Construction Noise and Vibration Management Sub-Plan (CNVMSP)

Kingscliff High School Upgrade
SSD-8744305

December 2021

RICHARD CROOKES CONSTRUCTIONS

Document Control

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Glossary/ Abbreviations

Abbreviations	Expanded Text
Ambient Noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Attenuation	The reduction in the level of sound or vibration.
CEMP	Construction Environmental Management Plan
CNVMSP	Construction Noise and Vibration Management Sup-Plan
dBA	Decibels using the A-weighted scale measured according to the frequency of the human ear.
DoE	NSW Department of Education
DPIE	NSW Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EMS	Environmental Management System
Environmental Aspect	Defined by AS/NZS ISO 14001:2015 as an element of an organisation's activities, products or services that can interact with the environment.
Environmental Impact	Defined by AS/NZS ISO 14001:2015 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 14001:2015 as an overall environmental goal, consistent with the environmental policy, that an organisation sets itself to achieve.
Environmental Target	Defined by AS/NZS ISO 14001:2015 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
EP&A Act	*Environmental Planning and Assessment Act 1979*
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.

OEH	Office of Environment and Heritage
RBL	The Rating Background Level for each period is the medium value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period (day, evening and night)
SINSW	School Infrastructure NSW
SEARs	Secretary's Environmental Assessment Requirements
SWP	Sound Power Level
SPL	Sound Pressure Level

1 Introduction

This Construction Noise and Vibration Management Sub-Plan (CNVMSP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the Kingscliff High School (KHS) Upgrade (the Project).

This CNVMSP has been prepared to address the requirements of the Kingscliff High School Upgrade State Significant Development Conditions of Consent - SSD-8744305, DECCW Interim Construction Noise Guideline (DECCW 2009), NSW Industrial Noise Policy (EPA 2000), and Assessing Vibration: A Technical Guideline (DEC 2006) and all applicable legislation.

This plan has been prepared to meet condition B17 and C4-C8 of the SSD Conditions application number SSD-8744305. The compliance matrix is set out in Table 1.

Table 1: Condition B17 Compliance Table

Condition	Condition Requirements	Document Reference (Page Number)
B17	The Applicant must prepare a Construction Noise and Vibration Management Sub – Plan must address, but not limited to the following:	
	be prepared by a suitably qualified expert, in consultation with Council; **Note:** This plan has been drawn from the information presented in the EIS and the Noise and Vibration Impact Assessment which has been submitted to Council.	Appendix A
	describe procedures for achieving the noise management levels in EPA's *Interim Construction Noise Guideline* (DECC,2009);	15-21
	describe the measures to be implemented to manage high noise generating works such as piling, in close proximity to sensitive receivers;	15-21
	include strategies that have been developed with the community for managing high noise generating works;	15-21
	describe the community consultation undertaken to develop the strategies in condition B17(d);	NA
	include a complaints management system that would be implemented for the duration of the construction; and	27
	include a program to monitor and report on the impacts and environmental performance of the development and the effectiveness of the implemented management measures in accordance with the requirements of Condition B13.	15-21
C4-8	Hours of Work	14

1.1 Project Overview

As part of the NSW Governments $7 billion School Infrastructure Package, the KHS Upgrade Project will include the demolition of existing facilities including carparks, to facilitate the following planned upgrades:

- Construction of a new Visual Arts, Music and Performance Building (Building O) in the north-western portion of the site.
- A new hydrant booster, tank and pump room in the north-eastern portion of the site.
- A new Covered Outdoor Learning Area (COLA) to the east of existing Building H.
- Demolition of a footpath and new landscaping works to the north of the current Building F.
- Alterations and refurbishment of existing buildings 'C' and 'G'.

The proposed design is shown as Figure 1-1.

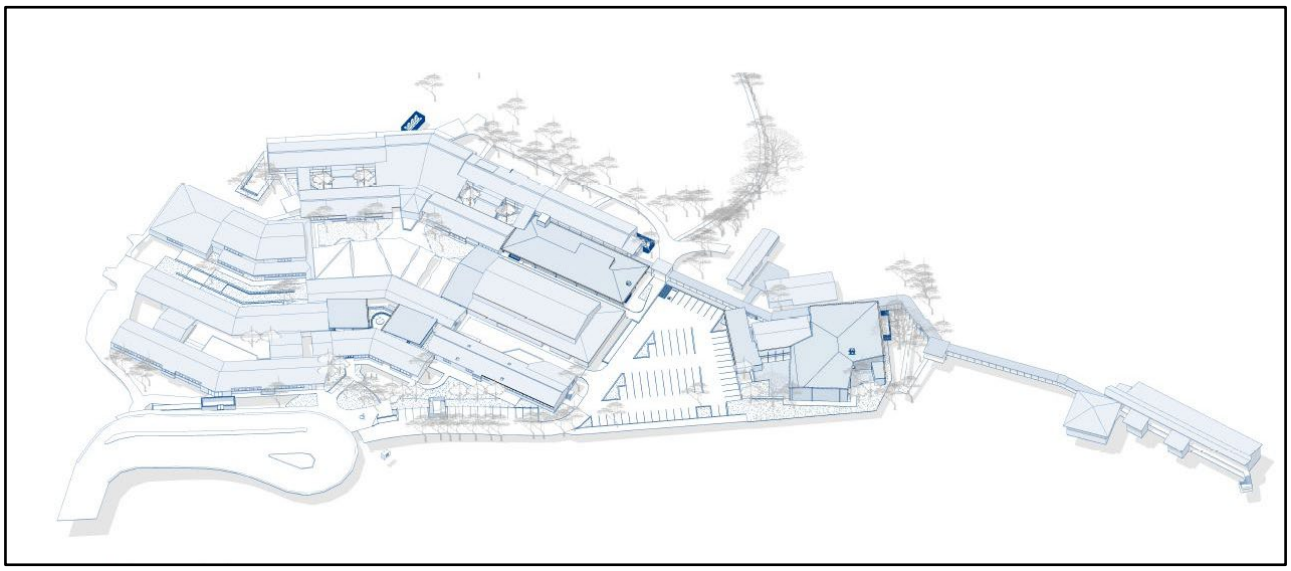

Figure 1-1 Proposed Design

A noise and vibration assessment prepared by Acoustic Works for the Department of Education (DoE) in 2021 assessed noise and vibration impacts on sensitive receivers during the proposed redevelopment of KHS. This assessment identified the potential for direct and indirect noise impacts on sensitive receivers but concluded that provided the proposed mitigation and management measures are implemented, no significant long-term impacts would be expected.

1.2 Site Description

KHS (the site) is located at 33 Oxford Street, Kingscliff and is legally described as Lot 57 DP 803814 and Lot 3 DP 803772. The site is located on the southern outskirts of Kingscliff, at the urban bushland interface.

2 Purpose and Objectives

2.1 Purpose

The purpose of this Plan is to describe how Richard Crookes Constructions (RCC) proposes to manage potential noise and vibration impacts during construction of the Project.

2.2 Objectives

The key objective of the CNVMSP is to ensure all measures derived from the Noise and Vibration Assessment, Development Conditions of Consent and licence/permit requirements relevant to noise and vibration are described, scheduled and assigned responsibility as outlined in:

- State Significant Development Conditions of Consent B17;
- DECCW Interim Construction Noise Guideline (DECCW 2009).

2.3 Targets

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

- Full compliance with the relevant legislative requirements and the Conditions of Consent;
- Implementation of 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);
- That demolition and construction activities are only undertaken at designated times and remain within established/agreed criteria; and,
- Complaints from the community and stakeholders are minimised.

3 Environmental Requirements

3.1 Relevant Legislation

3.1.1 Legislation

All legislation relevant to this plan is included in the CEMP.

3.1.2 Guidelines

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

- NSW Interim Construction Noise Guideline (ICNG), Department of Environment and Climate Change 2009
- NSW Noise Policy for Industry, Environment Protection Authority 2017
- NSW Assessing Vibration – a technical guideline (AVTG), Department of Environment and Conservation 2006
- Development Near Rail Corridors and Busy Roads – Interim Guideline, Department of Planning, 2008
- Australian Standard AS/NZS 2107:2000 Acoustics - Recommended design sound levels and reverberation times for building interiors
- Australian Standard AS2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites

4 Existing Environment

KHS is located in the town of Kingscliff, situated on the north coast of New South Wales (NSW). The primary use of the site is for the education of children between the ages of 13 – 18 which correspond to grade 7 through to grade 12. The proposed redevelopment of the site will include the progressive removal/demolition of two existing buildings and subsequent construction of several buildings and supporting infrastructure.

Figure 4-1 Location of Proposed Redevelopment and surrounds

Surrounding land uses and local businesses include:

- North & North-East - Residential
- East - Bushland
- South – Cudgen Creek
- West – Kingscliff TAFE & Driver School

4.1 Potential Receivers

A review of the area surrounding the works identified the occurrence of low density residential dwellings immediate to the sites north and north-east, with a commercial premises (driver school) and Kingscliff TAFE situated to the west. The noise and vibration assessment conducted by Acoustic Works for the site has grouped the residential allotments located in the north and north-east into four separate receivers. The receivers identified in the Acoustic Works Report are set out as follows:

- Receiver 1: Residential dwellings, located to the north of the school along Cambridge Court and Yale Street;
- Receivers 2: Residential dwellings, located to the north-east of the school along Oxford, Dinsey and Vulcan Streets;
- Receivers 3: Driving school, located to the west of the site; and
- Receivers 4: TAFE Kingscliff campus, located to the north-west of the site.

The location and groupings of these receivers are illustrated in Figure 4-2.

Figure 4-2 Proposed Redevelopment and Receivers (Acoustic Works, 2021)

4.2 Ambient Noise

The DECC Interim Construction Noise Guidelines (ICNG) 2009 specify that a quantitative assessment for major projects and/or projects of state significance is required to assess and predict airborne noise levels from the proposed works, and subsequently provide an assessment against set criteria.

Noise monitoring of the ambient environment was conducted at two sites representative of the local noise environment by Acoustic Works in 2021. The two sites were positioned at the closest sensitive receiver to the north (Receiver 1: Residential dwellings) and north-east (Receivers 2: Residential dwellings of the proposed works. Monitoring was conducted for a period of 7 days to measure background noise levels and subsequently calculate the Rating Background Level (RBL) in accordance with the NSW Noise Policy for Industry. The calculated RBL was then utilised in the assessment of deriving a Noise Management Level (NML) for construction activities.

The surrounding area is primarily affected by noise from the surrounding road network, wildlife and other activities associated with the TAFE and Driving School.

5 Noise and Vibration Criteria for NSW

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

- The Interim Construction Noise Guideline (ICNG),
- NSW Assessing Vibration – a technical guideline (AVTG),

Relevant elements of these documents are summaries 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, and;
- Provide flexibility in selecting site-specific feasible and reasonable work practices to minimise noise impacts.

5.2 Quantitative Noise Assessment Criteria

A quantitative noise assessment was carried out by Acoustic Works in 2021 (ref.20200400-1R01E Kingcliff High School ENV CNVMSP.docx) to ascertain the Rating Background Level (RBL dB(A)) in response to requirements of the DECC ICNG (2009) and the Planning Secretary's Environmental Assessment Requirements (SEARs).

Subsequently Noise Management Levels (LAeq 15 minutes) for sensitive receivers (Residential and Non-Residential) during Construction were determined by assessment against relevant criteria specified within Section 7.3.5 (Intrusiveness noise criteria) and Section 7.3.6 (Amenity Criteria) of the EIS Noise and Vibration Impact Assessment prepared by Acoustic Works (2021) as well as the Noise Policy for Industry, and which are listed in Section 5.3 below.

5.3 Adopted Project Noise Management Levels

The ICNG, sets out the criteria utilised in determining the noise management levels and how they are to be applied for sensitive receivers. These adopted values during standard construction hours for residential receivers is the Rating Background Level +10dB. Whereby, the noise level set represents the point above which there may be some community reaction to noise.

Commercial (R3) and TAFE (R4) uses have referred to the recommended 'maximum' internal levels in AS2107 for specific uses. Noise limits are set out and recommended in S.7.4.3 of the EIS Noise Vibration Impact Assessment prepared by Acoustic Works 2021.

Time Period	Receiver 1 (Residential)	Receiver 2 (Residential)	Receiver 3 (Commercial)	Receiver 4 (TAFE)		
	*Criteria $L_{eq\ (15min)}$ dBA	*Criteria $L_{eq\ (15min)}$ dBA	*Criteria $L_{eq\ (15min)}$ dBA	Outdoor Recreational Area	Classroom Internal	Classroom External
				*Criteria $L_{eq\ (15min)}$ dBA	*Criteria $L_{eq\ (15min)}$ dBA	*Criteria $L_{eq\ (15min)}$ dBA
Day	47	43	65	55	35	45
Evening	43	43	65	55	35	45
Night	38	38	65	55	35	45

Table 5-1 Project Specific Noise Criteria

Therefore, based on the assessment criteria R1 (residential) has an adopted NML value of 47dBA, R2 (residential) has an adopted NML value of 43dBA, R3 (Commercial has a Noise Management Level of 70dB(A) and R4 (TAFE) has an adopted NML value of 55 dBA during the specified construction hours of 7am – 6pm Monday to Friday and 7am – 1pm Saturday.

Specific NMLs for residential receivers are presented below which is extracted from Table 8 -Section 7.4.2.1 of EIS Noise and Vibration Assessment prepared by Acoustic Works (2021).

Table 8: Noise criteria for quantitative assessment - Residential

Time of day	Criterion LAeq(15min) *	How to apply
Recommended standard hours	Noise affected RBL + 10dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq (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 affected 75dBA	The highly noise affected level represents the point above 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: 1. 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 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended hours	Noise affected RBL + 5dB	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. For guidance on negotiating agreements see section 7.2.2.

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

Specific NMLs for non-residential receivers are presented in Table 9 which was extracted from Section 7.4.2.2 of EIS Noise and Vibration Assessment prepared by Acoustic Works (2021).

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Table 9: Noise criteria for quantitative assessment - Other uses

Land use	Management level LAeq(15min)	Assessment location
Classrooms at schools and other educational institutions	45dBA	Internal
Hospital wards and operating theatres	45dBA	Internal
Places of worship	45dBA	Internal

5.4 Vibration Criteria

There are three types of vibration as classified in the Assessing Vibration Technical Guideline 2006 which include:

- Continuous - vibration continues uninterrupted for a defined period (usually throughout daytime and/or night-time). This type of vibration is assessed on the basis of weighted RMS (root mean squared) acceleration values.
- Impulsive - rapid build up to a peak followed by a damped decay that may or may not involve several cycles. The duration is short, typically less than 2 seconds. Impulsive vibration (no more than three occurrences in an assessment period) is assessed on the basis of acceleration values.
- Intermittent - interrupted periods of continuous (e.g. a drill) or repeated periods of impulsive vibration (e.g. a pile driver), or continuous vibration that varies significantly in magnitude. Assessed on the basis of vibration dose values.

5.4.1 Acceptable values for continuous and impulsive vibration (1-80Hz)

The relevant criteria for continuous and impulsive vibration are set out in Table 5-3.

Type	**Location**	**Assessment Period**	**Preferred values m/s2**		**Maximum values m/s2**	
			z-axis	**x & y axis**	**z-axes**	**x & y axes**
Continuous Vibration	Critical Areas	Day or Night-time	0.005	0.0036	0.01	0.0072
	Residences	Day time	0.01	0.0071	0.02	0.014
		Night-time	0.007	0.005	0.014	0.01
	Offices, Schools & Places of Worship	Day or Night-time	0.02	0.014	0.04	0.028
	Workshops	Day or Night-time	0.04	0.029	0.08	0.058
Impulsive Vibration	Critical Areas	Day or Night-time	0.005	0.0036	0.01	0.0072
	Residences	Day time	0.3	0.21	0.6	0.42
		Night-time	0.1	0.071	0.2	0.14
	Offices, Schools & 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 5-2 Preferred Weighted RMS Vibration Acceleration Values

5.4.2 Acceptable values for intermittent vibration

Intermittent vibration is assessed using the vibration dose value (VDV) root-mean-quad method. VDV accumulates the vibration energy received over the daytime and night-time periods. The vibration dose methodology is as per standard BS 6472–1992.

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 within the grounds of the existing School envelop. 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.

Major activities involved in construction of the Project include the following works:

- Site establishment.
- Demolition and removal of existing buildings and car park.
- Construction and renovation of new and existing buildings and parking areas.
- Site disestablishment.

High noise activities will include demolition of existing infrastructure which may include rock breaking attachments on excavators, jackhammers and concrete saws.

6.2 Environmental Impacts

The subject works, as described in Section 6.1, will commence with demolition works of existing infrastructure, followed by the construction program and renovation of some existing buildings. The predicted noise levels derived from the noise assessment compiled by Acoustic Works (2021) and summarized in Table 6-1, for demolition and construction activities. The modelled values are representative of noise levels expected at the sensitive receiver.

Receiver	Environment	Activity	LAeq (adjusted) at Receivers	Compliance with INCG	
				Noise Affected	High Noise Affected
R1	Residential - North	Demolition	75	No	Yes
		Construction	66	No	Yes
R2	Residential – North-East	Demolition	70	No	Yes
		Construction	60	No	Yes
R3	Commercial - Driver School	Demolition	69	Yes	Yes
		Construction	60	Yes	Yes
R4	TAFE	Demolition	44	Yes	Yes
		Construction	37	Yes	Yes

Table 6-1 Predicted Noise Levels at Sensitive Receivers

6.2.1 Predicted Noise Levels

Predicted noise levels emitted from both construction and demolition activities occurring at the site are expected to exceed the recommended noise levels at residential receiver's locations with compliance predicted with the highly noise affected criteria. Demolition works are predicted to comply with the criteria for receivers 3 and 4 without the need for any additional acoustic treatment. Due to the proximity of neighbouring buildings, noise and vibration levels may need to be continually monitored during demolition and construction works and implement noise control measures located in Table 7.1 Noise and vibration management and mitigation measures.

6.2.2 Predicted Vibration Levels

A new two-storey visual arts building, and nearby carpark are identified as the closest activity to noise sensitive receptors. A typical vibration limit of 10 mm/s is recommended for these locations. At 10m distance from excavating, the maximum vector sum peak particle velocity is usually expected to be approximately between 0.1mm/s to 4.5mm/s.

Due to proximity of neighbouring residential buildings, vibration levels in some cases may need to be monitored during demolition and earthworks depending on the ground substrate and equipment used. If complaints are received vibration control would be implemented as outlined in Table 7.1 Noise and vibration management and mitigation measures

6.3 Hours of Work

The proposed hours of work (Standard Hours) for the project are in accordance with Condition C4 of SSD-8744305 and are as follows:

- Monday – Friday: 7 am – 6 pm;
- Saturday: 8 am – 1 pm; and,
- Sunday: No work on Sundays or Public Holidays.

In accordance with Condition C5, notwithstanding condition C4, provided noise levels do not exceed the existing background noise level plus 5dB, works may also be undertaken during the following hours:

- Between 6pm and 7pm, Mondays to Fridays inclusive; and
- Between 1pm and 4pm, Saturdays.

In accordance with Condition C8 of SSD-8744305, All intrusive noise activities such as rock breaking, rock hammering, sheet piling, pile driving and similar activities may only be carried out between the following hours:

- 9 am to 12 pm, Monday to Friday;
- 2 pm to 5 pm Monday to Friday; and
- 9 am to 12 pm, Saturday.

In accordance with Condition C6 of SSD-8744305, work outside of hours (OOHW) may be done under one of the following five categories;

- The delivery of oversized plant or structures that police or other authorities determine require special arrangements to transport along public roads;
- Emergency work to avoid the loss of life or damage to property, or to prevent environmental harm;
- Maintenance and repair of public infrastructure where disruption to essential services and/or considerations of worker safety do not allow work within standard hours;
- public infrastructure works that shorten the length of the project and are supported by the affected community, and;
- Works where a proponent demonstrates and justifies a need to operate outside the recommended standard hours.

For all works that meet the criteria listed above, community consultation will be required based on the level of impact received at the residence and duration of the event. Notification of such construction activities as referenced in condition C7 above must be given to affected residents before undertaking the activities or as soon as is practical afterwards.

For work outside the recommended hours, the criteria set in Table 8 of Section 7.4.2.1 Noise affected RBL +5dB) of the EIS Noise and Vibration Impact Assessment prepared by Acoustic Works 2021 is to be applied.

7 Environmental Mitigation and Management Measures

A range of environmental requirements and control measures are identified in the various environmental documents, including the Conditions of Consent, and the Noise and Vibration Assessment compiled by Acoustic Works as part of the EIS process. Specific actions and processes which will be implemented to comply and address these requirements and measures are outlined in Table 7-1.

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

Predicted noise impacts associated with demolition and construction of the proposed works has been assessed based on the source noise levels and procedures contained in AS2436-2010, as well as the results of previous noise measurements and assessments conducted by Acoustic Works. Calculations were performed based on the demolition and construction works being at the closest relevant distance to each of the existing receiver.

Predicted vibration levels at the new two storey building for Visual Arts and nearby refurbished car park would be the closest to the nearby noise sensitive noise receivers. A typical vibration limit of 10 mm/s is recommended for these locations as per Section 9 of the EIS Noise and Vibration Impact Assessment prepared by Acoustic Works (2021).

At 10m distance from excavating, the maximum vector sum peak particle velocity is usually expected to be approximately between 0.1mm/s to 4.5mm/s.

Section 10.1 of the EIS assessment prepared by Acoustic Works (2021) states that no further treatment is required for nearby sensitive receivers. Based on the measured noise levels and assessment of the site and surrounds, noise impacts at the nearby receiver locations are predicted to satisfy the assessment criteria for the proposed hours of operation without the need for further treatment. Due to the proximity of neighbouring buildings, vibration levels may need to be continually monitored during demolition works.

Table 7-1 Noise and vibration management and mitigation measures

ID	Measure / Requirement	Resource needed	When to implement	Responsibility	Reference
NV1	No later than 48 hours before the commencement of construction, a Community Communication Strategy must be submitted to the Planning Secretary for information. The Community Communication Strategy must provide mechanisms to facilitate communication between the Applicant, the relevant Council and the community (including adjoining affected landowners and businesses, and others directly impacted by the development), during the design and construction of the development and for a minimum of 12 months following the completion of construction. The Community Communication Strategy must: • identify people to be consulted during the design and construction phases; • set out procedures and mechanisms for the regular distribution of accessible information about or relevant to the development; • provide for the formation of community-based forums, if required, that focus on key environmental management issues for the development; • set out procedures and mechanisms: o through which the community can discuss or provide feedback to the Applicant; o through which the Applicant will respond to enquiries or feedback from the community; and o to resolve any issues and mediate any disputes that may arise in relation to construction and operation of the development, including disputes regarding rectification or compensation.	Development of a Community Communication Strategy	Prior to commencement of construction activities	Site Manager or their delegate (SINSW)	B10 Conditions of Consent

ID	Measure / Requirement	Resource needed	When to implement	Responsibility	Reference
NV2	In addition to meeting the specific performance measures and criteria in this consent, all reasonable and feasible measures must be implemented to prevent, and, if prevention is not reasonable and feasible, minimise any material harm to the environment that may result from the construction and operation of the development.	Development of CEMP and relevant sub-plans.	Ongoing	Site Manager or their delegate	A1 Conditions of Consent,
NV3	Prior to the commencement of any vibrational generating works that could impact on the buildings surveyed as required by Condition B9, the Applicant must: • provide a copy of the relevant survey to the owner of each residential building surveyed in the form of a Pre-Construction Survey Report; • submit a copy for the Pre-Construction Survey Report to the Certifier; and • provide a copy of the Pre-Construction Survey Report to the Planning Secretary when requested.	Suitably Qualified Person – Structural Engineer	Prior to finalisation of construction activities	Site Manager or their delegate	B9 Conditions of Consent
NV4 Refer to: Section 10.2 of EIS	Prior to installation of mechanical plant and equipment: • a detailed assessment of mechanical plant and equipment with compliance with the relevant specific noise criteria as recommended in the Noise and Vibration Impact Assessment, dated 27 July 2021 and prepared by Acoustic Works must be undertaken by a suitably qualified person; and • evidence must be submitted to the Certifier that noise mitigation recommendations identified in the assessment carried out under (a) have been incorporated into the design to ensure the development will not exceed the project specific noise criteria identified in the Noise and Vibration Impact Assessment, dated 27 July 2021and prepared by Acoustic Works.	Suitably qualified person with experience in acoustic assessments	Prior to commencement of construction activities	Site Manager or their delegate	B24 Conditions of Consent

ID	Measure / Requirement	Resource needed	When to implement	Responsibility	Reference
NV5	All construction plant and equipment used on site must be maintained in a proper and efficient condition and operated in a proper and efficient manner.		Prior to commencement of construction activities	Site Manager or their delegate	C2 Conditions of Consent
NV6	The normal construction works shall be as follows: • Monday to Friday 7am – 6pm • Saturday 8am – 1pm • No work on Sunday or public holidays		Ongoing	Site Manager or their delegate	C4 Conditions of Consent, Interim Construction Noise Guideline (DECCW 2009)
NV7	Notwithstanding condition C4, provided noise levels do not exceed the existing background noise level plus 5dB, works may also be undertaken during the following hours: • Between 6pm and 7pm, Mondays to Fridays inclusive; and • Between 1pm and 4pm, Saturdays.		Ongoing	Site Manager or their delegate	C5 Conditions of Consent, Interim Construction Noise Guideline (DECCW 2009)

ID	Measure / Requirement	Resource needed	When to implement	Responsibility	Reference
NV8	Construction activities may be undertaken outside of the hours in condition C4 and C5 if required: • by the Police or a public authority for the delivery of vehicles, plant or materials; or • in an emergency to avoid the loss of life, damage to property or to prevent environmental harm; or • where the works are inaudible at the nearest sensitive receivers; or • where a variation is approved in advance in writing by the Planning Secretary or his nominee if appropriate justification is provided for the works. Workers and delivery trucks do not congregate at or outside the site before 7am. This is an important factor in managing noise from the site.		Ongoing	Site Manager or their delegate	C6 Conditions of Consent, Interim Construction Noise Guideline (DECCW 2009)
NV9	Notification of such construction activities as referenced in condition C6 must be given to affected residents before undertaking the activities or as soon as is practical afterwards.	Development of a Community Communication Strategy	Ongoing	Site Manager or their delegate	C7 Conditions of Consent,
NV10	Rock breaking, rock hammering, sheet piling, pile driving and similar activities may only be carried out between the following hours: • 9am to 12pm, Monday to Friday; • 2pm to 5pm Monday to Friday; and • 9am to 12pm, Saturday		Demolition	Site Manager or their delegate	C8 Conditions of Consent

ID	Measure / Requirement	Resource needed	When to implement	Responsibility	Reference
NV11	A site-specific induction will be provided to all site personnel, contractors, sub-contractors with an emphasis on understanding and managing noise impacts from the work activities being undertaken. The induction will include: • All relevant project specific and standard noise and vibration measures • Relevant licence and approval conditions • Approved work hours as per Condition C4 • Restriction on construction vehicles arrival to site and surrounding residential precincts to within the working hours as per Condition C4 • Location of nearest sensitive receivers • No high noise generating activities • Construction employee parking areas • Designated loading and unloading areas/ and procedures • Environmental incident procedures		Ongoing	Site Manager or their delegate	C13 Conditions of Consent
NV12	The Applicant must ensure construction vehicles (including concrete agitator trucks) do not arrive at the site or surrounding residential precincts outside of the construction hours of work outlined under condition C14.		Ongoing	Site Manager or their delegate	C14 Conditions of Consent
NV13	The Applicant must implement, where practicable and without compromising the safety of construction staff or members of the public, the use of 'quackers' to ensure noise impacts on surrounding noise sensitive receivers are minimised. Any moveable plant (e.g., compressors should be located as far as practical from the residential premises.		Ongoing	Site Manager or their delegate	C15 Conditions of Consent

ID	Measure / Requirement	Resource needed	When to implement	Responsibility	Reference
NV14	Vibration caused by construction at any residence or structure outside the site must be limited to: • For structural damage, the latest version of DIN 4150-3 (1992-02) Structural vibration - Effects of vibration on structures (German Institute for Standardisation, 1999); and • For human exposure, the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: a technical guideline (DEC,2006) (as may be updated or replaced from time to time).		Ongoing	Site Manager or their delegate	C16 Conditions of Consent, AVTG 2006
NV15	Vibratory compactors must not be used closer than 30 metres from residential buildings unless vibration monitoring confirms compliance with the vibration criteria specified in condition C16.		Ongoing	Site Manager or their delegate	C17 Conditions of Consent
NV16	The limits in conditions C16 and C17 apply unless otherwise outlined in a Construction Noise and Vibration Management Plan, approved as part of the CEMP required by condition B17		Ongoing	Site Manager or their delegate	C18 Conditions of Consent
NV17	Prior to commencement of operation, the Applicant must engage a suitably qualified person and experienced expert to prepare a post-construction dilapidation report. This report is: • ascertain whether the construction created any structural damage to public infrastructure by comparing results of the Post-Construction Dilapidation Report with the Pre-Construction Dilapidation Report as required by condition B5 of this consent; • have, if it's decided that there is no structural damage to public infrastructure, the written confirmation from the relevant public authority that there is no adverse structural damage to their infrastructure (including roads). • be submitted to the Certifier; • be forwarded to Council for information; and • be provided to the Planning Secretary when requested.	Suitably Qualified Person – Structural Engineer	Prior to finalisation of construction activities	Site Manager or their delegate	D13 Conditions of Consent

ID	Measure / Requirement	Resource needed	When to implement	Responsibility	Reference
NV18	All contractors and workers are to receive an environmental induction, which must at least include: • Project specific and relevant standard noise and vibration mitigation measures. • Permissible hours of work. • Any limitations on high noise generating activities. • Location of nearest sensitive receivers. • Construction employee parking areas. • Designated loading/unloading areas and procedures. • Site opening/closing times (including deliveries). • Environmental incident procedures.	Site specific Induction	Ongoing	Site Manager or their delegate	Best practice
NV19	If further noise mitigation is required, acoustic barriers around the perimeter of the site can be installed during the work. If further noise reductions are required, install additional screening around noise sensitive areas.	Installation of temporary attenuation as required.	Prior to the commencement of Construction Activities	Site Manager or their delegate	Section 10.3.3.2 of the Acoustic Assessment for the EIS process

ID	Measure / Requirement	Resource needed	When to implement	Responsibility	Reference
NV20	Community consultation will be required with nearby residences during demolition and construction activities that are likely to exceed noise limits. The Responsible Person should notify the adjacent residential premises of the intention to commence work that may cause adverse impacts on surrounding residents. If plant is to be operated close proximity to residential premises, the Responsible Person should advise the occupants of the premises the length and time that the plant will be in operation proximate to the property boundary. Demolition and construction works are predicted to comply with the highly noise affected noise affected limit of 75 dB(A) LAeq 15min at all residential receiver locations and the criteria for receiver 3 and 4 without the need for any additional acoustic treatments.	Development of a Community Communication Strategy	Prior to the commencement of Construction Activities	Site Manager or their delegate	Section 10.3 of the Acoustic Assessment for the EIS process

ID	Measure / Requirement	Resource needed	When to implement	Responsibility	Reference
NV21	The Responsible Person maintain a record of complaints, which records the following details: • The time and date of lodgement of the complaint; • The name and telephone number of the complainant; • The nature of the complaint, including a description of the noise (e.g., likely noise source, duration of the noise event - is the noise continuous, or of a short duration); • The outcome of the investigation. Assign the task of managing noise emissions to a person (the 'responsible person') that is likely to be present on-site most of the time that activity is occurring (usually the Site Manager). This person would be responsible for handling noise complaints and ensuring that work does not commence before the specified allowable times. The name and contact details of the 'responsible person' should be displayed outside the principal construction office.	Development of a Community Communication Strategy	Ongoing	Site Manager or their delegate (SINSW)	Section 10.3.3 of the Acoustic Assessment for the EIS process
NV22	If a complaint regarding a particular piece of plant, the plant shall be inspected for working condition, with particular attention given to the condition of engine covers or enclosures, and exhaust system, if machinery is in good condition, a high-performance silencer should be installed. If complaints arise regarding noise, the complaint will be directed to the 'responsible person' who will determine the source of noise and take immediate steps to investigate further or mitigate the noise as required. This may involve moving the noise source further away from the affected premises, replacing the equipment, installing high performance silencers, or in some cases, engaging a qualified acoustic consultant to provide specialist control advice.		Ongoing	Site Manager or their delegate	Section 10.3 of the Acoustic Assessment for the EIS process

ID	Measure / Requirement	Resource needed	When to implement	Responsibility	Reference
NV23	Additional attenuation or alternative construction/demolition methodologies will be required to ensure predicted elevated noise levels are mitigated during these activities (jackhammers / concrete saws).	Installation of permanent and temporary attenuation	Prior to the commencement of Construction Activities	Site Manager or their delegate	Section 10.3 of the Acoustic Assessment for the EIS process
NV24	Vibration levels in some cases may need to be monitored during demolition and earthworks depending on the ground substrate and equipment used. Due to proximity of neighbouring buildings, vibration levels my need to be continually monitored during the demolition and construction works to ensure vibration levels remain generally compliant with the criteria nominated in Section 7.5 of the EIS Noise and Vibration Impact Assessment, dated 27 July 2021 and prepared by Acoustic Works. Due to the proximity of the school buildings, vibration is predicted to be an issue if not managed. If complaints are received from the school regarding vibration during demolition and basic construction works, it is recommended that continued vibration monitoring at the receiver location with SMS warning system issued to the responsible persons onsite. The Responsible Person shall cease works that may cause vibration intrusion and engage a qualified person to determine suitable management and physical controls to reduce excessive vibration cannot resume until satisfactory mitigation treatment is implemented.	Suitably Qualified Person – Noise and Vibration	During Demolition Activities	Site Manager or their delegate	Section 10.3 of the Acoustic Assessment for the EIS process

ID	Measure / Requirement	Resource needed	When to implement	Responsibility	Reference
NV25	The head contractor is to elect a “Responsible Person” who is onsite during construction hours and who has sufficient time and authority to implement the management plan. The Responsible Person will be required to receive, document and respond in an appropriate manner to complaints made against the centre with regards to noise. The Responsible Person is to keep record of performance indictors and feedback from management, staff, subcontractors, and adjacent noise receivers as appropriate. The person would also be responsible for documenting changes/modifications to the Noise Management Plan.	Suitably Qualified Person – Noise and Vibration	During Demolition Activities	Site Manager or their delegate	Section 10.3 of the Acoustic Assessment for the EIS process

ID	Measure / Requirement	Resource needed	When to implement	Responsibility	Reference
NV26	Management is to review the incident/complaints register on a regular basis (at least fortnightly) to determine any common or reoccurring issues to be addressed. The plan should be reviewed if processes or activities onsite are changed/modified or new activities are introduced. The plan should be reviewed if noise complaints are being made with regards to single activity or type of noisy activity occurring onsite. Document all changes/modifications to the Noise Management Plan.Management is to review the incident/complaints register on a regular basis (at least fortnightly) to determine any common or recurring issues to be addressed. The plan should be reviewed if processes or activities are introduced. The plan should also be reviewed if noise complaints are being made with regards to a single activity or type of noisy activity occurring onsite, Document all changes/modifications to the Noise Management Plan.				

8 Compliance Management

8.1 Roles and Responsibilities

The RCC Project Team's organisational structure and overall roles and responsibilities are outlined in the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Chapter 7 of this Plan.

8.2 Training

All employees, contractors and 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;
- The process for seeking approval for out of hours works, including consultation;
- Location of noise sensitive areas;
- Complaints reporting; and
- General noise and vibration management measures.

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

8.3 Inspection and Monitoring

Noise and vibration monitoring will be undertaken throughout the construction phase of the Project to verify the predicted noise and vibration impacts. This will assist in identifying impacts to sensitive receivers, quantifying and reporting compliance, determining if mitigation measures are effective and if any further mitigation measures are required to reduce and manage noise and vibration impacts.

The policy and procedures for Noise and Construction Vibration monitoring are set out in section 12.3 and 12.4 of the Noise and Vibration Impact Assessment (Acoustic Works, 2021).

An excerpt (Sections 12.3 and 12.4) of the Acoustic Works report is provided as Appendix B.

8.4 Complaints

Complaint management will be undertaken as per the Community Communications Strategy, relevant to noise and vibration.

Complaints will be recorded and managed as detailed in the CEMP. Information to be recorded will include location of complaint, time/s of occurrence of alleged noise and vibration impacts (including nature of impact particularly with respect to vibration), perceived noise source, prevailing weather conditions and similar details that could be utilised to assist the investigation into the complaint.

8.5 Auditing

Audit requirements are detailed in the CEMP.

8.6 Reporting

Reporting requirements and responsibilities are documented in the CEMP.

9 Review and Improvement

9.1 Continuous Improvement

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

The continuous improvement process will be designed to:

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

9.2 Update and Amendment

The processes described in 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 CEMP and the consent conditions SSD-8744305.

Appendix A – Consultant Qualification

Appendix B – Noise and Construction Vibration Monitoring Policy and Procedures (Acoustic Works, 2021)

The following is an excerpt of *Acoustic Works (2021) Noise & Vibration Impact Assessment Kingscliff High School.*

Appendix A – Consultant Qualification

Ben Pieterse
Environmental Scientist

Qualifications

Bachelor of Environmental Science. Southern Cross University, 2019.

National Acid Sulfate Soils Guidance - Identification and Assessment Course. Southern Cross University, 2021.

Conduct Backhoe/Loader Operations. Lawrence Davis Industry Training, 2021.

Asbestos Awareness Training. Alert Force, 2020.

Construction Induction. Workplace Health and Safety QLD, 2019.

Certificate II Information Technology. TAFE NSW, 2008

Key areas of Experience:

- Desktop and field- based site assessment
- Technical report writing
- Contaminated land investigation and remediation
- Resource recovery and waste management
- Project management
- Stakeholder engagement
- Environmental management
- On-site wastewater assessment

Career Summary

A multi-skilled and accomplished Environmental Scientist, Ben is approaching three years of environmental consulting experience in the northern NSW region. A member of the Australasian Land and Groundwater Association (ALGA) Association of NSW – Ben's expertise is crucial in identifying environmental issues and delivering the correct solution.

Ben's recent experience includes; Leading the preparation of Construction Environmental Management Plans, Management of works contracts and subcontractor engagement, Routinely applying resource recovery options for materials generated by local Councils and private enterprise, leading the successful assessment and of a local Council site, routinely applying resource recovery options for materials generated by local Councils and private enterprise.

Environmental Project Highlight

2021 - Detailed site investigation and acid sulfate soil assessment associated with the development of a constructed wetland at Byron Bay, NSW.
Client: Byron Shire Council

- Consultation with stakeholders to establish target project outcomes.
- Develop project budget, contract procurement and engagement and coordination of subcontractors.
- Lead site investigation program (borehole drilling and soil sampling program).
- Preparation of Detailed Site Investigation Report and Acid Sulfate Soils Management Plan.
- Ongoing consultation with client on project outcomes and requirements for management of excavation spoil.

Appendix B – Noise and Construction Vibration Monitoring Policy and Procedures (Acoustic Works, 2021)

The following is an excerpt of *Acoustic Works (2021) Noise & Vibration Impact Assessment Kingscliff High School.*

12.3 Noise monitoring

If required, short-term operator-attended noise measurements will be suitable for investigating 'spot-checks' of noise complaints in most situations. The methodology must establish the level of noise from the noise source being investigated and check for compliance.

12.3.1 Equipment

Sound level meters must have an accuracy at least equivalent to a Type 1 meter as described in Australian Standard AS1259. The sound level meter must be fitted with a windshield and must have a current laboratory calibration certificate or label in accordance with calibration requirements outlined in AS1259 and AS2659. Equipment should also be calibrated in the field in accordance with these standards.

The sound level meter must be capable of L_{eq} measurement and statistical L_n measurement (e.g. L_{10}, L_{90} etc), using the broadband 'A' scale frequency weighting.

12.3.2 Parameters

For measurement of ambient noise (without site noise), the sound level meter must be set to the following parameters;

- 15 minute measurement duration.
- Broadband
- 'Fast' time response.
- 'A' frequency weighting.

The measured descriptors of ambient noise are background noise $L_{A90,15min}$ and $L_{Aeq,15min}$.

For measurement of noise from construction activities at the site, the sound level meter must be set to the following parameters;

- 15 minute measurement duration.
- 'Z' (Linear) frequency weighting for 1/3 octave frequency spectrum.
- 'A' frequency weighting for overall broadband result.
- 'Fast' time response.

The measured descriptors of site noise should include (when available on a sound meter); L_{eq}, Lp, and 1/3 octave spectrum (to establish any tonal characteristics).

Measurement duration may change depending on the duration of each relevant source.

12.3.3 Procedure for measuring noise

12.3.3.1 Where to measure noise

In accordance with the code, noise levels should be measured at the property boundary that is most exposed to construction noise, at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Typically this would be an outdoor location in the most exposed position in a receivers' yard. The address of locations for assessment should be those locations where complaints have been received.

The sound level meter should be held at arm's length or set up on a tripod so the microphone is 1.5 metres above the ground. Where possible the measurement position should be 3 to 5 metres from walls, buildings and other reflecting surfaces.

The location of vegetation also needs to be considered, because noise levels can be increased locally by even a light breeze rustling leaves. Noise due to wind in vegetation can make accurate measurement difficult. Where possible, move away from nearby plants if rustling noise is present.

12.3.3.2 When to measure ambient noise

Ambient noise should be measured when it is representative of minimum levels that would occur during the time the activity would typically be conducted. Suitable times may include;

- Prior to commencement of daily activities.
- During smoko or lunchbreak (if site activities are ceased).
- On RDO's (rostered days off).
- After completion of daily activities.

Ideally, a number of ambient noise measurements should be taken at various times of day. Ambient noise measurement should only be done at times or locations unaffected by noise from the site.

12.3.3.3 When to measure noise from construction

Measurements of construction noise should be taken at the time(s) when the noise is representative of the current maximum level of noise emanating from the site, or at times when a complaint has been received.

12.3.3.4 What to avoid

The following conditions shall be avoided during the noise assessment;

- Average wind speed (at the microphone height) greater than 5m/s (approximately 20km/h). Typically at a wind speed of 5 m/s, leaves and branches would be in constant motion and the wind would extend a small flag.
- Rain periods (if intermittent, any affected data can be excluded).
- Other extraneous noise, such as train passby etc.
- Noise such as talking or physically bumping the sound level meter in a manner that will affect the readings.

12.3.3.5 Steps for measurement

The steps for performing a noise measurement are as follows;

10. Calibrate the sound level meter before commencing noise measurements. The sound pressure level shown on the meter should match the stated sound pressure level for the calibrator being used. The equipment should not vary by more than 1 dB. If it has then the measurements may be invalid.
11. Ensure the meter is set to 'Fast' time weighting, 'A' frequency weighting for broadband measurement, 'Z' weighting for 1/3 octave measurement. Descriptors include L_{90}, L_{eq}, and LpA.
12. Measure the ambient noise level continuously for 15 minutes (where possible), excluding all distinct extraneous noises. If extraneous noise is present, pause the meter when this occurs or choose another measuring time or restart the measurement at another location. If more than one valid noise measurement of the ambient noise for a location is obtained, use the lowest level as the ambient noise level. Note the $L_{A90,15min}$ value and other relevant values as described above. Where it is not possible to continuously measure over a 15-minute period, then note the duration of the measurement.
13. Measure the noise emanating from the site, excluding all distinct extraneous noises. Note the duration of the measurement. Note the relevant measured values and description of the types of noise that were audible/measurable from the site.
14. Note whether the measured noise appears to contain tonal or impulsive characteristics and apply correction factors where appropriate.
15. Check the field calibration at the end of the monitoring period in accordance with Australian Standard IEC 61672.1-2004 and Australian Standard 2659. Re-monitoring may be required where there is a calibration drift greater than that allowed by the standards.

12.3.3.6 Information to be reported

Any reporting should be concise. The minimum requirements to be included in a report are;

- Date of measurements.
- Time of measurements.
- Person(s) performing measurements.
- Equipment used for measurements.
- Location of measurements.
- Measured values.
- Corrected values (where applicable).
- Notes regarding audibility of noise sources.
- Notes regarding any extraneous sources that may have influenced measurements.
- Detail of instrumentation and calibration.
- Meteorological conditions.

12.4 Construction vibration monitoring

The preferred measurement technique is one which records unfiltered data from which any desired values can later be determined, including frequency-weighted RMS and peak values.

Vibration monitoring equipment should be calibrated in accordance with relevant Australian or standards.

Vibration should be measured on a structural surface designed to support a person, with the floor or ground as the preferred reference surface. The z-axis (vertical) shall be measured. Ideally more than two points in a receiver location should be measured at one time to obtain space average vibration levels. If the above is not practicable, one position of the receiver location is chosen where, in the opinion of an authorised officer, the vibration level is the greatest. The locations should be either clearly marked or clearly defined on a diagram for later identification. The transducer should not be attached to a flexible floor covering which may damp the vibration. The transducer shall be firmly fixed in the position, and the method of fixing shall be reported.

Items to be reported include;

- Date and time of measurement.
- Location of measurements (including diagram of measurement positions).
- Equipment used for measurements (including calibration details).
- Method of fixing of transducer.
- Description of the type of equipment or source of vibration (where possible).
- One-third octave band frequency analysis (1Hz to 80Hz) reported as z-axis r.m.s acceleration in units of ms^{-2}. For each measurement this should include starting and ending time and brief description of events occurring within the measurement time frame.
- Overall broadband peak particle velocity (ppv) reported as z-axis velocity in units of ms^{-1}. For each measurement this should include starting and ending time and brief description of events occurring within the measurement time frame.
- The results of the one-third octave band analysis and peak particle velocity analysis should be compared with the vibration limits.
- Statement of whether the vibration complies with the recommended limits.