formerly DECC)
EP&A Act	NSW Environmental Planning and Assessment Act 1979
ER	Environmental Representative
ERG	Environmental Review Group
EWMS	Environmental Work Method Statements
Feasible and reasonable	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..

LAeq (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.
LA (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.
LGA	Local government area
Minister, the	NSW Minister for Planning
OEH	NSW Office of Environment and Heritage (formerly DECC)
PoEO Act	NSW Protection of the Environment Operations Act 1997
Project, the	Whytes Lane to Pimlico Road Early Works – Wave 2
SEE Civil	SEE Civil Pty Ltd
SPIR	Submissions / Preferred Infrastructure Report

1 Introduction

1.1 Context

This Construction Noise and Vibration Management Plan (CNVMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the Whytes Lane to Pimlico Road Early Works – Wave 2 (the Project).

This CNVMP has been prepared to address the requirements of the Minister's Conditions of Approval (CoA) and the mitigation measures listed in the Pacific Highway Upgrade Woolgoolga to Ballina Environmental Impact Statement (EIS) and all applicable legislation.

Wave 2 (the Project) is located within Section 11 of the Woolgoolga to Ballina Pacific Highway Upgrade. Wave 2 of the Early Works (soft soil treatments) is to allow the future upgrade of the section of HW10 Pacific Highway, Woolgoolga to Ballina. The Project specifically covers the following soft soil site as detailed below:

- Soft Soil Site 11 – between Whytes Lane and Pimlico Road (W2P) (STN 159,900 to STN 163,800).

Construction and non-construction activities have been scheduled for the duration of the works taking into consideration peak productivity periods and potential high risk activities. Community consultation will continue throughout the project.

1.2 Background

The Pacific Highway Upgrade Woolgoolga to Ballina EIS (Roads and Maritime Services 2012) assessed noise and vibration impacts on sensitive receivers and structures from construction of the Project.

As part of EIS development, a construction and operational noise and vibration assessment was prepared to satisfy the Director General Requirements (DGRs) issued by Planning and Infrastructure. The noise and vibration assessment was included in the EIS as Working Paper: Noise and Vibration.

The EIS concluded that there will be some noise and vibration impacts during construction and the extent will vary depending on the type of activity in progress and the proximity to sensitive receivers. Wave 2 early works consists of the importation of rock and fill, to be placed as preload. This will form part of the ultimate road embankment in a discreet area of section 11. The EIS covers all aspects of the ultimate project therefore the predicted maximum levels for noise and vibration predicted in the EIS will not be realised due to the limited scope of this proposed early works.

Additional management measures were provided within the *Woolgoolga to Ballina Submissions / Preferred Infrastructure Report Nov 2013*, with applicable management measures from that report included as part of this CNVMP.

1.3 Environmental management systems overview

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

The CNVMP is part of the SEE Civil environmental management framework for the Project, as described in Section 4.1 of the CEMP. This Plan has been developed in accordance with the requirements of CoA D26 (a).

Management measures identified in this Plan will be incorporated into site or activity specific Environmental Work Method Statements (EWMS). EWMS will be developed and signed off by environment and management representatives prior to associated works and construction

personnel will be required to undertake works in accordance with the identified requirements and associated mitigation measures.

Used together, the CEMP, strategies, procedures and EWMS form management guides that clearly identify required environmental management actions for reference by SEE Civil personnel and contractors.

The review and document control processes for this Plan are described in Section 1.6 and Chapter 10 of the CEMP.

2 Purpose and objectives

2.1 Purpose

The purpose of this Plan is to describe how SEE Civil proposes to manage potential noise and vibration impacts during construction of the Project.

The management of noise and vibration impacts in this Plan is based on the assessment undertaken as part of the EIS. The assessment in the EIS considered the following guidelines and standards:

- *NSW Road Noise Policy (DECCW 2011)* NSW Industrial Noise Policy (EPA 2000).
- RTA Environmental Noise Management Manual (ENMM) (RTA 2001).
- Interim Construction Noise Guideline (ICNG) (DECC 2009).
- Assessing Vibration: A Technical Guideline (DEC 2006).
- British Standard 7385: Part 2 ""Evaluation and measurement of vibration in buildings".
- Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration (1990) Australian and New Zealand Environment and Conservation Council (ANZECC).
- Australian Standard AS2187.2-2006: "Explosives – Storage, Transport and Use".

2.2 Objectives

The key objective of the Construction Noise and Vibration Management Plan (CNVMP) is to ensure that impacts to the local community and the built environment from noise and vibration are minimised. Specific objectives include:

- Identifying sensitive receivers and ensure appropriate environmental controls and procedures are implemented during construction activities.
- Minimising potential adverse noise and vibration impacts to the environment and community.
- Managing impacts if they occur through a systematic analysis of mitigation strategies.
- Ensure appropriate measures are implemented to address the relevant Conditions of Approval (CoA) outlined in Table 3.1 and the mitigation measures detailed in the Environmental Impact Statement (EIS).
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in Section 3.1 of this Plan.

2.3 Targets

Targets have been established for the management of noise and vibration impacts during the Project to ensure:

- Full compliance with the relevant legislative requirements and CoA.
- Implement feasible and reasonable noise mitigation measures with the aim of achieving the construction noise management levels detailed in the Interim Construction Noise Guideline (DECC, 2009).
- Complaints from the community and stakeholders are minimised.

3 Environmental requirements

3.1 Relevant legislation and guidelines

3.1.1 Legislation

Legislation relevant to noise and vibration management includes:

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

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

3.1.2 Guidelines

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

- Roads and Maritime QA Specification G36 – Environmental Protection (Management System).
- Roads and Maritime QA Specification G38 – Soil and Water Management.
- Roads and Maritime QA Specification G40 – Clearing and Grubbing.
- Roads and Maritime QA Specification G1 – Job Specific Requirements.
- NSW Road Noise Policy (DECCW 2011).
- NSW Industrial Noise Policy (EPA 2000).
- RTA Environmental Noise Management Manual (ENMM) (RTA 2001a).
- Interim Construction Noise Guideline (ICNG) (DECC 2009).
- Assessing Vibration: A Technical Guideline (DEC 2006).
- British Standard 7385: Part 2 “Evaluation and measurement of vibration in buildings”.
- German DIN 4150: Part 3 – 1999 Effects of Vibration on Structure (DIN 1999).

3.2 Minister’s Conditions of Approval

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

Table 3-1 Conditions of Approval relevant to noise and vibration

CoA No.	Condition Requirements	Document Reference
	Construction Noise	
B14	The SSI shall be constructed with the aim of achieving the construction noise management levels detailed in the *Interim Construction Noise Guideline* (DECCW, 2009). All feasible and reasonable noise mitigation measures shall be implemented and any activities that could exceed the construction noise management levels shall be identified and managed in accordance with the Construction Noise and Vibration Management Plan *Note:* *The Interim Construction Noise Guideline identifies ‘particularly annoying’ activities that require the addition of 5dB (A) to the predicted level before comparing to the*	This plan

CoA No.	Condition Requirements	Document Reference
	construction NML.	
B15	Construction activities associated with the SSI shall be undertaken during the following standard construction hours: (a) 7:00am to 6:00pm Monday to Friday, inclusive; and (b) 8:00am to 5:00pm Saturday; and (c) at no time on Sunday or public holidays.	This plan Appendix C
B16	Construction works outside of the standard construction hours identified in condition B15 may be undertaken in the following circumstances: (a) construction works that generate noise that is: (i) no more than 5 dB(A) above rating background level at any residence in accordance with the *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009); and (ii) no more than the noise management levels specified in Table 3 of the *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009) at other sensitive receivers*;* or (b) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or (c) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm; or (d) between 6.00am and 7.00am and 6.00pm and 7.00pm Monday to Friday (except public holidays) in sparsely populated areas (these construction hours may be reviewed and/or revoked by the Director General in consultation with the EPA in the case of unresolved noise complaints); or (e) low noise impact activities and work as follows: (i) between 6.00am and 7.00am Monday to Friday; and/or (ii) between 6.00pm and 7.00pm Monday to Friday; or (f) works approved through an EPL; or (g) works approved by a Construction Environment Management Plan or Construction Noise and Vibration Management Plan for the SSI	This plan
B17	Construction activities which cannot be undertaken during the standard construction hours for technical or other justifiable reasons (Out of Hours work) may be permitted outside the construction hours specified in condition B15 with the approval of the Environmental Representative. Out of Hours work shall be undertaken in accordance with an approved Construction Environment Management Plan or Construction Noise and Vibration Management Plan for the SSI, where that plan provides a process for the consideration of Out of Hours work. This consideration includes: (a) process for obtaining the Environmental Representative's approval for Out of Hours work; (b) details of the nature and need for activities to be conducted during the varied construction hours; (c) justifies the varied construction hours in accordance with the *Interim Construction Noise Guideline* (DECCW, 2009); (d) provides evidence that consultation with potentially affected receivers and notification of the relevant council has been undertaken, that the issues raised have been addressed and all feasible and reasonable mitigation measures have been put in place; and (e) provides evidence of consultation with the EPA on the proposed variation in standard construction hours.	This plan
B18	Construction activities resulting in impulsive or tonal noise emission (such as rock breaking, rock hammering, pile driving) shall only be undertaken: (a) between the hours of 8:00am to 5:00pm Monday to Friday; (b) between the hours of 8:00am to 1:00pm Saturday; 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.	This plan

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. The works subject to this condition may be undertaken in sparsely populated areas within the construction hours specified in condition B15.	
B19	The Applicant shall, where feasible and reasonable, limit high noise impact activities and work to the mid-morning and mid-afternoon periods, except in sparsely populated areas.	This plan
	Construction Vibration	
B20	The SSI shall be constructed with the aim of achieving the following construction vibration goals: (a) for structural damage to heritage structures, the vibration limits set out in the German Standard *DIN 4150-3: Structural Vibration – Part 3 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 of vibration in buildings* (and referenced in Australian Standard 2187.2 – 2006 *Explosives – Storage and use – Use of explosives*). Guide for measurement of vibration and evaluation of their effects on buildings; and (c) for human exposure, the acceptable vibration values set out in *Assessing Vibration: A Technical Guideline* (Department of Environment and Conservation, 2006).	This plan
D10	Prior to the commencement of construction, the Applicant shall undertake a land use survey to identify areas that are sensitive to construction vibration and construction ground-borne noise impacts. The results of the survey shall be incorporated into the Construction Noise and Vibration Management Plan	This plan
D26 (a)	As part of the Construction Environmental Management Plan for the SSI, the Applicant shall prepare and implement: a) a **Construction Noise and Vibration Management Plan** to detail how construction noise and vibration impacts will be minimised and managed. The Plan shall be developed in consultation with the EPA and shall be consistent with the guidelines contained in the *Interim Construction Noise Guidelines* (DECC, 2009) and shall include, but not necessarily be limited to: (i) identification of sensitive receivers and relevant construction noise and vibration goals applicable to the SSI stipulated in this approval; (ii) details of construction activities and an indicative schedule for construction works; including the identification of key noise and/or vibration generating construction activities (based on representative construction scenarios, including at ancillary facilities) that have the potential to generate noise and/or vibration impacts on surrounding sensitive receivers, particularly residential areas; (iii) identification of feasible and reasonable measures proposed to be implemented to minimise and manage construction noise and vibration impacts (including construction traffic noise impacts); (iv) 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); and (v) a description of how the effectiveness of these actions and measures would be monitored during the proposed works, clearly indicating how often this monitoring would be conducted, the locations where	This plan Section 4, Appendix D & E Section 7 Section 8 Section 8 Section 9

CoA No.	Condition Requirements		Document Reference
		monitoring would take place, how the results of this monitoring would be recorded and reported, and, if any exceedance is detected, how any non-compliance would be rectified;	
	(vi)	an out-of-hours work (OOHW) protocol for the assessment, management and approval of works outside of standard construction hours as defined in condition B15 including a risk assessment process under which the Environmental Representative may approve out-of-hour construction activities. The OOHW protocol shall detail standard assessment, mitigation and notification requirements for high and low risk out-of-hour works, consultation procedures with the EPA, the relevant council and affected landowners;	Appendix C
	(i)	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;	Section 8 & 9
	(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 exceedances of relevant noise and vibration goals are detected; and	Section 9
	(viii)	Mechanisms for the monitoring, review and amendment of this plan.	Section 10

4 Existing environment

4.1 Sensitive receivers

Wave 2 is a 3.8km section of geotechnical soft soil works located off the main alignment within Section 11. The works are from Whytes Lane to Pimlico Road (STN 159,900 to STN 163,800).

The Project involves ground treatment and preparatory earthworks for the future duplication of the Pacific Highway, specifically the construction of embankments (both with and without wick drains), surcharges, stability berms and associated temporary works. The noise and vibration assessment identified and considered potential noise impacts for each individual dwelling along the Project alignment and within 600 metres either side of the new or existing road centre line. .

There are 2 residential receivers identified within 600 meters of the Wave 2 project. Both these receivers are located approximately 400 meters from the Approved Project Boundary.

The locations of identified sensitive receivers including sensitive receivers which are outside of the 600 meter buffer are detailed in Appendix D of this Plan. All sensitive receivers including those which occur outside of the 600 metre buffer are also identified on the Sensitive Areas Plans in Appendix A5 of the CEMP.

4.2 Ambient noise

Noise monitoring was conducted as part of the EIS in 2011 and 2012. The monitoring was undertaken to provide background noise levels and, among other purposes, to establish appropriate construction noise assessment criteria. Locations were selected to be representative of receivers that would experience a noise impact from the existing highway or from the Project (see Appendix A5 of the CEMP for monitoring locations).

A summary of the noise monitoring results is provided in Table 4-1.

Table 4-1 Ambient noise monitoring results (dBA)

Location	Day			Evening			Night		
	L_{Amax}	L_{Aeq}	RBL	L_{Amax}	L_{Aeq}	RBL	L_{Amax}	L_{Aeq}	RBL
Section 11									
R2068	76.3	61.2	39				75.7	59.2	31
R2072	63.8	48.6	38			45	61.5	45.9	31

5 Noise and vibration criteria for NSW

The EPA recommends management levels and goals when assessing construction noise and vibration. These are outlined in:

- Interim Construction Noise Guideline (ICNG).
- Assessing Vibration: a technical guideline.
- The ANZECC Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration.

Relevant elements of these documents are summarised and discussed in this Chapter.

5.1 Construction noise and assessment objectives

The DECC Interim Construction Noise Guideline (ICNG, July 2009) provides guidelines for the assessment and management of construction noise. The ICNG focuses on applying a range of work practices to minimise construction noise impacts rather than focusing on achieving numeric noise levels.

The main objectives of the ICNG are to:

- Identify and minimise noise from construction works.
- Focus on applying all 'feasible' and 'reasonable' work practices to minimise construction noise impacts.
- Encourage construction during the recommended standard hours only, unless approval is given for works that cannot be undertaken during these hours.
- Reduce time spent dealing with complaints at the project implementation stage.
- Provide flexibility in selecting site-specific feasible and reasonable work practices to minimise noise impacts.

5.2 Quantitative noise assessment criteria

Construction noise assessment goals presented in the ICNG are referenced to noise management levels for residential, sensitive land uses and commercial/ industrial premises.

Residential premises

Table 5-1 sets out management levels for noise at residences and how they are to be applied.

In Table 5-1 the rating background level (RBL) is used when determining the management level. The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours). The term RBL is described in detail in the NSW Industrial Noise Policy (EPA, 2000).

As a guide, the difference between the internal noise level and the external noise level is typically 10dB with windows open for adequate ventilation.

Table 5-1 Noise at residents using quantitative assessment

Time of day	Management Level $L_{Aeq\ (15\ min)}$ *	How to apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 5 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq\ (15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • 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	The highly noise affected level represents the point above

Time of day	Management Level $L_{Aeq\ (15\ min)}$ *	How to apply
	affected 75 dB(A)	which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: – 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	• 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 1.5m above ground level. If the property boundary is more than 30m 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.

Other land uses

Consultation should be undertaken with noise sensitive land use occupants likely to be affected by noise from the works to schedule the project's work hours to achieve a reasonable noise outcome.

Internal noise levels are assessed at the centre of the occupied room. External noise levels are assessed at the most affected point within 50 metres of the area boundary. Where internal noise levels cannot be measured, external noise levels may be used. A conservative estimate of the difference between internal and external noise levels is 10dB for buildings other than residences. Some buildings may achieve greater performance, such as where windows are fixed (that is, cannot be opened). The management levels in Table 5-2 are 5dB above the corresponding road traffic noise levels in the Environmental Criteria for Road Traffic Noise (EPA 1999) (and the 'maximum' levels in the NSW Industrial Noise Policy (EPA 2000) for commercial and industrial uses) to account for the variable and short-term nature of construction noise.

Table 5-2 Noise at sensitive land uses (non-residents) using quantitative assessment

Land use	Noise assessment location	Noise management level ($L_{Aeq,15min}$)
Classrooms at schools and other educational institutions	Internal	45
Hospitals and operating theatres		
Places of worship		

Land use	Noise assessment location	Noise management level ($L_{Aeq,15min}$)
Active recreation areas[1]	External	65
Passive recreation areas[2]	External	60
Community centers	Dependent on intended use	Maximum internal levels recommended in AS2107 for specific use
Industrial premises	External	75
Office, retail outlets	External	70
Other noise sensitive businesses	Investigation to determine suitable noise levels on project-by-project basis	

Notes:

1. Active recreation areas are characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion.
2. Passive recreation areas are characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion (e.g. reading, meditation).

5.3 Adopted project noise management levels

Based on measured noise levels described in Section 4.2, the ultimate project-specific construction noise objectives for each representative monitoring location have been determined and are presented in Table 5-3 for residential land usage. Wave 2 has only 2 residential receivers identified (R2072 and R2075) within 600 meters to the project boundary for which noise management levels are detailed in Table 5-2. It is very unlikely the construction noise will approach the noise management levels as these where determine for the ultimate project. The possibility of works outside standard construction hours additional management levels for these times are also included in the construction noise objectives. All Extended hours (which only consist of traffic management activities i.e. setting up signs and installing concrete barriers) will follow the Out of Hours works procedure Appendix C.

The Project has been split into 6 (A to F) noise catchment areas (NCAs). Each NCA represents a typical background noise environment. This is based on noise levels measured across the Project. The areas are based on a buffer located either side of the Project, as follows:

- NCA A: 400–600 metres south side of the Project centreline.
- NCA B: 200–400 metres south side of the Project centreline.
- NCA C: 0–200 metres south side of the Project centreline.
- NCA D: 0–200 metres north side of the Project centreline.
- NCA E: 200–400 metres north side of the Project centreline.
- NCA F: 400–600 metres North of the Project centreline

For the early works NCA A: 400–600 metres south side of the Project centreline is applicable.
Table 5-3 Project-specific construction noise objectives

Location	Setback from existing highway (m)	Standard hours (7am-6pm)		Extended hours – morning (6am-7am)		Extended hours – evening (6pm-7pm)	
		RBL dB(A)	Noise objective	RBL dB(A)	Noise objective	RBL dB(A)	Noise objective
Section 11							
R2072	550	39	49	50	55	45	50
R2075	570	38	48	48	53	45	50

Table 5-3a Project-specific construction noise objectives for Out of Hours Works

Location	Setback from existing highway (m)	Out of hours (7pm-6am)	
		RBL dB(A)	Noise objective
Section 11			
R2072	550	31	36
R2075		31	36

5.4 Vibration criteria

Effects of ground vibration on buildings resulting from construction may be segregated into the following three categories:

- Human exposure – disturbance to building occupants: vibration in which the occupants or users of the building are inconvenienced or possibly disturbed.
- Effects on building contents – vibration where the building contents may be affected.
- Effects on building structures – vibration in which the integrity of the building or structure itself may be prejudiced.

Vibration criteria relating to human comfort that are applicable to this project are taken from the DEC (2006) document Assessing Vibration – A Technical Guideline and include the following.

- Continuous vibration – from uninterrupted sources (see Table 5-4).
- Impulsive vibration – up to three instances of sudden impact e.g. dropping heavy items, per monitoring period (see Table 5-5).
- Intermittent vibration – such as from drilling, compacting or activities that would result in continuous vibration if operated continuously (see Table 5-6).

Two standards by which building damage from construction-induced vibration are commonly assessed include:

- British Standard 7385: Part 2-1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration (BSI 1993).
- German DIN 4150: Part 3 – 1999 Effects of Vibration on Structure (DIN 1999).

The German standard provides the most stringent criteria and will be used in this CNVMP. The DIN guideline values for peak particle velocity (mm/s) measured at the foundation of the building are summarised in Table 5-7. The criteria are frequency dependent and specific to particular categories of structure.

Table 5-4 Continuous vibration acceleration criteria (m/s^2) 1-80Hz

Location	Assessment period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day or night-time	0.020	0.014	0.040	0.028
Workshops	Day or night-time	0.04	0.029	0.080	0.058

Table 5-5 Impulsive vibration acceleration criteria (m/s^2) 1-80Hz

Location	Assessment period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Residences	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	0.14
Offices, schools, educational institutions and places of worship	Day or night-time	0.64	0.46	1.28	0.92
Workshops	Day or night-time	0.64	0.46	1.28	0.92

Table 5-6 Intermittent vibration dose values (m/s$^{1.75}$) 1-80Hz

Location	Daytime		Night-time	
	Preferred Values	Maximum Values	Preferred Values	Maximum Values
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Table 5-7 Structural damage criteria

Type of Structure	Peak Component Particle Velocity, mm/s			
	Vibration at the foundation at a frequency of			Vibration of horizontal plane of highest floor at all frequencies
	1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz*	
Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
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 100Hz, at least the values specified in this column shall be applied.

6 Environmental aspects and impacts

6.1 Environmental aspects

The Project will involve a range of activities incorporating various heavy machinery, plant and equipment that will operate in a number of locations across the Project. In order to assess the level of potential impact on noise and vibration sensitive receivers, the broad categories of construction activity likely to interact with these receivers are identified below:

- Site enabling works (soft soil treatments) importing fill and placing in an embankment, installing wick drains.
- Clearing and mulching.
- Earthworks - placing and compacting
- Ancillary sites- compound area
- Access to site

The above activities are a small part of the overall project that was assessed and impacts from these above activities will be well below the predicted management levels.

6.2 Impacts

The potential for noise and vibration impacts on sensitive receivers or structures will depend on a number of factors. Typically these might include:

- The type of equipment in use.
- The number of equipment simultaneously in use.
- Ground condition.
- Topography and other physical barriers.
- Proximity to sensitive receivers.
- The condition of sensitive receivers.
- Hours/duration of construction works.
- Proximity of heavy traffic areas such as the highway.

Relevant aspects and the potential for related impacts have been considered in a risk assessment at Section 3.4 and Appendix A2 of the CEMP.

Noise and vibration impacts attributable to the Project are anticipated. Chapter 8 provides a suite of mitigation measures that will be implemented to avoid or minimise impacts on the receiving community and/or built environment.

7 Construction noise and vibration assessment

A range of plant and equipment will be required to undertake activities associated with the Project. A summary of anticipated construction scenarios and predicted noise levels are provided below. This information will be used to determine potential impacts on the receiving community. An adaptive management approach will be applied to the implementation of mitigation measures to minimise impacts on the community.

Works that are required to be undertaken outside of standard operating hours shall be performed in accordance with the Out of Hours Work Protocol, as approved by the ER per CoA B17.

7.1 Construction activities

Table 7-1 provides a summary of construction scenarios, and associated plant and equipment required for the works. Plant and equipment may be used in isolation or simultaneously. Appendix A provides a list of equipment and a correlating sound pressure level.

Table 7-1 Construction scenarios and associated plant and equipment

Scenario reference no.	Construction scenario	Typical plant and equipment required	Sound Power Level LAeq dB(A)
A	Site enabling works (soft soil treatments)	Excavator (30 tonne)	103
		Dozer (20 tonnes)	114
		Product truck (4 axle, 25 tonne)	108
		Vibratory compactor (12 tonne)	112
		Padfoot compactor	107
		Grader (25 tonne)	114
		Smooth barrel roller (18 tonne)	107
		Water cart	107
B	Clearing and mulching	Excavator (30 tonne)	103
		Dozer (20 tonnes)	114
		Product truck (4 axle, 25 tonne)	108
		Vibratory compactor (12 tonne)	112
		Padfoot compactor	107
		Grader (25 tonne)	114
		Smooth barrel roller (18 tonne)	107
		Water cart	107
C	Earthworks	Excavator (30 tonne)	103
		Dozer (20 tonnes)	114
		Product truck (4 axle, 25 tonne)	108

		Vibratory compactor (12 tonne)	112
		Padfoot compactor	107
		Grader (25 tonne)	114
		Smooth barrel roller (18 tonne)	107
		Water cart	107
		Backhoe	110
		Front end loader	114
		Scraper	108
D	Ancillary sites and compounds	Excavator (30 tonne)	103
		Dozer (20 tonne)	114
		Product truck (4 axle, 25 tonne)	108
		Water cart	107
		Backhoe	110
		Forklift trucks	
		Powered hand tools	101
E	Haulage routes	Haul trucks (25 tonne)	108

7.2 Construction noise impacts

7.2.1 General construction

A summary of predicted noise impacts from each related construction scenario on each sensitive noise receiver in the entire Section 11 Note only 2 receivers in the 400-600m band are potentially impacted by the early works has been provided in Appendix E of this Plan. Predicted noise levels for each construction scenario have been derived by calculating the combined noise output from the sound power levels of each piece of equipment listed in Appendix A. Table 7-2 details the number of sensitive receivers exceeding the NML for each scenario for each NCA again this is for the entire section and ultimate project

Table 7-2 Noise impact on representative sensitive receivers

NCA	Scenario reference no.	Normal Hours NML	No. receivers exceeding Normal hours NML	Out of hours NML	No. receivers exceeding out of hours NML
A	*A*	*48*	*0*	*36*	*4*
	B		*0*		*8*
	C		*7*		*8*
	D		*4*		*8*
	E		*0*		*0*

* Refer to Table 5-3 for a definition for extended hours

The construction plant modelled as part of the noise and vibration assessment for the EIS (Working Paper: Noise and Vibration, Roads and Maritime /Aurecon/SKM November 2012) for the soft soil treatments incorporated in the Project includes all plant identified in Table 7-3. The assessment found that no receivers in the Project study area would be exposed to noise levels exceeding the NML and no receivers would be classified as “high affected” (75dB (A) in accordance with the ICNG).

The impacts predicted by the noise assessment above are representative of the worst case 15 minute period of the works.
The assessment included the plant and equipment identified in Table 7-1 operating simultaneously and at the shortest separation distance to each sensitive receiver. In reality, separation distances are likely to vary and as the works are relatively linear in nature, the time at which each receiver is exposed to such levels would be short.

7.2.2 Compound and stockpile operation (including access)

The Project will require a main site compound, and a number ancillary facilities and stockpile sites. These compound and ancillary facilities will accommodate a range of activities, plant and equipment including, but not limited to:

- Office accommodation.
- Staff amenities.
- Light vehicle parking and access.
- A plant and equipment maintenance workshop.
- Material and chemical storage.
- Equipment storage.
- Material storage.

Not all sites will serve the same purpose and may include only one, or many combinations of the activities listed above. Table 7-3 summaries the likely combination of activities, plant and equipment anticipated at facilities for the project. Appendix B8 of the CEMP provides a list and assessment of all ancillary facilities and stockpile sites on the Project. A minor consistency review has been undertaken on ancillary site 1a. The ancillary site is significantly smaller than the main compound assessed, due to the reduced scope of works and the nature of use will limit any cumulative impacts.

Figure 7.1

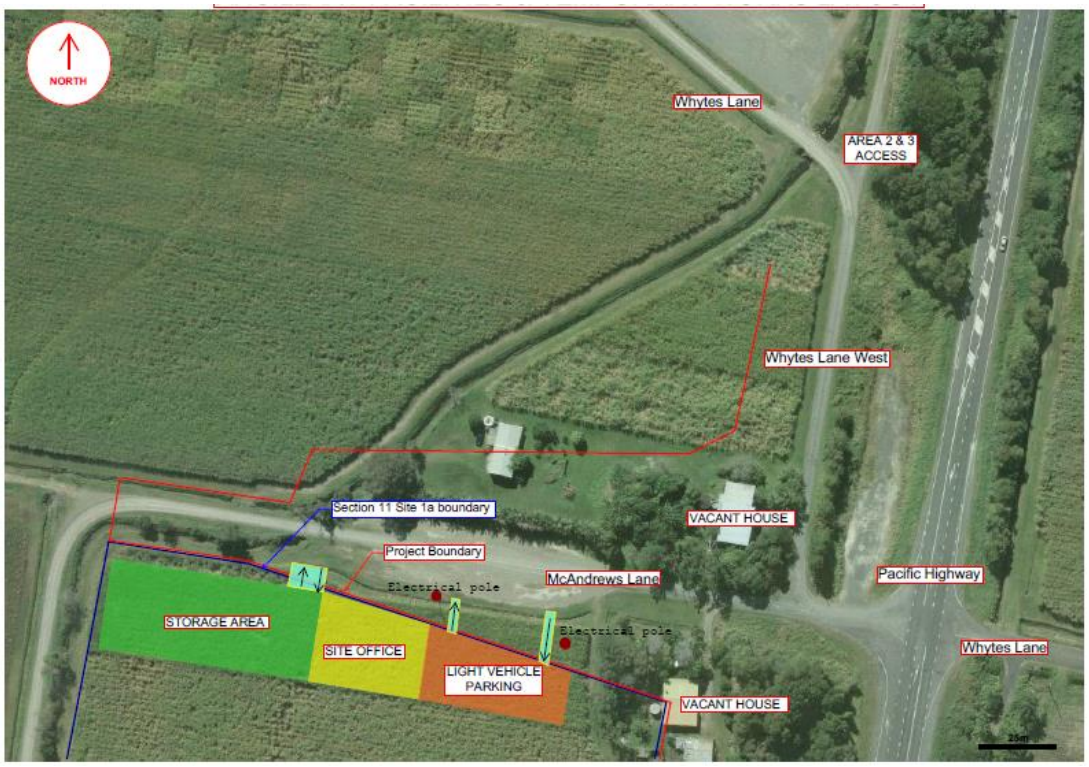


Table 7-3 Likely construction facilities and associated attributes

Facility reference no.	Facility type	Activities	Typical plant and equipment required
A	*Ancillary facility (including stockpile area)*	• *Light vehicle parking.* • *Site office.* • *Equipment maintenance workshop.* • *Material storage and handling containers.* • *Stockpile area.*	• *Office vehicles* • *Excavator (30 tonne)* • *Dozer (20 tonne)* • *Product trucks (4 axle, 25 tonne)* • *Water cart* • *Backhoe* • *Front end loader* • *Smooth drum roller* • *Padfoot roller*

Table 7-4 provides the predicted noise levels at various distances from each facility type.

Table 7-4 Predicted noise levels from facility type ($L_{Aeq\ (15min)}$)

Facility reference no.	Distance from facility					
	50 metres	100 metres	200 metres	300 metres	500 metres	600 metres
A	*80*	*74*	*68*	*65*	*60*	*59*

Vibration impacts from the operation of compound and ancillary facilities are not anticipated. Again these predicted levels are based on the ultimate project and not the smaller early works project. Therefore, it is very unlike noise management levels will be exceeded.

7.2.3 Construction Traffic Noise

The NSW Roads Noise Policy does not provide guidelines to assess road traffic noise from construction. In general, an increase in traffic numbers of at least 25 per cent (or decrease of 20 per cent) is required to change noise levels by 1 dB (A). Where construction traffic would use newly built haul roads, this impact has been assessed against noise management levels related to general work activities.

Noise impacts from haulage have been assessed where a completely new haul road is required. Noise impacts have been considered based on predicted construction traffic numbers, sourced from the Working paper – Traffic and transport. There are no new haul roads proposed as part of this section of works.

7.2.4 Out of Hours Works

Where works are to be conducted out of normal hours they will be conducted in accordance with Appendix C of this plan. Appendix E and Table 7.2 detail the NML's and predicted impacts on sensitive receivers from potential construction scenarios undertaken out of normal hours. Note: that the only out of hours work is traffic control and setup.

7.2.5 Sleep Disturbance

In accordance with the ICNG, the maximum noise assessment for construction works is considered applicable where works would potentially be undertaken over two or more consecutive nights. This is to assess the potential for sleep disturbance as a result of maximum noise levels, not just average noise levels. Although the ICNG does not specifically provide criteria for assessing maximum noise events, it does refer to methods within the NSW Road Noise Policy (RNP - DECCW, 2011).

The RNP discusses the potential for disruption of normal sleep patterns due to irregular noise events, but concludes there is insufficient evidence to assist in setting trigger levels for this type of impact. The work to date on the subject specifies that:

- Maximum noise levels below 50-55 dB(A) are unlikely to cause an awakening from a sleep state
- One or two noise events per night with maximum noise levels of 65-70 dB (A) are not likely to affect the health and wellbeing significantly.

Maximum noise emissions from construction works usually result from unforeseen and sporadic incidents such as the dropping of an excavator bucket, rock dropping into metal containers or metal plant hitting hidden metal/rock ground conditions. These events and the magnitude of emission are heavily dependent on the types of activities undertaken, plant being used, materials being processed and a number of other variables.

The one off nature of maximum noise emissions means the accurate prediction of maximum noise emissions for a particular activity is relatively difficult. In addition to the magnitude of the maximum noise emission, the frequency and number of events over a particular night time period is also important when determining sleep disturbance.
Table 7-5 shows the number of receivers within Section 11 that have the potential to be exposed to maximum noise levels above the adopted criteria.

Table 7-5 Construction maximum noise summary

NCA	Total no. of receivers	Number of receivers exposed to LAmax above 65dB(A) in a night time period
A	2	0

7.3 Construction vibration assessment

7.3.1 Vibration assessment

Table 7-6 lists vibration intensive plant assessed in the noise and vibration assessment undertaken as part of the EIS to be used during construction and provides predicted ground vibration levels at various distances from the plant. The vibration levels are indicative only and will vary depending on the particular item of plant and geotechnical conditions.

Table 7-6 Typical plant vibration levels

Plant description	Safe Working Distance (metres)	
	Cosmetic Damage[1]	Human Response[2]
Vibratory roller (7-13 tonne)	*15*	*100*
Vibratory roller (13-18 tonne)	*20*	*100*
Small hydraulic hammer (300kg)	*2*	*7*
Medium hydraulic hammer (900kg)	*7*	*23*
Jackhammer (hand held)	*1 (nominal)*	*Avoid contact with structure*

Note 1: Referenced from British Standard BS 7385 Part 2-1993 *Evaluation and measurement for vibration in buildings Part 2*
Note 2: Referenced from DECCW's Assessing Vibration: a technical guideline

There are no receivers within 400m.

The safe working distances identified in the above Table 7-6 shows that no receivers are predicted to be within the cosmetic damage range and therefore no structural damage would be anticipated as part of the Project. Safe working distances for human response range from nominal to 100m. The implementation of the environmental control measures outlined in Section 8 would ensure that human perception to vibration occurring as part of the Project would be minimal.

8 Environmental control measures

A range of environmental requirements and control measures are identified in the various environmental documents, including the EIS, Environmental Noise Management Manual (ENMM), (Submissions / Preferred Infrastructure Report, Conditions of Approval and Roads and Maritime documents. Specific measures and requirements to address impacts from noise and vibration are outlined in Table 8-1.

N

Procedures outlined in Practice note vii of the RTA Environmental Noise Management Manual (ENMM) will be followed with the intent to manage and/or minimise noise impacts for Out of Hours Work. The nature of proposed out of hours work in traffic management on the existing highway.

Table 8-1 Noise and vibration management and mitigation measures

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
GENERAL					
NV1	Training will be provided to all project personnel, including relevant sub-contractors on noise and vibration requirements from this plan through inductions, toolboxes and targeted awareness training. Noise and vibration training requirements will be as per Section 9.2 of this plan.		Pre-construction, construction	ESR	G36, Section 9.2
NV2	Work compounds, parking areas, equipment and material stockpile sites will be positioned away from noise-sensitive locations in accordance with the criteria in Section 3.7.2 and Appendix B8 of the CEMP, and Appendix I of the CSWQMP.		Construction	ESR	G36
NV3	Site entry and exit points will be located as far as possible from sensitive receivers, taking into account the importance of safe access.		Construction	Foreman	Submissions / PIR(CNV3)
NV4	Truck routes to and from the worksite will be via major roads where possible, in accordance with the Construction Traffic and Access Management Plan.		Construction	Superintendent	Submissions / PIR (CNV9)
PLANT AND EQUIPMENT					
NV5	Static noise sources, such as generators, pumps and lighting towers, will be located as far as possible from sensitive receivers. Place screening or enclosures around fixed plant under regular operation that may impact upon noise sensitive receivers. The use of temporary noise shielding will be determined following community consultation.		Construction	Foreman	G36, Submissions / PIR (CNV11 and CNV12)
NV6	Plant or machinery will not be permitted to 'warm-up' before the standard construction hours.		Construction	Operators	Submissions / PIR (CNV8)
NV7	Switching off engines when equipment is not in use for extended periods (i.e. 30 minutes).		Construction	Operators	G36
NV8	Manually adjustable or ambient noise sensitive or 'squawker' type reversing alarms on plant and/or flashing lights will be used at night.		Construction	Superintendent	G36, Submissions / PIR (CNV6)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
NV9	Where possible, maintenance work on construction plant will be undertaken away from noise sensitive receivers.		Construction	Foreman	G36
NV10	All construction plant and equipment used on the site will be, in addition to other relevant requirements: • Fitted with properly maintained noise suppression devices in accordance with the manufacturer's specifications. • Maintained in an efficient condition. • Operated in a proper and efficient manner		Construction	Superintendent	G36, Submissions / PIR Submissions / PIR (CNV4) ; MCoA B80
NV11	Loading and unloading will be carried out as far as practical away from sensitive receivers.		Construction	Foreman	Good practice
NV12	Truck movements will be kept to a minimum, i.e. that trucks are sufficiently utilised for each trip.		Construction	Foreman	Good practice
NV20	Trucks will not queue up outside residential properties. No trucks will arrive on site or be permitted to queue near sensitive receivers prior to the 7.00 am start time unless required by road safety considerations.		Construction	Foreman	Good practice
NV21	Noisy plant working simultaneously close together will be avoided to the greatest extent practical adjacent to noise affected sensitive receivers.		Construction	Foreman	Good practice
NV23	Truck drivers will limit compression braking as far as practicable.		Construction	Operators	Good practice
NV24	Where possible, noise generating equipment will be strategically positioned to take advantage of natural screening from geographical features or other structures to reduce the transmission of noise between work sites and receiver locations.		Construction	Foreman	Good practice
NV25	Appropriately sized equipment would be selected in order to minimise vibration emissions, where required.		Construction	Foreman	Submissions / PIR (CNV17)
CONSTRUCTION HOURS					
NV26	Construction works associated with the Project, other than blasting, will only be undertaken during the following hours:		Construction	Construction Manager	CoA B15

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	• 7:00am to 6:00pm Mondays to Fridays, inclusive; and • 8:00am to 5pm Saturdays; and • at no time on Sundays or public holidays. Unless otherwise assessed and justified in the CEMP or this Plan.				
NV27	Works outside of the construction hours identified in CoA B15 will only 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 in accordance with the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009); and (ii) no more than the noise management levels specified in Table 3 of the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009) at other sensitive receivers; or b) for delivery of materials required outside these hours by the Police or other authorities for safety reasons; or c) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm; or d) between 6.00am and 7.00am and 6.00pm and 7.00pm Monday to Friday (except public holidays) in sparsely populated areas (these construction hours may be reviewed and/or revoked by the Director General in consultation with the EPA in the case of unresolved noise complaints); or e) low noise impact activities and work as follows: (i) between 6.00am and 7.00am Monday to Friday; and/or (ii) between 6.00pm and 7.00pm Monday to Friday; f) works approved through an EPL or g) works approved by a Construction Environment		Construction	Construction Manager	CoA B16

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	Management Plan or Construction Noise and Vibration Management Plan for the SSI in accordance with CoA B19.				
NV28	The Applicant shall, where feasible and reasonable, limit high noise impact activities and work to the mid -morning and mid-afternoon periods, except in sparsely populated areas. Rock breaking, rock hammering, sheet piling, pile driving and any similar activity will be scheduled only between the hours of 9am to 12pm and 2pm to 5pm, Monday to Friday; and 9am to 12pm, Saturday except where works are to be undertaken outside proposed construction hours as outlined above. These activities, if undertaken in continuous blocks and where there is an impact on a sensitive receiver, must not exceed 3-hours in duration, particularly if work extends outside the standard construction hours. A minimum respite period of 1 hour shall be scheduled before activities recommence.		Construction	Construction Manager	CoA B19, Submissions / PIR (CNV2)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
NV29	Construction activities resulting in impulsive or tonal noise emission (such as rock breaking, rock hammering, pile driving) shall only be undertaken: (a) between the hours of 8:00am to 5:00pm Monday to Friday; (b) between the hours of 8:00am to 1:00pm Saturday; 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. *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.* *The works subject to this condition may be undertaken in sparsely populated areas within the construction hours specified in condition CoA B15.*		Construction	Foreman	Submissions / PIR (CNV2) CoA B18
NV30	Any proposal to undertake works outside of the standard working hours identified in CoA B15 will be subject to CoA B17 and the processes and assessment requirement contained in the out of hours works procedure (see Appendix C).		Construction	Construction Manager	CoA B17
NV31	Affected receivers would be consulted prior to the commencement of out of hours work.		Construction	Communications Manager	Submissions / PIR (CNV1)
NV32	Affected educational institutions shall be consulted and reasonable steps taken to ensure that noise generating construction works in the vicinity of affected buildings are not timetabled during examination periods where practicable, unless other reasonable arrangements to the affected institutions are made at no cost to the affected institution.		Construction	Construction Manager	CoA B27
CONSULTATION AND COMPLAINTS MANAGEMENT					
NV33	Residents / sensitive receivers will be notified of construction activities that are likely to affect their noise and		Pre-construction /	Communications	Submissions / PIR

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	vibration amenity in accordance with the Community Communications Strategy. Information provided will include: (i) The types of activities to be undertaken. (ii) The timing of activities including expected start and finish. (iii) The location of activities. (iv) Details of the community information line and how to make an enquiry and/or complaint		Construction	Manager	(CNV31)
NV34	Affected receivers will be consulted prior to the commencement of out of hours work.		Construction	Superintendent / Communications Manager	Submissions / PIR (CNV1)
NV35	Circumstances may arise during construction where works outside of standard construction hours are essential and sensitive receivers are assessed to be highly noise affected (i.e. experience noise levels greater than 75 dBA). Where this is the case, opportunities to minimise impacts on highly noise effected receivers, including the provision of alternative accommodation, would be considered in consultation with those affected receiver(s).		Construction	Communications Manager	Good practice
NV36	All complaints received will be managed in accordance with the Community Communications Strategy.		Construction	Communications Manager	Submissions / PIR (CNV7)
NV37	Where it has been identified as necessary (e.g. in response to community complaints), noise monitoring will be undertaken to check that noise mitigation measures are effective.		Construction	Construction Manager / Communications Manager	Submissions / PIR (CNV10)
SURVEY, MONITORING AND REPORTING					
NV38	Initial noise monitoring of plant and equipment will be undertaken to ensure the noise performance levels predicted in this CNVMP are being met.		Pre-construction / Construction	Environmental Officer / Noise Specialist	Good practice
NV39	Noise and vibration monitoring will be undertaken in accordance with Section 9.3. The program for construction noise and vibration monitoring indicates monitoring frequency, location, how the results of this monitoring are		Construction	Environmental Officer / Noise Specialist	Submissions / PIR (CNV13)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	recorded and, procedures that are followed where significant exceedances of relevant noise and vibration goals are detected.				
NV40	Building Condition Inspections for each public utility, structure and building will be carried out where: (i) Blasting operations are within 500 metres or the distance at which the calculated 95th percentile Peak Velocity of ground vibration from the proposed blast is 2 mm/s, whichever is the greater. (ii) Pile driving activities are within 250 metres or the distance at which the calculated 95th percentile Peak Velocity of ground vibration from the proposed pile driving is 2 mm/s, whichever is the greater (iii) Other vibration causing activities where the distance at which the calculated 95th percentile Peak Velocity of ground vibration is 2 mm/s.		Pre-construction / Construction	Project Engineer	G36
NV41	The Building Condition Inspection report will include as a minimum: (i) Floor plan of the subject building. (ii) Record site details - age, construction, site slope and provision for drainage, presence of trees. (iii) Type of defects and their positions and extents on the floor plan. (iv) Photograph of external view and photograph of all defects of significance (especially if of concern to the owner), or typical examples of say, hairline plaster cornice cracks. (v) How doors sit in the jambs - out of line may indicate foundation settlement. (vi) External signs of reactive clay foundation soil, e.g. lifting of slabs, uneven kerbing.		Pre-construction / Construction	Project Engineer	G36
NV42	All complaints, including those related to property damage, will be managed in accordance with the Roads and Maritime Complaints and Enquiries Procedure – see section 6.3.2 of the CEMP.		Construction	Communications Manager	Good practice

9 Compliance management

9.1 Roles and responsibilities

The SEE Civil Project Team's organisational structure and overall roles and responsibilities are outlined in Section 4.2 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Chapter 8 of this Plan.

9.2 Training

All employees, contractors and utility staff working on site will undergo site induction training that includes construction noise and vibration management issues. The induction training will address elements related to noise and vibration management including:

- Existence and requirements of this sub-plan.
- Relevant legislation.
- Normal construction hours.
- Noise impacts during establishment of ancillary sites at the beginning, during meal breaks and the conclusion of out of hours work (e.g. arrival and exit of vehicles and personnel).
- The process for seeking approval for out of hours works, including consultation.
- Location of noise sensitive areas.
- Complaints reporting.
- General noise and vibration management measures.
- Specific responsibilities to minimise impacts on the community and built environment from noise and vibration associated with the works.

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

9.3 Inspections and monitoring

Weekly and other routine inspections by Environmental Officers, Roads and Maritime, ERG representatives and ER will occur throughout construction. Detail on the nature and frequency of these inspections are documented in Section 8.2 of the CEMP.

Noise and vibration monitoring will also occur routinely for the duration of the Project. Monitoring will be undertaken by an Acoustic Consultant or the Environmental Officer during the construction phase of the Project.

9.3.1 Noise monitoring

The following noise monitoring will be undertaken:

- Periodic noise monitoring at nominated sensitive receiver locations (refer to section 4.1 of this plan) to determine the effectiveness of mitigation measures against predicted impacts.
- Where complaints are received, additional noise monitoring may be undertaken at sensitive receivers to determine if the actual construction noise generated exceeds the predicted 'worst case' construction noise levels identified in Section 7.2 of this Plan.
- Noise monitoring may be carried out for the purpose of refining construction methods or techniques to minimise noise.

- Ongoing spot checks of noise intensive plant and equipment will be undertaken throughout construction to ensure compliance with manufactures specifications.

Where actual noise levels are found to exceed the predicted worst case levels, the source of excessive noise generations will be identified, and any additional feasible and reasonable measures available will be implemented to either reduce noise emissions or reduce the impacts on receivers.

Details of site activity and equipment usage will be noted during construction noise monitoring.

Acoustic instrumentation employed in the noise monitoring surveys will comply with the requirements of AS1259.2-1990 Acoustics – Sound Level Meters, Part 2: Integrating – Averaging and carry appropriate NATA (or manufacturer) calibration certificates.

Within six months of commencing construction, the contractor shall, in consultation with the EPA, prepare to the satisfaction of the Secretary, a review of the operational noise mitigation measures proposed to be implemented for the SSI. The review may be submitted in stages to suit the staged construction of the SSI. This Operational Noise Review is to be completed in accordance with CoA D11.

9.3.2 Vibration monitoring

The following vibration monitoring will be undertaken:

- For the protection of buildings, monitoring will be carried out at the commencement of vibratory compaction work within 50 metres of buildings to ensure that safe vibration levels specified in Section 7.3.1 are not exceeded and to confirm safe working distances.
- When vibration intensive activities are required, vibration monitoring will be carried out within the established buffer zones, or where there is considered to be a risk that levels may exceed the relevant structural damage goals.
- Vibration monitoring may be carried out in response to complaints, exceedances, or for the purpose of refining construction methods or techniques to minimise vibrations.
- Vibration monitoring will continue throughout construction, where appropriate, at nominated sensitive receiver locations to determine the effectiveness of mitigation strategies.

Where vibration is found to exceed safe levels, impacts will be avoided by changing work methods and/or equipment, or through the provision of building protection measures where possible. In the event a complaint relating to property damage is received, an inspection of the property would be undertaken and an interim building condition survey prepared.

Vibration monitoring will be carried out with the aim of achieving the following construction vibration goals (CoA B20):

a) for structural damage to heritage structures, the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration – Part 3 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 of vibration in buildings (and referenced in Australian Standard 2187.2 – 2006 Explosives – Storage and use – Use of explosives). Guide for measurement of vibration and evaluation of their effects on buildings; and

c) for human exposure, the acceptable vibration values set out in Assessing Vibration: A Technical Guideline (Department of Environment and Conservation, 2006).

9.4 Non-conformances

Non-conformances in general will be dealt with and documented in accordance with Section 8.6 of the CEMP.

9.5 Complaints

Complaints will be recorded in accordance with the Community Communications Strategy (CCS). Information to be recorded will include location of complainant, time/s of occurrence of alleged noise or vibration impacts (including nature of impact particularly with respect to vibration), perceived source, prevailing weather conditions and similar details that could be utilised to assist in the investigation of the complaint. All resident complaints will be responded to in a timely manner and action taken recorded in accordance with the CCS.

9.6 Auditing

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

Audit requirements are detailed in Section 8.3 of the CEMP.

9.7 Reporting

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

Specific reports prepared in response to noise and vibration monitoring will capture detail including, but not limited, to:

- The locations and description of monitoring undertaken.
- A tabulation of results (e.g. for noise including L_{MAX}, L_{10}, L_{90} and L_{Aeq} noise levels) together with notes identifying the principle sources and operations.
- Summary of any measurements exceeding the nominated criteria, and descriptions of the plant or operations causing these exceedances.
- Detail of any corrective actions and confirmation of their successful implementation.

10 Review and improvement

10.1 Continuous improvement

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

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance.
- Determine the cause or causes of non-conformances and deficiencies.
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies.
- Verify the effectiveness of the corrective and preventative actions.
- Document any changes in procedures resulting from process improvement.
- Make comparisons with objectives and targets.

10.2 Update and amendment

The processes described in Section 8 and Section 9 of the CEMP may result in the need to update or revise this Plan. This will occur as needed.

Only the Environmental Site Representative, or delegate, has the authority to change any of the environmental management documentation.

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

Appendix A
Plant and equipment sound power levels

Plant noise source	dB (A) LAeq Sound power level
2 x Excavator – 30t	103
2 x Dozer – 20t	114
18 x Product truck - 4 axle, 25t	108
2 x Vibratory compactor - 12t	112
2 x Padfoot compactor	117
1 x Grader – 25t	114
2 x Smooth barrel roller – 18t	107
1 x Watercart – extracting water	107
Backhoe	110
Front End Loader	114
Fork Lift Truck	101
Powered Hand Tools	115
Scraper	108
Skid Steer Loader	104

Appendix B
Blast management plan

Note: This appendix is not applicable to the Wave 2 Project and therefore has been intentionally omitted.

Appendix C

Out of hours works procedure

Out of Hours Works Procedure

HW10 Pacific Highway Upgrade, Woolgoolga to Ballina – Whytes Lane to Pimlico Road Early Works – Wave 2

Contract No: 14.2544.2091.

SEE Civil Pty Ltd
24A Ozone St Chinderah NSW 2487
ABN 88 115 963 427

CONTENTS

SPECIFIC PROJECT INFORMATION

Out of Hours Works Procedure		
Project Name	HW10 Pacific Highway Upgrade, Woolgoolga to Ballina – Whytes Lane to Pimlico Road Early Works – Wave 2	
Project Address	Whytes Lane Pimlico NSW 2478	
Contract Number	14.2544.2091	
SEE Job Number	J396-1	
Date Issued	20 October 2015	
SEE Contact Person	Ryan Buckley	Mobile: 0407 386 956

	Name	Signature
Prepared By: Quality Manager	Ben McGloin	
Reviewed By: Project Manager	Ryan Buckley	
Authorised By: Operations Manager - Infrastructure	Charl Alberts	

Revision History				
Revision	**Details of Revision**	**Prepared**	**Reviewed**	**Approved**
01	For Distribution	BM	RB	CA
02	For RMS Revision	BM	RB	CA
03	For RMS Revision	BM	RB	CA
04	Response to Agency comments	MH	LP	CA
05	For Approval	LP	RB	CA

1 PURPOSE

This work procedure has been developed to assist with compliance of environmental legislation, project obligations and to effectively manage potential environmental impacts associated with noise during in the course of construction of the Project. It is prepared in accordance with the Conditions of Approval (CoA), Environmental Impact Statement (EIS) management measures, Environment Protection Licence (EPL) and Project Construction Noise and Vibration Management Plan (NVMP).

2 OBJECTIVES

This procedure outlines the project requirements for construction working hours and documents a process to be implemented when work outside of standard hours is required. The key objective of the procedure is to ensure that impacts to the local community are avoided and minimised and the requirements of the EPL and CoA are met. Specific objectives include:

- Minimising potential adverse noise impacts to the community
- Identify sensitive receivers and ensure appropriate noise control measures are implemented during construction activities
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in the NVMP.
- Ensuring appropriate measures are implemented to comply with the Project's EPL.

2.1 WORK HOURS

In accordance with CoA B15, standard construction hours are:

- 7am to 6pm Mondays to Fridays inclusive;
- 8am to 5pm Saturdays; and
- At no time Sundays or public holidays.

In accordance with CoA B18, high noise impact works and activities shall only be undertaken:

a) between the hours of 8:00 am to 6:00 pm Monday to Friday;
b) between the hours of 8:00 am to 1:00 pm Saturday; 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.

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.

In accordance with CoA B16, construction works outside of the standard construction hours may be undertaken in the following circumstances:

a) construction works that generate noise that is:
    i. no more than 5 dB(A) above rating background level at any residence in accordance with the Interim Construction Noise Guideline (ICNG) (DECC 2009); and
    ii. no more than the noise management levels specified in Table 3 of the ICNG 2009 at other sensitive recievers; or
b) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
c) where it is required in an emergency to avoid injury or the loss of life, property and/or to prevent environmental harm; or
d) between 6:00am and 7:00am and 6:00pm and 7:00pm Monday to Frioday (except public holidays) in sparsely populated areas (these construction hours may be reviewed and/or revoked by the Secretary in consultation with the EPA in the case of unresolved noise compliants): or
e) low noise impact activites and work between:
    i. 6:00am and 7:00am Monday to Friday; and/or

ii. 6:00pm and 7:00pm Monday to Friday;

f) Works approved through an EPL; or

g) Works approved by a CEMP or CNVMP for SSI

2.2 MANAGEMENT LEVELS

Generally the management levels that apply to construction works are:

Table 1: ICNG Construction Noise Management Levels – General activities

Sensitive receiver distance from the existing Pacific Highway (metres)	Management level LAeq (15 min) dB(A)		
	Recommended standard hours	Outside recommended standard hours (6pm-10pm)	Outside recommended standard hours (10pm-7am)
0 to 100 m	55	48	40
100 to 200 m	54	48	40
Greater than 200 m	50	45	40

Note: Where ground-borne noise is likely to exceed air-borne noise, such as in tunnelling activities, the noise management levels are:

Table 2: Ground borne noise management levels

Time	Management level LAeq(15 min) dB(A)
Evening (6pm to 10pm)	Internal: LAeq (15 min) 40 dB(A)
Night-time (10pm to 7am)	Internal: LAeq (15 min) 35 dB(A)

2.3 OUT OF HOURS WORKS PROCESS

To enable the works listed above to occur outside of standard construction hours the following process shall be implemented;

1. Project engineers to consult with the ESR and Community Manager 6 weeks in advance of proposed out of hours works. The engineer is to submit an out of hours works (OOHW) request form (refer to Annexure A) which will allow the ESR to determine the predicted noise level, compliance with CoA B16 and the Project EPL.
2. The ESR will assess the OOHW request and determine;
    a. if the proposed works are likely to exceed RBL +5dB(A) or management levels specified in Table 3 of the Interim Construction Noise Guideline, or
    b. if a negotiated agreement has been reached with affected receivers, where the prescribed noise and vibration levels cannot be achieved; or
    c. if the works are for the delivery of materials required outside of standard hours by the NSW Police Force or other authorities for safety reasons; or
    d. where it is required in an emergency to avoid injury or the loss of life, property and/or to prevent environmental harm, or
    e. if the EPL criteria for out of hours work are met, or if an EPL variation is required.

If the ESR determines, based on initial noise assessment, that the works will be less than RBL +5dB(A) or management levels specified in Table 3 of the Interim Construction Noise Guideline at the closest sensitive receiver, and meets the requirements of condition B16 (a)(i) and (ii) or comply with CoA B16(b) to (g), the works will be approved by the ESR. Specific noise management measures, in accordance with the NVMP will be included on the OOHW approval and noise monitoring undertaken.

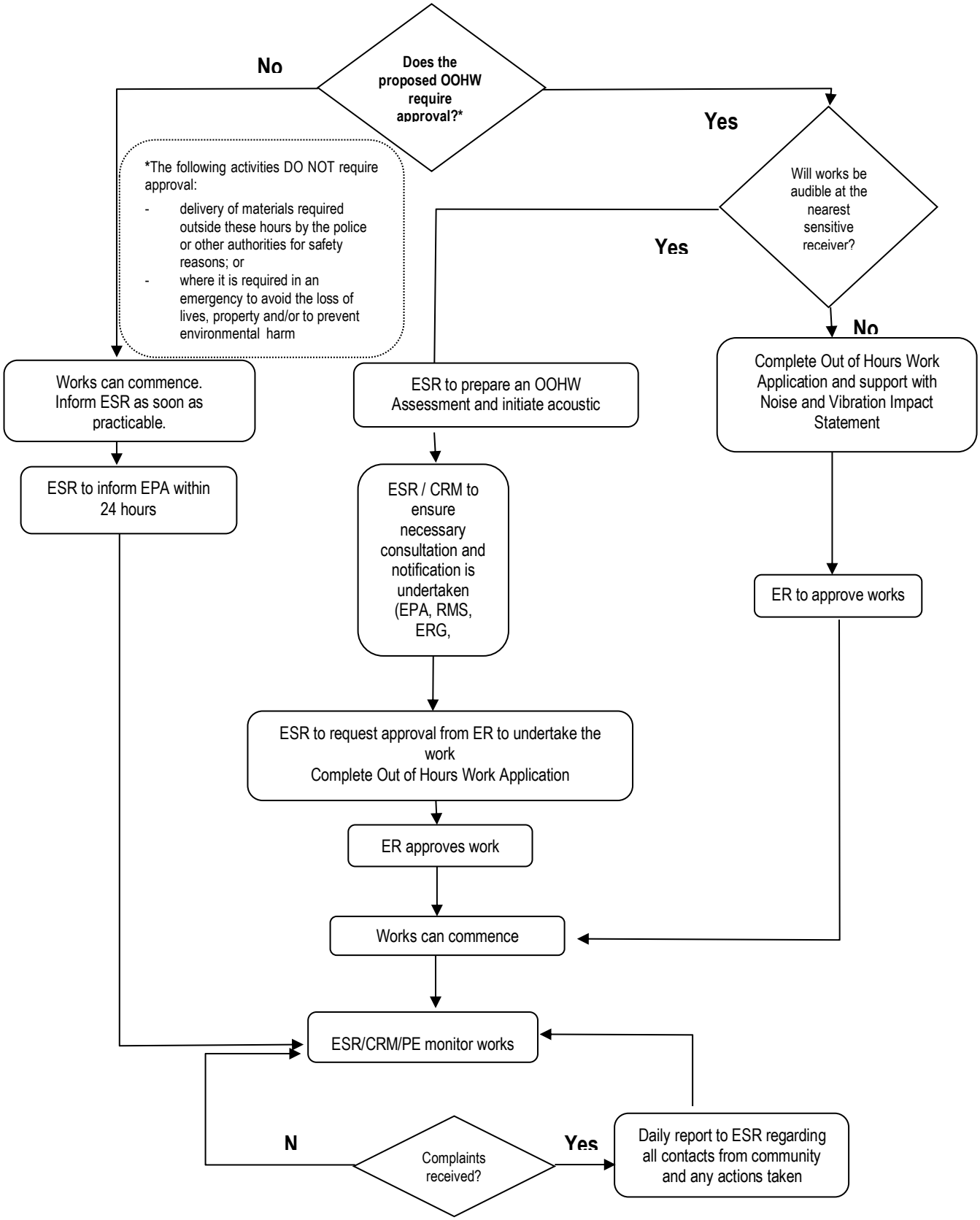
3. The ESR will review the proposed OOH works that do not comply with either B16(a)(i)-(ii) or B16(b)-(g) and determine if the works meet the EPL Conditions. If the EPL requirements are satisfied, the ESR will prepare a

report, including predicted noise levels and noise management requirements in accordance Interim Construction Noise Guideline (ICNG) (DECC 2009). Noise monitoring will be undertaken in accordance with the NVMP.

4. The Project Manager will review the report and approve the work.
5. The approved report will be provided to the Environmental Representative and the EPA for information prior to the works commencing.
6. The Community Manager will notify the affected sensitive receivers in accordance with the EPL and Community Action Plan and (Communications Stakeholder Engagement Strategy)notification requirements.
7. Where the ESR has reviewed the proposed works and the activities exceed RBL +5dB(A) or management levels specified in Table 3 of the Interim Construction Noise Guideline or the works do not meet the EPL Condition requirements, an EPL variation will be requested from the EPA.
8. If proposed out of hours works do not comply with CoA D16 (a) – (g) and the EPL, the works cannot be undertaken.

3 APPROVAL

Figure 1 Out of Hours Works Procedure Flow chart


Does the proposed OOHW require approval?*
No
Yes
*The following activities DO NOT require approval:
- delivery of materials required outside these hours by the police or other authorities for safety reasons; or
- where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm
Will works be audible at the nearest sensitive receiver?
Yes
No
Works can commence. Inform ESR as soon as practicable.
ESR to prepare an OOHW Assessment and initiate acoustic
Complete Out of Hours Work Application and support with Noise and Vibration Impact Statement
ESR to inform EPA within 24 hours
ESR / CRM to ensure necessary consultation and notification is undertaken (EPA, RMS, ERG,
ER to approve works
ESR to request approval from ER to undertake the work
Complete Out of Hours Work Application
ER approves work
Works can commence
ESR/CRM/PE monitor works
N
Complaints received?
Yes
Daily report to ESR regarding all contacts from community and any actions taken

4 RESPONSIBILITIES

Role	Definition/Responsibility
Noise and vibration specialist	A professional consultant engaged to provide noise and vibration advice regarding proposed activities
Environment Site Representative	Ensures that all on site aspects of this procedure are carried out. Provides advice on this procedure to site personnel
Project Manager	Ensures that all aspects of this procedure are implemented. The project manager can delegate to the ESR.
Superintendent / Site Supervisor	Ensures that works are carried out in accordance with assessed proposal.
Project Engineers	Report any possible breaches or failure of mitigation measures. Ensures that works are carried out in accordance with assessed proposal
Environmental Representative	Approves out of hours work

5 CONSULTATION REQUIREMENTS

The Project will notify the community in accordance with the Community Action Plan and (Communications Stakeholder Engagement Strategy). This notification will:

(i) be made by targeted letterbox drop, doorknock, phone call or email to noise sensitive receivers;

(ii) be made not less than 5 days and not more than 14 days before commencement of any out of hours works or activities;

(iii) include:

a. a diagram that clearly identifies the location of the proposed out of hours works in relation to nearby cross streets and local landmarks or geographical features;
b. details of the timing, nature, scope and duration of the proposed works and activities;
c. detail of why the proposed works and activities are being undertaken outside of standard construction hours;
d. details of the predicted noise and vibration impacts of the works on identified sensitive receivers;
e. details of all proposed mitigation measures, including respite periods and proposed scheduling;
f. details of the types of plant and equipment that will be used to undertake the work;
g. details of how complaints may be made and additional information obtained about the work;
h. contact details in community languages relevant to the locality; and include notification of any upcoming project community meetings, forums and Variable Message Signs (VMS).

5.1 RELEVANT REFERENCES

- Interim Construction Noise Guidelines, DECC 2009.
- Construction Noise and Vibration Management Plan
- Minister's Conditions of Approval
- Environmental Noise Management Manual Practice Note vii

5.2 PROCEDURE (INAUDIBLE)

#	Safeguards/controls *How can the risk be minimised?*	Responsibility
PLANNING		
A1	Ensure that works meet guideline management levels as described above and is supported by a noise and vibration impact assessment.	ESR Construction Manager
A2	Ensure that any required noise and vibration monitoring points are in place.	ESR
A3	Environmental Work Method Statements (EWMS) will be prepared to outline specific mitigation measures for all Project locations activities. The EWMS will reiterate any	ESR

	specific requirements to mitigate noise and vibration impacts. Training in the use of EWMS should be provided during induction and as part of toolbox meetings. EWMS will be provided to personnel in advance of activities.	
PRE-CONSTRUCTION AND CONSTRUCTION		
B1	Ensure all mitigation measures are installed properly and are working effectively.	ESR Site Supervisor
B2	Undertake any noise and vibration monitoring required as part of the works.	ESR
B3	Should there be any exceedance of the approved noise and vibration management levels that is attributable solely to the works, work is to stop immediately and additional mitigation measures installed to ensure management levels are adhered to.	ESR Site supervisor
REPORTING		
C1	Once works are complete, a brief summary of all noise and vibration data collected and the works undertaken should be prepared. Any additional clarifying comments should be included in this summary.	ESR

5.3 PROCEDURE (AUDIBLE)

#	**Safeguards/controls** ***How can the risk be minimised?***	**Responsibility**
PLANNING		
A1	Where audible out of hours work is required, an Out of Hours Work (OOHW) Assessment will be prepared by the ESR. As part of the preparation of the OOHW Assessment, the ESR will consult with Roads and Maritime Services' (RMS), Environment Protection Authority (EPA) and affected receivers at least 2 weeks prior to the proposed work. Refer to Steps A2 to A6 for details on consultation requirements. The OOHW Assessment will include: Details of the nature and justification for activities to be conducted during the varied construction hours; A noise impact assessment of predicted noise levels in each noise catchment area (NCA) with number of residents predicted to affected; Details of any additional proposed noise monitoring; Evidence that appropriate consultation with potentially affected sensitive receivers and notification of agencies has been undertaken; Evidence that all reasonable and feasible noise mitigation measures have been put in place; and Evidence of consultation with EPA on the proposed variation in construction hours.	ESR Construction Manager
A2	The ESR will consult with EPA on the proposed variation in construction times. The consultation will include but not be limited to details on how SEE Civil are meeting the requirements of Minister's Condition and conditions of the EPL.	ESR
A3	The ESR and Community Relations Manager (CRM) will undertake community consultation to inform the community of the proposed out of hours activities and mitigation measures to be implemented to obtain general community support. If there is opposition from the community for the proposed OOHW, then SEE Civil will review and revise the proposed work program and mitigation measures based on community feedback and continue to work with the community to obtain community support.	ESR Community Relations Manager
A4	The CRM in consultation with the relevant team members (i.e. ESR, Construction Manager or Traffic Manager) will prepare written notifications for the community and agencies (including Council), outlining the works to be undertaken, date and location, and	ESR Community Relations

	any likely impacts to the community. Once the SEE Civil internal review process is completed, the draft notifications are forwarded to RMS for review.	Manager
A5	Once approved, the CRM issues the letterbox notification to residents 5 days, individual letters 2 days and door knocks 48 hours in advance of the proposed works. The type of consultation utilised will be determined by the CRM in consultation with the EM. Details of the community notification will be provided to EPA, Council and RMS at least 48 hours prior to the works commencing (by fax or email to the relevant officer).	ESR Community Relations Manager
A6	Following completion of the appropriate consultation with potentially affected sensitive receivers, EPA and RMS, the OOHW Assessment will be finalised and submitted with the Out of Hours Work Application to the ER for consideration and approval.	ESR
A7	Ensure that any required noise and vibration monitoring points are in place	ESR
A8	Environmental Work Method Statements (EWMS) will be prepared to outline specific mitigation measures for all Project locations activities. The EWMS will reiterate any specific requirements to mitigate noise and vibration impacts. Training in the use of EWMS should be provided during induction and as part of toolbox meetings EWMS will be provided to personnel in advance of activities	ESR
PRE-CONSTRUCTION AND CONSTRUCTION		
B1	Ensure all mitigation measures are installed properly and are working effectively.	ESR Site Supervisor/ Site Superintendent
B2	Undertake any noise and vibration monitoring required as part of the works.	ESR
B3	Should there be any exceedance of the approved noise and vibration management levels that is attributable solely to the works, work is to stop immediately and additional mitigation measures installed to ensure management levels are adhered to.	Site supervisor ESR
REPORTING		
C1	Once works are complete, a brief summary of all noise and vibration data collected and the works undertaken should be prepared. Any additional clarifying comments should be included in this summary.	ESR
COMPLAINTS		
D1	Any complaints received as a result of the works are to be managed in accordance with the Construction Complaints and Enquiries Management System.	ESR Community Relations Manager

APPENDIX A – OUT OF HOURS WORK APPLICATION

APPENDIX B – CONTACTS

Appendix B – Contact details for RMS and other regulatory bodies

Agency and Stakeholder contact details	
Agency / Stakeholder	**Contact details**
DoPI	
EPA	Craig Dunk Craig.Dunk@epa.nsw.gov.au
DPI (fisheries)	James Sakker james.sakker@dpi.nsw.gov.au
Ballina Shire Council	
NSW Office of Water	water.referalls@dpi.nsw.gov.au
WIRES	

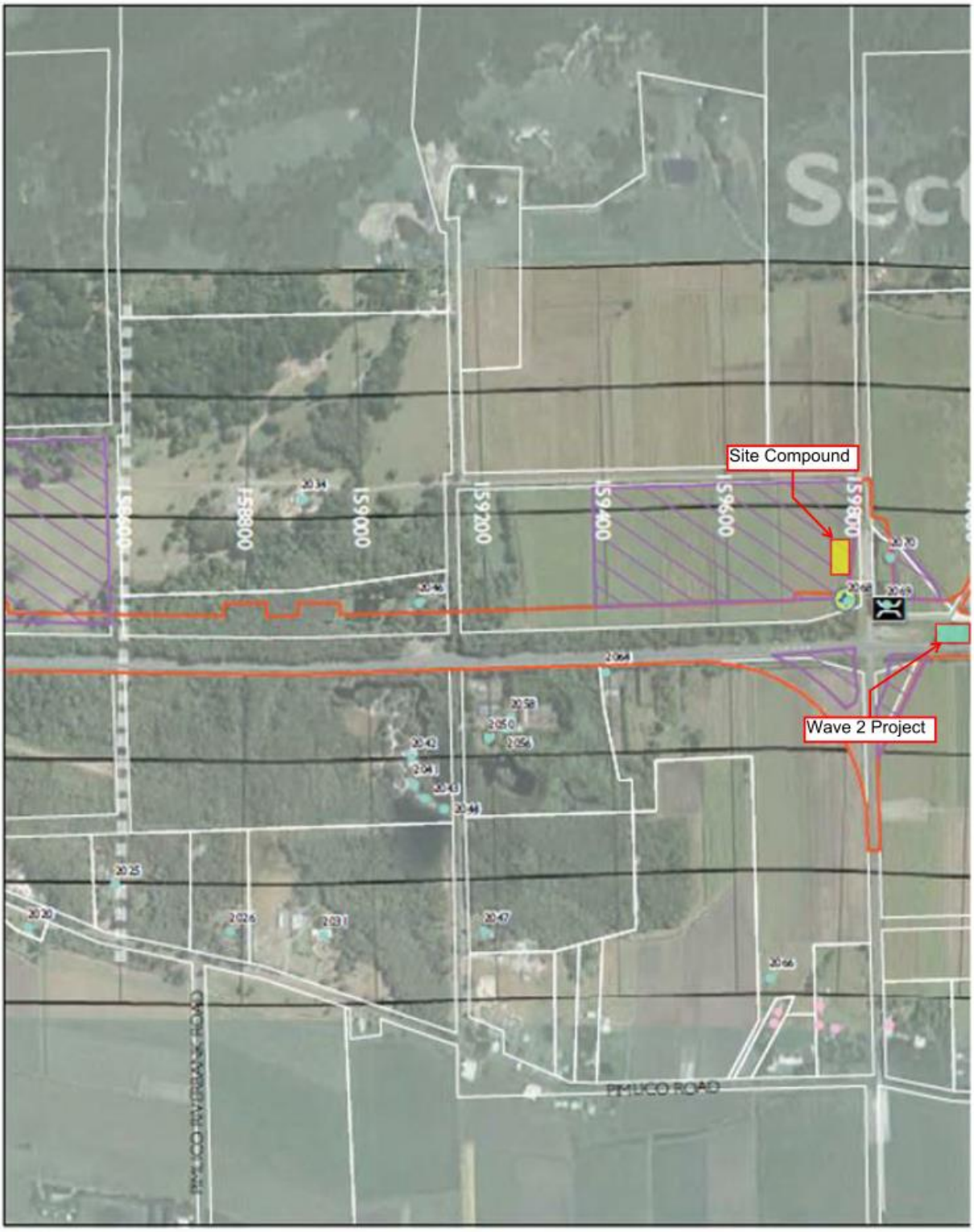
Project team contact details			
Position / Role	**Organisation**	**Name**	**Phone**
Project Manager	SEE Civil	Ryan Buckley	0407 386 956
Construction Manager	SEE Civil	Mark Turner	0408 173 937
Environmental Site Representative	Boyds Bay Environmental	Scott West	0413 005 350
RMS' Environmental Officer	RMS	Daniel Saunders	0423 066 956
Site Supervisor	SEE Civil	Peter Buckley	0409 328 154
Traffic Manager	SEE Civil	Ben McGlioin	0488 072 040
Community Relations Manager	SEE Civil	Peta Newton	0407 662 456

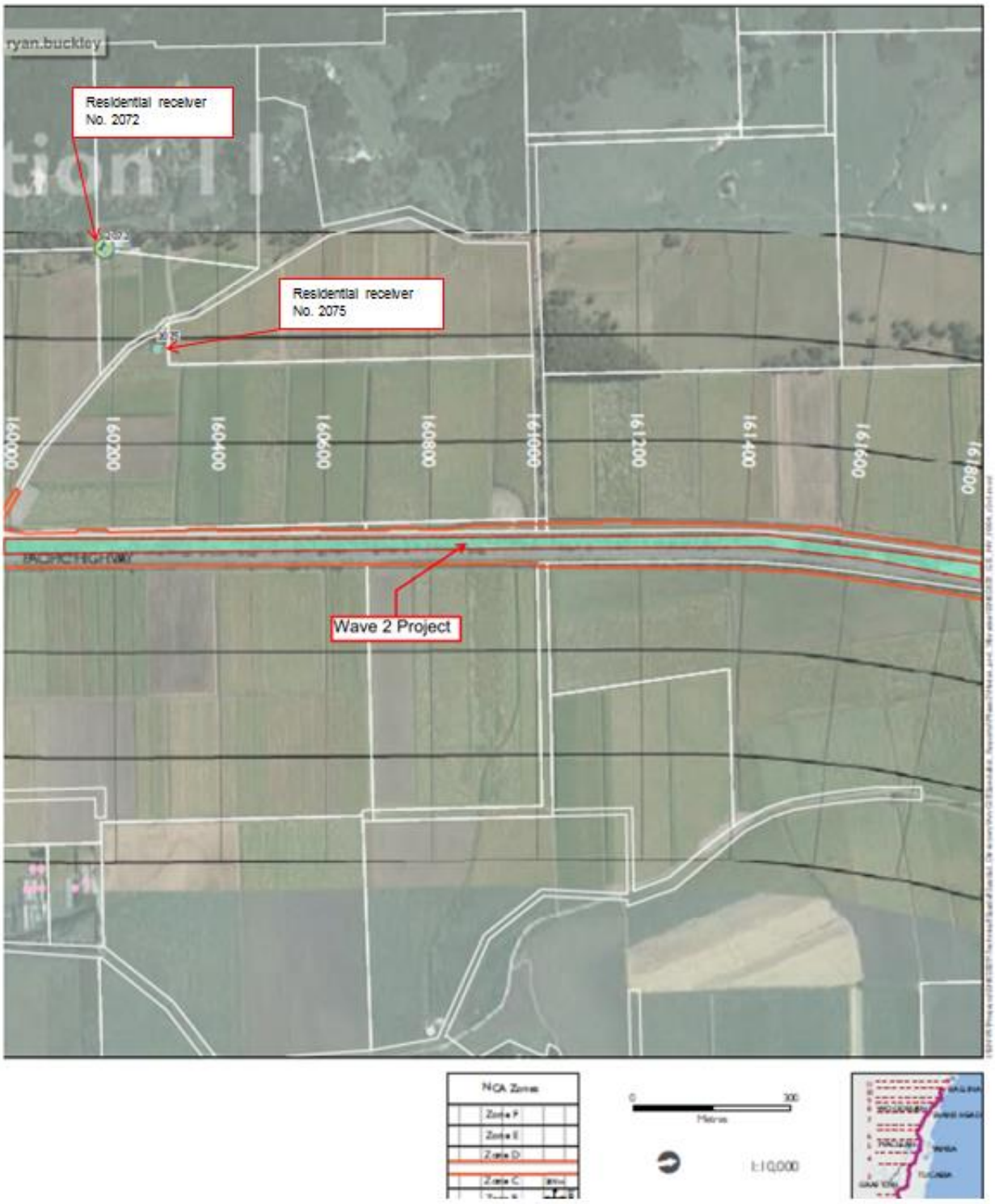
Appendix D

Noise Catchment Areas

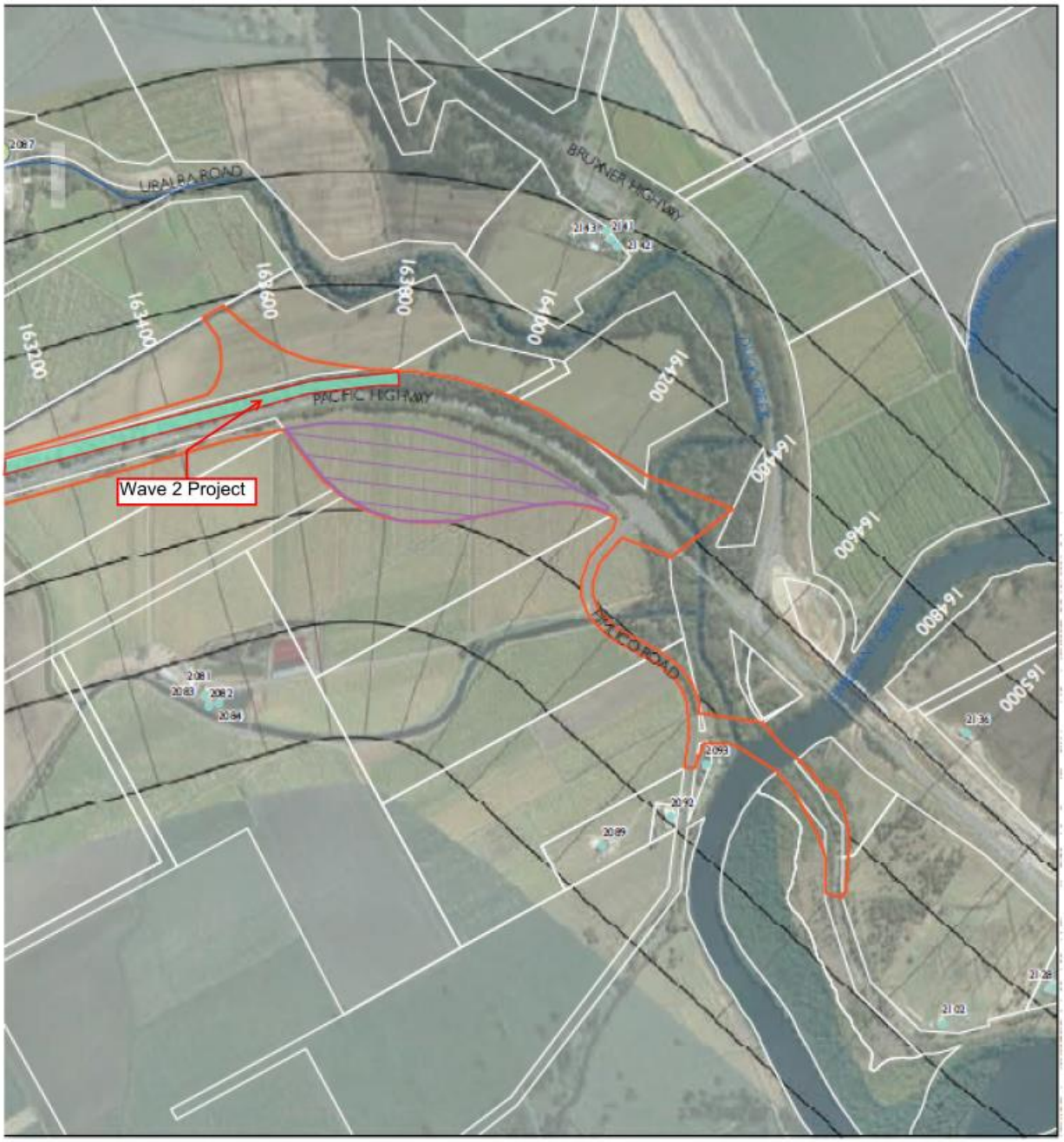
Note: Wave 2 Project chainages are 159800 to 163800

Sensitive receiver 2068, 2069 and 2070 has been aquired.


Site Compound
Wave 2 Project
PIMUCO ROAD
PIMUCO RIVERBANK ROAD
The project
Upgrade completed to dual carriageway
Upgrade under construction
Ancillary site
Receiver location
Receiver location outside NCA
Logger location
Blasting location
Bridge


ryan.buckley
Residential receiver No. 2072
Residential receiver No. 2075
160000
160200
160400
160600
160800
161000
161200
161400
161600
161800
Wave 2 Project
NCA Zones
Zone F
Zone E
Zone D
Zone C
0
300
Metres
1:10,000


Wave 2 Project
161600
161800
162000
162200
162400
162600
162800
163000
The project
Upgrade completed to dual carriageway
Upgrade under construction
Ancillary site
Receiver location
Receiver location outside NCA
Logger location
Blasting location
Bridge



NCA Zones

Zone F

Zone E

Zone D

Zone C

Zone B

Zone A

0 300

Metres

1:10,000

SHEET 52 of 52

Appendix E

Predicted Construction Noise Levels

Receiver ID	NCA	NML Proposed Working Hours	NML Out of Hours Works	Enabling works	Clearing	Earthworks	Ancillary Sites	Haul Roads	Lmax
2026	11-a	48	36	0	45	50	44	0	58
2031	11-a	48	36	0	44	49	45	0	57
2047	11-a	48	36	0	45	50	47	0	58
2066	11-a	48	36	0	43	48	48	0	56
2081	11-a	70	70	40	46	51	53	0	61
2082	11-a	70	70	39	45	50	53	0	61
2083	11-a	70	70	43	45	50	53	0	61
2084	11-a	70	70	40	45	50	53	0	61
2041	11-b	70	70	0	53	58	49	0	66
2043	11-b	70	70	0	52	57	49	0	65
2044	11-b	70	70	0	51	56	49	0	64
2042	11-b	70	70	0	55	60	49	0	68
2050	11-c	70	70	0	58	63	51	0	71
2056	11-c	70	70	0	60	65	52	0	73
2058	11-c	70	70	0	60	65	53	0	73
2064	11-c	70	70	0	67	72	59	0	80
2046	11-d	48	36	0	66	71	52	0	79
2068*	11-d	48	36	0	0	0	0	0	8
2069*	11-d	48	36	39	0	0	0	0	47
2070*	11-d	48	36	39	0	0	0	0	47
2034	11-e	48	36	0	54	59	48	0	67
2075	**11-e**	**48**	**36**	**39**	**45**	**50**	**48**	**0**	**58**
2078	11-e	48	36	40	50	55	34	0	63
2072	**11-f**	**48**	**36**	**40**	**43**	**48**	**48**	**0**	**56**
2087	11-f	70	70	38	43	48	48	0	56

Notes:

Sensitive receiver 2068, 2069 and 2070 has been acquired

Residential Sensitive receivers **2072** and 2075 are within 600 meters of the Wave 2 Project.

1. * Receiver is situated within the project boundary and has not been assessed
2. R2064 Receiver is exposed to levels as a result of one construction activity that exceeds the proposed hours noise management level (NML)
3. 2075 and 2078 are the only residential receivers within the band 400-600m of the proposed early works.