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Mr Stuart Hodgson
Principal Manager,
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Sydney Metro
Transport for NSW
PO Box 588
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3 September 2017

Ref: CNVIS-Crows Nest

Dear Stuart

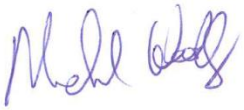
RE: Endorsement of Construction Noise and Vibration Impact Statement – Crows Nest, Sydney Metro City & Southwest

Thank you for providing the following documents for Environmental Representative (ER) review and endorsement as required by the Condition of Approval E82 of the Sydney Metro City & Southwest project (SSI – 15_7400 January 9 2017).

- Construction Noise and Vibration Impact Statement (CNVIS) – Crows Nest Site, (Revision F dated 1 September 2017).
- Acoustic Advisor (AA) Endorsement (of the above document) dated 2 September 2017

As an approved ER for the Sydney Metro City & Southwest project, I have reviewed the above document for its suitability for implementation. The review did not comprise a technical review, as the ER has relied upon the AA's review of technical aspects of the document. On the basis of the endorsement of the document by the AA, the ER endorses the document subject to the comments within the AA endorsement being addressed.

Yours sincerely



Michael Woolley
Environmental Representative – Sydney Metro – City and South West

ENDORSEMENT
CITY & SOUTHWEST ACOUSTIC ADVISOR

Review of	**Construction Noise and Vibration Impact Statement for Delta demolition works at Crows Nest**	**Document reference:**	Construction Noise & Vibration Impact Statement VICTORIA CROSS 2, prepared by Osterman Consulting for Delta Pty Ltd, report number 0116-041-03, Rev F
Prepared by:	Dave Anderson		
Date of issue:	2 September 2017		

As approved Acoustic Advisor for the Sydney Metro City & Southwest project, I have reviewed and provided comment on the Construction Noise and Vibration Impact Statement (CNVIS) for the Delta demolition works at Crows Nest, as required under A27 (d) of the project approval conditions.

The CNVIS identifies a number of highly sensitive receivers near to the site, including recording studios and medical facilities. I have met with Osterman Consulting to discuss earlier drafts of the impact statement and have spoken with them at length on the 'phone to discuss my formal comments. The impact statement has been revised to address my comments and has been finalised based on additional baseline noise and vibration monitoring.

I endorse revision F of the impact statement, noting that it identifies potential for significant impacts to receivers in Clarke Street unless the recommended mitigation and management measures are implemented. A number of these measures will be critical to the successful completion of this work, including:

- Ongoing unattended monitoring, supplemented by attended monitoring at times when work is carried out near highly sensitive receivers;
- The use of pulverisers in lieu of hydraulic hammers, where practical, and scheduling certain hammering activity on Saturdays, where possible;
- Ongoing consultation with highly sensitive receivers during the works to ensure mitigation and management measures are effective

Dave Anderson, City & Southwest Acoustic Advisor

Construction Noise & Vibration Impact Statement

CROWS NEST

Sydney Metro

Prepared for: Delta Group
1 September 2017
Report number: 0116-041-03
Prepared by: Mark Della Sabina & Rauf Osterman

Report revision History

Rev no.	Date	Description	Prepared by	Reviewed by
A	26/01/2017	Initial Draft	Mark Della Sabina	Rauf Osterman
B	22/02/2017	General update and revision following review by Delta and Project AA	Mark Della Sabina	Rauf Osterman
C	03/08/2017	Updated to incorporate comments from Project AA dated 21/03/2017	Mark Della Sabina	Rauf Osterman
D	10/08/2017	Updated to incorporate comments from Sydney Metro dated 07/08/2017	Mark Della Sabina	Rauf Osterman
E	25/08/2017	Updated to incorporate comments from Project AA dated 16/08/2017 and Project ER dated 10/08/2017	Mark Della Sabina	Rauf Osterman
F	01/08/2017	Update to vibration criteria for Crows Nest Day Surgery	Mark Della Sabina	Rauf Osterman

1. Introduction

1.1 Context

This Construction Noise and Vibration Impact Statement (CNVIS) has been developed for Delta Pty Ltd (Delta) to assess the noise and vibration impacts associated with demolition and retention works at the Crows Nest site (the site) on the Sydney Metro City & Southwest Project (the project). This CNVIS exists as a sub-plan to the Construction Noise and Vibration Management Plan 0116-041-01 (CNVMP) for the project.

The principal issues addressed within this CNVIS include:

- Identification of noise sensitive receivers near to the site;
- Prediction of the level of noise and vibration impact on these sensitive receivers from construction activities including assessment of predicted compliance with project-imposed Noise and Vibration Management Levels;
- Details of the plant and equipment to be used on site including details of sound mitigation measures to be employed to reduce noise impacts on adjacent noise sensitive receivers.

1.2 Site Overview

The Crows Nest site is located on the western fringe of the Crows Nest village, between the Pacific Highway and Clarke Lane (eastern side of the Pacific Highway) and Oxley Street, south of Hume Street. Works on the site involve demolition of a number of low-rise commercial buildings. Construction activities are based on the Crows Nest site functioning as two separate construction zones split by Hume Street.

Figure 1: Crows Nest Site Overview

1.3 Site Layout and Access

Site layout and access is illustrated in Figure 2.

Figure 2: Crows Nest Site Layout and Access

2. Applicable Criteria

2.1 Airborne Noise Management Levels

Conditions of Approval E37 and E38 for the project impose alternative requirements on Noise Management Levels for the Crows Nest site. These additional requirements override the CNVS and therefore ICNG NML's and refer to internal noise levels only. The objective of these conditions is to allow for longer working hours whilst mitigating impact to sensitive receivers, and are predicated on consultation with the affected sensitive receivers to determine appropriate respite hours. These requirements are outlined in Table 1.

Table 1.Noise Criteria for the Assessment Period

Assessment Period	% of Assessment Period	Hours in Assessment period	Internal Noise Criteria (which must not be exceeded)
07:00 - 20:00	50	6.5	$L_{eq(15\ minute)}$ 60dB(A)
	25	3.25	$L_{eq(15\ minute)}$ 55dB(A)

In addition to the above, CoA A2 states that works "must be carried out in accordance with all procedures, commitments, preventative actions, performance criteria and mitigation measures set out in the EIS as amended by the PIR unless otherwise specified". Therefore, where specific criteria are not set in the approval conditions (i.e. remaining 6.5 hours of the Assessment Period, external noise levels affecting outdoor uses, etc.), the criteria in the EIS, PIR and CNVS should be used. Notwithstanding the above, at no time can noise generated by construction exceed the National Standard for exposure to noise in the occupational environment of an eight-hour equivalent continuous A-weighted sound pressure level of $L_{Aeq,(8h)}$, of 85dB(A) for any employee working at a location near the CSSI.

2.2 Ground-borne Noise Management Levels

The Noise Management Levels given in Section 2.1 apply also for ground-borne noise.

2.3 Construction Vibration

2.3.1 Structural Damage

Condition E28 of the Conditions of Approval for the project stipulate that vibration from construction activities shall not exceed the vibration limits set out in the British Standard BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from ground-borne vibration.

British Standard 7385: Part 2 1993 suggests levels of vibration at which 'cosmetic', 'minor' and 'major' damage may occur. This standard is based on data collated from a wide range of national and international sources which collectively saw relatively few cases of damage caused by vibration. BS7385 suggests that vibration levels up to the cosmetic damage level are considered 'safe' and have produced no observable damage for particular building types.

For the purposes of this standard, damage includes minor non-structural effects such as hairline cracks on drywall surfaces, hairline cracks in mortar joints and cement render, enlargement of existing cracks and separation of partitions or intermediate walls from load bearing walls.

BS7385 is based on peak particle velocity and specifies damage criteria for transient vibration within the range of frequencies usually encountered in buildings, being 4Hz to 250Hz. This criteria is reproduced in Table 2.

Table 2. BS7385: Part 2 Structural Damage Criteria

Group	Type of Structure	Damage Level	Peak component particle velocity, mm/s		
			4 Hz - 15 Hz	15 Hz - 40 Hz	40 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	Cosmetic	50 (all frequencies)		
		Minor	100 (all frequencies)		
		Major	200 (all frequencies)		
2	Unreinforced or light framed structures Residential or light commercial type buildings	Cosmetic	15 to 20	20 to 50	50
		Minor	30 to 40	40 to 100	100
		Major	60 to 80	80 to 200	200

Where dynamic loading caused by continuous vibration may result in magnification of vibration through a building structure the guideline values may need to be reduced by up to 50 per cent. Rock breaking, rock hammering and sheet piling activities are considered to have the potential to cause dynamic loading in some structures (eg residences).

For construction activities involving intermittent vibration sources such as rock breakers, piling rigs, vibratory rollers, excavators and the like, the predominant vibration energy occurs at frequencies greater than 4 Hz (and usually in the 10 Hz to 100 Hz range). On this basis, and consistent with the guidance from BS 7385, the following conservative vibration damage screening level per receiver type have been adopted for the project:

- Reinforced or framed structures: **25.0 mm/s**
- Unreinforced or light framed structures: **7.5 mm/s**

Where vibration levels are predicted to exceed the screening criteria, a more detailed assessment of the structure and attended vibration monitoring would be carried out to ensure vibration levels remain below appropriate limits for that structure.

With regards to heritage items, BS7385 states that “a building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive”. Therefore determination of applicable limits shall specifically consider:

1. The structural condition of the building (in consultation with a structural engineer where required); and

2. The heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed.

At the time of writing, the applicable vibration criteria for heritage structures have not yet been confirmed (pending confirmation of the structural condition of the buildings). A precautionary approach will therefore be adopted, with an interim vibration criterion of 2.5mm/s (consistent with section 3.1.9.2 of the Noise and Vibration Technical Paper in the EIS) and attended vibration monitoring during site trials of any high vibration activity (such as hammering) to determine safe working distances. Subject to structural engineering assessment, the applicable vibration limit will be revised to the conservative vibration damage screening level for heritage structures of 7.5mm/s.

2.3.2 Critical Areas and Sensitive Equipment

The Conditions of Approval for the project provide vibration limits based only on prevention of structural damage. These levels of vibration are not suitable for application to critical working areas such as operating theatres. From the document "Assessing Vibration: a technical guideline" published by the NSW Department of Environment and Conservation, Appendix C references a maximum peak velocity of 0.28mm/s for critical working areas and associated sensitive equipment (i.e. Crows Nest Day Surgery).

Results of vibration monitoring conducted at the surgery (See Appendix E) show intermittent vibration levels during surgery operating hours of approximately 0.2mm/s. Frequency analysis of these results suggest that this level of vibration is due to daily activity within the surgery and not from external sources (i.e. outside the building). Several vibration spikes up to 0.4mm/s were noted during the monitoring period however the low frequency content of these readings suggests they were caused by external sources (i.e. outside the building).

Considering the above, a limit of 0.28mm/s shall be applied at the Crows Nest Day Surgery as a general approach, with a lower limit of 0.2mm/s for times when the microscopes are used for surgery. Application of this variable vibration criteria is predicated on the basis of site-specific mitigation measures outlined in Table 13.

2.3.3 Warning Levels

The INFRA Monitoring System used on this project features a number of real time alerts and alarms that enable instant notification where limits are approached or exceeded. Where vibration-intensive works are planned to occur in close proximity to sensitive receivers, and works are expected to approach the limits for cosmetic damage, monitoring equipment shall be equipped with visual and/or audible alarms that are triggered when the levels of vibration exceed the control criteria presented in Table 3.

Table 3. Operator Warning and Halt Levels		
Structure	**Site Control Criteria (PPV in any Orthogonal Direction)**	
	Operator Warning Level	**Operator Halt Level**
Reinforced or framed structures	20 mm/s	25 mm/s
Unreinforced or light framed structures	5 mm/s	7.5 mm/s
Heritage structures (precautionary levels)	1.5 mm/s	2.5 mm/s
Heritage structures	5 mm/s	7.5 mm/s

3. Noise and Vibration Assessment

3.1 Sensitive Receivers

A full list of sensitive receivers surrounding the site are listed in Appendix A. A subjective classification of the noise & vibration impact has been evaluated for each sensitive receiver and documented as:

- Low Impact
- Moderate Impact
- High Impact

The classifications were determined on a case-by-case basis using the metrics defined in the CNVS, including:

- The location of the works in relation to the NSR's with consideration of the noise attenuation features such as distance to NSR's, noise barriers, attenuation factor of NSR's windows and elements, Topographical features etc.
- The type and sensitivity of the NSR's:
    - Lower impact: e.g. commercial buildings/scattered residential (low density)
    - Moderate impact: eg standard residential (typical density)
    - High impact: e.g residential home for elderly/high density unit blocks/persistent complainers/residents deemed to have "construction noise fatigue", highly sensitive commercial (jewellers, etc.) or health applications e.g. operating theatres, MRI's, Psychotherapy units, Audio & video production studios etc. and schools/childcare centres.
- Predicted noise and vibration levels and extent of noise exceedance above Noise Management Level
- The type of and intensity of noise emitted from works (ie tonal or impulsive):
    - Lower Impact: No high noise and/or vibration intensive activities
    - Moderate Impact: Short/intermittent high noise and/or vibration intensive activities
    - High Impact: Prolonged high noise and/or vibration intensive activities.
- The duration of any OOHW required.

Site plans illustrating the location of, and degree of impact to, sensitive receivers can be found in Appendix B.

3.2 Construction Activities and Sources of Noise

The degree of noise impact on adjacent sensitive receivers from demolition activities is highly dependent on the type and size of machinery used, and the duration of exposure to the works. Machinery is discussed in Section 3.2.1 while the works schedule is discussed in Section 3.2.2.

3.2.1 Construction Activities and Equipment Noise

In consultation with Delta Group, a list of the activities to be undertaken and the associated machinery is provided in Table 4.

Table 4. Construction Activities and Equipment Noise

Equipment	Construction Activity	Assumed Sound Power* Level dB(A)
2T Excavators	Strip Out	88
20T Excavators w/hammer	Structural Demolition	116
45T Long-reach Excavator w/hammer+	Low Level Structural Demolition	119
20T Excavators w/hydraulic shears/pulverisers	Structural Demolition	104
Mustang Bobcats	Strip Out and Structural Demolition	110
Powered Hand Tools	Strip Out	100
Trucks	Haulage	105
Concrete Cutters	Concrete Cutting	119

✳ Sound power levels provided in the table above should be verified against specifications of actual equipment used onsite.
\+ Proposed for use on lower levels only. Hoarding may provide up to 10dB reduction in predicted noise levels

3.2.2 Construction Schedule

Figure 3 illustrates the duration of structural demolition for each building across the site, and therefore duration of greatest impact to the nearest sensitive receiver.

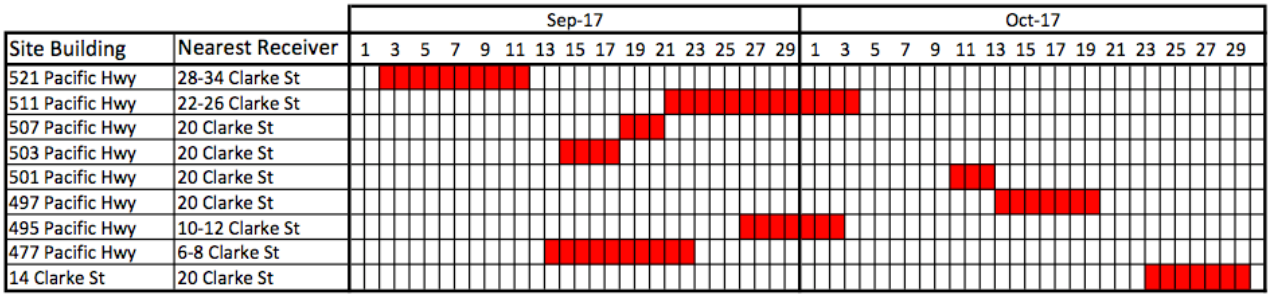


Figure 3: Schedule of Hard Demolition Works

3.3 Airborne Noise Predictions

Using the sound power levels stated in Section 3.2, predicted noise levels have been calculated at representative locations around the site based on the distance between noise-emitting activities and the closest sensitive receivers for that location. These predictions assume that equipment is operating at the nearest point of works to the sensitive receiver and therefore represent worst-case scenarios. The predictions do not take into account any mitigation measures. Due to the staging of construction works and the expected spread of equipment across the full area of the site, cumulative noise impacts are expected to be minimal.

To convert the predicted noise level from external to internal, it is necessary to make an assessment of the degree of noise reduction between the outdoor and indoor environment. This assessment is made according to noise reduction values listed in Table 5.

Table 5. Typical Noise Reduction Values

Building Environment	Noise Reduction
Most building types - with windows open	10dB
Most building types - with windows closed	20dB
Commercial buildings - non-opening double-glazed windows, etc.	30dB

Based on these reduction values, predicted internal noise levels are provided in the following tables and are highlighted according to the following:

Exceeds 25% limit of 55dB(A)
Exceeds 50% limit of 60dB(A)

3.3.1 General Site

Due to the significant number of sensitive receivers across the project, and for the purposes of reducing the required number of monitors, sensitive receivers with like characteristics have been grouped into 'noise catchment areas' (NCAs) that can be represented by a single monitor. For the purpose of simplicity, NCA's have been defined according to their general direction relative to the site. This is defined in the following table along with the applicable facade noise reduction values used for the purpose of converting external noise levels to internal noise levels.

Table 6. Noise Catchment Areas

Location	Receiver Type	Assumed Facade Noise Reduction (dBA)
North - Opposite Oxley Street	Apartment-style residential - openable windows	20

Table 6. Noise Catchment Areas		
Location	**Receiver Type**	**Assumed Facade Noise Reduction (dBA)**
East - Opposite Clark Lane	Openable or single glazed windows. Includes: • 4 Clarke St • 6-8 Clarke St • 22-26 Clarke St	20
	Commercial building - non-opening or double glazed windows. Includes: • 10-12 Clarke St • 20 Clarke St • 28-34 Clarke St	30
South - 473 Pacific Highway	Low-rise commercial - no windows facing site	30
West - Opposite Miller Street	Low-rise residential and commercial - openable windows	20

Table 7 provides a general assessment of worst-case noise impacts from the site as a whole on each of the NCA's around the site.

Table 7. Predicted Internal Noise Levels for NCAs					
	Predicted Noise Levels $dBL_{Aeq(15\ minute)}$				
Equipment	North	East[2] (20dB Reduction)	East[2] (30dB Reduction)	South	West
2T Excavators	26	46	36	36	31
20T Excavators w/hammer	54	74[1]	64[1]	64[1]	59
45T Long-reach Excavator w/ hammer	57	77[1]	67[1]	67[1]	62
20T Excavators w/pulveriser	42	62	52	52	47
Mustang Bobcats	48	68	58	58	53
Powered Hand Tools	38	58	48	48	43
Trucks	43	63	53	53	48
Concrete Cutters	57	77[1]	67[1]	67[1]	62

[1]Predicted value provided for reference only. Pulverising methods shall be preferenced adjacent to these premises.
[2] Several receivers in the East direction have superior sound insulation (recording studios, psychotherapist office) and will therefore experience lower noise levels than predicted.

3.3.2 Highly Sensitive Receivers

Highly Sensitive Receivers generally include those that have raised concern over or objection to project works, or, due to the nature of activities conducted at the premises, require special consideration i.e. childcare centres, etc. This section provides a targeted assessment of noise impacts to each Highly Sensitive Receiver for the various stages of the works.

3.3.2.1 36 Hume Street - Kelly's Place Childcare Centre

Kelly's Place childcare centre is located to the North-East of the Crow's Nest Site at 36 Hume Street. Kelly's Place is generally well shielded from the majority of the Crows Nest site with the exception of 14 Clarke Street which is situated diagonally across from Kelly's Place childcare centre on the corner of Clarke and Hume Streets.

Kelly's Place childcare centre is a partially subterranean premises, with approximately half the height of the facade facing Site being below ground level. The external play area is located on the opposite side of the building and also well shielded from the Crows Nest site.

The core sleep period is between 12:00pm and 2:00pm. It is reasonable to assume a 30dBA facade noise reduction without treatment.

Due to the nature of activities conducted, childcare centres are subject to more stringent criteria for internal NML's than those specified under CoA E37/E38. Section 4.1.1 of the CNVMP stipulates the following limits for childcare centres:

- Internal Sleep Areas - 40dB(A) when in use
- Internal Play Areas - 55dB(A)

In addition to the internal NML's, an external NML of 65dBL$_{Aeq(15min)}$ is to be adopted for the outdoor play area and all reasonable steps taken to manage demolition noise levels so that they do not exceed the external NML by more than 10dBA at times when the outdoor play area is used.

Table 8 illustrates the predicted internal and external noise levels resulting from works on the Crows Nest site. Note that predictions are based on the distance from the closest point of 14 Clarke St to the childcare centre and therefore represent worst-case impacts. Generally, noise levels will be well below those presented in Table 8.

Table 8. Minimum distances to comply with NML's

Equipment	Sound Power Level	Predicted Noise Levels dBL$_{Aeq\ (15\ minute)}$	
		Internal Play Areas[1] Target - 55dB(A) / 40dB(A)	External Play Area[2] Target - 75dBL$_{Aeq\ (15\ min)}$
2T Excavators	88	14	38
20T Excavators w/hammer	115	42	66
45T Long-reach Excavator w/hammer	104	45	69
20T Excavators w/hydraulic shears/pulverisers	119	30	54
Mustang Bobcats	110	36	60
Powered Hand Tools	100	26	50
Trucks	105	31	55
Concrete Cutters	119	45	69

[1] Predicted internal noise level based on distance attenuation, 30dB(A) facade noise reduction plus a further 10dB(A) noise reduction due to shielding by existing structure.
[2] Predicted noise level at external play area based on distance attenuation plus a further 10dB(A) noise reduction due to shielding by existing structure.

3.3.2.2 Clarke Street Sensitive Receivers

A number of highly sensitive receivers are located along Clarke St with a horizontal distance to the Crows Nest site of as little as 5m. These are outlined in Table 9.

Table 9. Clarke Street Highly Sensitive Receivers

Address	Receiver	Details
22-26 Clarke St	Crows Nest Day Surgery	Two operating theatres that are in use all day. Some of the surgeons use microscopes during the operations. The operating theatres face the demolition site.
	Crows Nest Eye Surgery	Assessment and consultation performed on site using diagnostic laser equipment. No operations performed on site. Situated furthest in building from demolition. Equipment falls within the category of normal vibration sensitivity. Expected vibration impact is low to moderate.
20 Clarke St	ISM Studios 2	Small recording booth on ground floor. Company works on TV commercial music and voice overs and is expecting ground & structure-borne noise to be an issue.
	Mondo	Recording studio on level 2 closest to demolition site. Recording booth is highly sound proofed with a floating floor. Expected noise transmission loss 35 - 40dBA. Owners have decided to relocate, have signed a lease on new premises which they are currently fitting out.
	TSD	Video recording business. TSD in same location as Mondo but recording booth is away from closest demolition. Expected noise transmission loss for recording booth is 20 - 25dBA
10-12 Clarke St	Labsonics	Audio post-production studio. Recording booth on 5th floor. Previously affected by demo at 479 Pacific Highway. Looking at installing a modular booth with a floating floor within their vocal recording booth in order to mitigate potential impacts.
	Molemap	Potentially vibration sensitive treatment machines
6-8 Clarke St	Carolyn Andrews Psychotherapy	Appointments Monday to Friday 6.30am to 6pm. Patient consultation needs to be undertaken in a quiet environment. The consultation room is fitted with extra internal sound insulation of magnetite type.
Cnr Oxley St & Pole Lane	Northside Community Church	Only conducts services on Sunday and will not be affected by the demolition works.

The predicted internal noise levels presented in Table 7 for the 'East' direction apply to these receivers. It can be seen that there is potential for significant noise impacts to these receivers if not appropriately managed. Specific mitigation measures for these receivers are outline in Section 4.2.3.

3.4 Ground-borne Noise

As demolition and retention works do not involve ground excavation, ground-borne noise is expected to be an issue only where sensitive receivers are directly coupled to the works (structure-borne noise). On the Crows Nest site, this applies to:

- 473 Pacific Highway
- 20 Clarke Street

To mitigate potential impacts of both airborne and ground-borne noise, demolition of adjoining structures shall be completed preferencing pulverisers. Ground-borne noise is therefore not anticipated to be a significant issue for these sensitive receivers.

3.5 Vibration Predictions

Vibration at the nearest sensitive receivers (adjacent to the building foundation) has been estimated using the formula from the FTA's Guideline "Transit Noise and Vibration Impact Assessment".

$$PPV_{Receiver} = PPV_{Ref} \times \left(\frac{d_{ref}}{d}\right)^{1.5}$$

Where: $PPV_{Receiver}$ = peak particle velocity at the receiver in mm/s
PPV_{Ref} = peak particle velocity of the source, measured at the reference distance (7.6 m)
d_{ref} = reference distance for the vibration source (7.6 m)
d = horizontal distance from the source to the receiver (m)

The values of PPV_{Ref} are based on a review of current literature and are provided in Table 10 for reference.

Table 10. Reference PPV's

Equipment	PPV @ 7.6m (mm/s)
2T Excavators	2.5
20T Excavators w/hammer	5.1
45T Long-reach Excavator w/ hammer	7.6
20T Excavators w/hydraulic shears/pulverisers	2.5

Table 10. Reference PPV's	
Equipment	**PPV @ 7.6m (mm/s)**
Mustang Bobcats	0.3
Powered Hand Tools	0.2
Trucks	1.9
Concrete Cutters	0.2

The levels of predicted vibration at the nearest sensitive receivers are provided in Table 11. Note that:

- these predictions assume that equipment is operating at the nearest point of works to the sensitive receiver and therefore represent worst-case scenarios.
- these predictions represent maximum instantaneous levels for the purpose of assessing the likelihood of cosmetic damage and are not applicable for the assessment of human comfort which is measured as vibration dose values.

Table 11. Predicted Ground Vibration				
Equipment	**Predicted PPV (mm/s)**			
	North (Oxley St)	**East (Clarke Lane)[2]**	**South (473 Pac. Hwy)**	**West (Pacific Hwy)**
2T Excavators	0.1	1.7	4.8	0.4
20T Excavators w/hammer	0.3	3.4	9.6[1]	0.8
45T Long-reach Excavator w/hammer	0.4	5.0	14.3[1]	1.1
20T Excavators w/hydraulic shears/pulverisers	0.1	1.7	4.8	0.4
Mustang Bobcats	<0.1	0.2	0.5	<0.1
Powered Hand Tools	<0.1	0.1	0.3	<0.1
Trucks	0.1	1.3	3.6	0.3
Concrete Cutters	<0.1	0.1	0.3	<0.1

[1]Predicted value provided for reference only. Pulverising methods shall be preferenced adjacent to these premises.
[2]These values apply to the heritage-listed St Leonards Centre, 28 - 34 Clarke Street where works approach the Eastern boundary of the site immediately adjacent to this premises.

The German Standard DIN 4150 Part 2 - 1975 presents information on the degree of human perception of various levels of motion. The threshold for 'noticeable' vibration is stated as 1mm/s, with 'easily noticeable' at

2.2mm/s. In light of this, and with reference to Table 11, it is evident that vibration from demolition works will at times be perceptible to persons occupying nearby sensitive receivers.

The highest levels of vibration are those associated with hard demolition works, namely hammering and pulverising. Unless otherwise coupled, vibration transmission from such works to adjacent sensitive receivers is via ground. Naturally then, vibration levels will only approach those levels in Table 11 where demolition works are occurring at or near ground level. Similarly, vibration impacts will diminish rapidly on upper levels of adjacent sensitive receivers.

Much of the impact to 473 Pacific Highway and 20 Clarke Street shall be mitigated by adoption of pulverising methods for demolition of adjacent structures. Still, occupants of tenancies closest to the works will likely experience perceptible levels of vibration during demolition of 477 Pacific Highway and 14 Clarke Street, respectively. Refer to Figure 3 for the demolition schedule.

4. Noise and Vibration Management

4.1 Environmental Monitoring

Noise and vibration monitoring shall be undertaken using permanent installations at the nearest representative sensitive receivers around the site supplemented with short term attended monitoring as required. Results of monitoring shall be reviewed and reported on a weekly basis to ensure ongoing compliance. Where complaints are received, additional monitoring may be conducted at the specific location of complaint. Monitor locations are detailed in Table 12 and illustrated in Appendix B.

Table 12. Monitoring Locations

Property	Monitor Category	Installation Type	Location	
545 Pacific Highway	Noise & Vibration	Permanent	External balcony	Representative monitor for compliance
420 Pacific Highway	Noise & Vibration	Permanent	External balcony	Representative monitor for compliance
22-26 Clarke Street	Noise & Vibration	Permanent	Clarke lane wall	Representative monitor for compliance
10-12 Clarke Street	Noise & Vibration	Permanent	External Awning - Lvl 1	Representative monitor for compliance
471-473 Pacific Highway	Noise & Vibration	Permanent	Internal - Oil Paintings Plus	Representative monitor for compliance

The number and location of monitoring points shall be reviewed after an initial period of 2 - 3 months. Where noise and vibration levels are negligible and, in consideration of the works still to be completed, those levels are not expected to increase for the remainder of the project, consideration shall be given to the removal of redundant monitoring points.

For further detail on environmental monitoring, refer to Section 6.3 of the CNVMP.

4.1.1 Heritage-listed Structures

Effective monitoring of heritage-listed structures can pose unique challenges where sensitive heritage fabrics are involved. CoA E31 stipulates that a heritage specialist shall provide advice regarding noise and vibration monitoring of heritage-listed structures. Such advice is provided in Appendix C.

4.2 Mitigation Measures

4.2.1 Standard Mitigation Measures

A range of standard noise and vibration mitigation measures shall be adopted on the site so as to minimise the impact of works on neighbouring sensitive receivers. These are outlined in Table 13. Where it is predicted that NML's will be exceeded even with the implementation of standard mitigation measures, additional mitigation measures shall be put in place (See Section 4.2.2).

Table 13. Noise and Vibration Mitigation Measures

No.	Control	Anticipated Noise Reduction	Timing
Administration			
NVM1	Conduct a site induction addressing the requirements of this CNVMP for all new personnel undertaking site activities	N/A	Prior to starting works
NVM2	Educate staff on noise and the impacts of workers activities on the noise environment	N/A	Prior to starting works / following noise complaints
NVM3	Develop a complaints handling procedure and respond to complaints	N/A	Prior to starting works / as required
NVM4	Conduct regular toolbox talks to reiterate the appropriate noise and vibration management methodologies	N/A	Periodically
Procedural			
NVM5	Turn off machinery when not in use	Up to 10 dB	Daily
NVM6	Conduct regular noise measurements in the vicinity of the site to assess compliance with noise criteria	N/A	As needed / following changes in activities
NVM7	The coincidence of noisy plant working simultaneously close together would be avoided	Up to 10 dB	Daily
NVM8	Operate and maintain equipment according to manufacturers' specifications.	Up to 3 dB	Daily
NVM9	Do not use crane whistles, amplified external telephone ringers/ horns or alarms (excluding emergencies)	N/A	Daily
NVM10	Preference the use of the following in lieu of hydraulic hammers: • hydraulic concrete shears • hydraulic concrete pulverisers • saw cutting and lifting	Up to 15 dB	At all times so far as is practicable
NVM11	Maximise offset of noisy plant to sensitive receivers as much as possible.	N/A	Where practicable
NVM12	Sequencing of demolition work to retain noise shields (walls, etc.) as long as possible along north eastern edge of site	5 to 15 dB	Where practicable
NVM13	Positioning of load out areas and dump chutes away from neighbouring walls and enclosing dump chutes	N/A	Where practicable

Table 13. Noise and Vibration Mitigation Measures			
No.	**Control**	**Anticipated Noise Reduction**	**Timing**
NVM14	Unless compliance with the relevant traffic noise criteria can be achieved, night time heavy vehicle movements at the Chatswood dive site, Crows Nest Station, and Victoria Cross Station and Waterloo Station sites would be restricted to: • The Pacific Highway and Mowbray Road at the Chatswood dive site • The Pacific Highway, Hume Street and Oxley Street at the Crows Nest Station construction site • McLaren Street, Miller Street and Berry Street at the Victoria Cross Station construction site • Botany Road and Raglan Street at the Waterloo Station construction site.	N/A	Night time works only
NVM15	Where vibration levels are predicted to exceed the screening criteria for structural damage, a more detailed assessment of the structure and attended vibration monitoring would be carried out to ensure vibration levels remain below appropriate limits for that structure. For heritage items, the detailed assessment would specifically consider the heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed.		Ongoing
Engineering			
NVM16	Use site offices, sheds as noise barriers during demolition works	5 to 15 dB	Prior to starting works
NVM17	Use equipment appropriately sized for each task.	Up to 2 dB	Daily
NVM18	Use a noise reduction kit on the jack hammer to limit its sound power level to 115 dBA.	6 dB per source	When selecting equipment
NVM19	Use smart broadband reversing alarm on mobile equipment where possible.	2 to 5 dB	When selecting equipment
Hours of Work			
NVM20	Operate during standard work hours wherever possible	N/A	Daily
NVM21	Introduce respite periods and/or take smoke and lunch breaks when noisy equipment is operating close to the site boundaries.	N/A	Daily
NVM22	Ongoing consultation shall be undertaken with affected sensitive receivers to determine sensitive periods. The business management plan shall be referred to in this instance.	N/A	Daily
Site-Specific			
NVMCN1	Structural demolition of 14 Clarke St to occur on Saturdays due to proximity to childcare centre, yoga studio, recording studio	N/A	Daily
NVMCN2	Consideration shall be given to attended monitoring at sensitive receivers on Clarke St, in particular the Crows Nest Day Surgery, to supplement unattended monitoring	N/A	Ongoing

Table 13. Noise and Vibration Mitigation Measures			
No.	**Control**	**Anticipated Noise Reduction**	**Timing**
NVMCN3	Regular consultation via Place Manager with Crows Nest Day Surgery to identify times when microscopes are used for surgery	N/A	Weekly

4.2.2 Additional Measures

The Sydney Metro Construction Noise and Vibration Strategy outlines additional mitigation measures that shall be adopted where exceedance of imposed limits is expected, with the level of measure commensurate with the degree of exceedance.

The latest version of the strategy, as referenced in Section 6, outlines the following additional measures for works within standard construction hours:

Noise

- Letterbox Drops - Information to neighbours on expected duration of noise-intrusive activities
- Monitoring - Monitoring at the nearest affected sensitive receiver (may include attended monitoring where permanent monitors do not reflect the nearest affected sensitive receiver)

It is anticipated that these measures will be required where hammering activity approaches the boundaries of the site and where demolition works approach adjoining properties outlined in Section 3.4.

Vibration

- Letterbox Drops - Information to neighbours on expected duration of vibration-intrusive activities
- Monitoring - Monitoring at the nearest affected sensitive receiver (may include attended monitoring where permanent monitors do not reflect the nearest affected sensitive receiver)
- Project-specific respite offer - Consultation with affected receivers to determine appropriate means of respite

4.2.3 Mitigation Measures for Highly Sensitive Receivers

4.2.3.1 Kelly's Place Childcare Centre

Predicted noise levels at Kelly's Place childcare centre (Table 8) are mostly compliant with internal and external NMLs. The slight exceedance of the 40dB(A) internal NML during sleep periods would be easily mitigated by

avoiding the use of hammers on the closest points of 14 Clarke St during the hours of 12:00pm to 2:00pm weekdays. Nonetheless, demolition of 14 Clarke St shall be undertaken on Saturdays.

4.2.3.2 Clarke Street Receivers

As is evident from consultation (Appendix D), these sensitive receivers have varied and conflicting sensitive periods. Some receivers' sensitive periods encompass the entire working day as is the case for the Crows Nest Day Surgery. Therefore, it is neither reasonable or feasible to instigate ongoing respite periods for mitigation of noise and vibration impacts.

Instead, to mitigate the impact of noise and vibration along this side of the project, a number of standard mitigation measures shall be employed concurrently, including:

- Sequencing of demolition works such that external walls along Clarke Lane are left in place for as long as possible to act as a noise shield. The shielding effect afforded by leaving external walls in place is expected to reduce predicted noise levels presented in Table 7 by a further 10dB(A).
- Pulverising methods to be preferenced wherever possible particularly for demolition of final shielding walls along Clarke Lane
- Where hammering is required immediately adjacent to Clarke St highly sensitive receivers identified in Table 9, consider scheduling such activities out of hours or on Saturdays.
- Ongoing consultation with Clarke St highly sensitive receivers via Place Manager to monitor effectiveness of mitigation measures.
- Consideration shall be given to attended noise and vibration monitoring to supplement the unattended monitoring detailed in section 4.1.
- Installation of a permanent monitor at the Crows Nest Day Surgery to measure compliance against limits for 'Critical Working Areas'.

5. Conclusion

Airborne noise is predicted to be the key environmental impact arising from demolition works on the Crows Nest site. Noise Management Levels are likely to be exceeded where hammering activities approach the boundary of the site and will thus necessitate the adoption of pulverising methods, particularly as works approach adjoining premises at 473 Pacific Highway and 20 Clarke Street where structure-borne noise and vibration would also be a notable impact. The use of pulverisers will mitigate both noise and vibration related impacts where works approach these nearest sensitive receivers.

For the purpose of minimising noise impacts to both Kelly's Place childcare centre and other adjoining noise-sensitive businesses, 14 Clarke Street shall be demolished on Saturdays.

Finally, a precautionary vibration limit of 2.5mm/s has been adopted for the heritage-listed St Leonards Centre until such time as a structural engineer can assess the integrity of the building. It must be noted that, where hammering activities are to occur in close proximity to the St Leonards Centre, predicted vibration levels may reach as high as 5mm/s. Pulverising methods must therefore be adopted immediately adjacent to the St Leonards Centre until such time as the structural engineering assessment of the building is conducted and the screening criteria of 7.5mm/s adopted.

6. References

Additional guidelines and standards relating to the management of construction noise and vibration from this project include:

- NSW Interim Construction Noise Guideline (ICNG), Department of Environment and Climate Change 2009
- NSW Road Noise Policy, Dept. of Environment, Climate Change and Water 2011
- NSW Industrial Noise Policy, Environment Protection Authority 2000
- NSW Assessing Vibration – a technical guideline (AVTG), Department of Environment and Conservation 2006
- Australian Standard AS/NZS 2107:2000 Acoustics - Recommended design sound levels and reverberation times for building interiors
- Australian Standard 2834-1995 Computer Accommodation, Chapter 2.9 Vibration
- Australian Standard AS 2187.2 Explosives - Storage and use - Part 2 Use of explosives
- Australian Standard AS2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites
- British Standard BS 6472-2008, 'Evaluation of human exposure to vibration in buildings (1- 80Hz)
- British Standard 7385: Part 2-1993 'Evaluation and measurement of vibration in buildings'
- German Standard DIN4150-1999 Structural vibration Part 3: Effects of vibration on Structures
- Sydney Metro Construction Noise and Vibration Strategy, Report No. 610.14213-R3, Transport for NSW 2016
- Sydney Metro City and Southwest Environmental Impact Statement, Transport for NSW 2016
- Sydney Metro City and Southwest Submissions and Preferred Infrastructure Report, Transport for NSW 2016
- Sydney Metro City and Southwest Conditions of Approval, Department of Planning and Environment 2017
- Transit Noise and Vibration Impact Assessment, Federal Transit Administration 2006
- Environmental Noise Management Manual (ENMM), Roads and Traffic Authority 2001

Appendices

Appendix A - List of Sensitive Receivers

Property Numbers	Address	Business	Business Category	Distance	Impact		Sensitive Equipment
					Noise	Vibration	
1	28 - 34 Clarke St	DC Health Performance	Health Buildings	7m	Low Impact	Low Impact	
1	28 - 34 Clarke St	Axient	Office Buildings	7m	Low Impact	Low Impact	
1	28 - 34 Clarke St	Voice Logic	Office Buildings	7m	Low Impact	Low Impact	
1	28 - 34 Clarke St	Short Kenyon & Crane	Office Buildings	7m	Low Impact	Low Impact	
1	28 - 34 Clarke St	Markwell Foods	Office Buildings	7m	Low Impact	Low Impact	
1	28 - 34 Clarke St	WB Finance	Office Buildings	7m	Low Impact	Low Impact	
1	28 - 34 Clarke St	pmdl	Office Buildings	7m	Low Impact	Low Impact	
1	28 - 34 Clarke St	ARCS Australia	Office Buildings	7m	Low Impact	Low Impact	
1	28 - 34 Clarke St	Jet Interactive	Office Buildings	7m	Low Impact	Low Impact	
2	22 - 26 Clarke St	Crows Nest Day Surgery	Health Buildings	7m	High Impact	High Impact	Zeiss Lumera 700 surgical microscopes (0.4 x to 2.4x magnification
		The day surgery has 2 operating theatre on site that are in use all day. The operating theatres face the demolition site at approximately 5 m distance. Expected noise and dust sensitivity is high with moderate vibration sensitivity.					
2	22 - 26 Clarke St	Crows Nest Eye Surgery	Health Buildings	7m	Moderate Impact	Moderate Impact	
		Assessment and consultation is carried out on site using diagnostic laser equipment. No operations are carried out on site which is situated furthest in the building from the demolition. The equipment falls within the category of normal vibration sensitivity. Expected vibration impact is low to moderate.					
2	22 - 26 Clarke St	Dental On Clarke	Health Buildings	7m	Moderate Impact	Moderate Impact	
2	22 - 26 Clarke St	Special Needs Dentistry	Health Buildings	7m	Moderate Impact	Moderate Impact	

Property Numbers	Address	Business	Business Category	Distance	Impact		Sensitive Equipment
					Noise	Vibration	
2	22 - 26 Clarke St	Specialist Endo Crows Nest	Health Buildings	7m	Moderate Impact	Moderate Impact	
2	22 - 26 Clarke St	Specialist Paediatric Dental Practice	Health Buildings	7m	Moderate Impact	Moderate Impact	
2	22 - 26 Clarke St	Specialist Medical Practice	Health Buildings	7m	Moderate Impact	Moderate Impact	
2	22 - 26 Clarke St	Northshore Oral & Maxofacial Surgery	Health Buildings	7m	High Impact	High Impact	
2	22 - 26 Clarke St	Orthopaedic Spinal Surgery	Health Buildings	7m	High Impact	High Impact	
2	22 - 26 Clarke St	Jade Remedies	Shop Buildings	7m	Moderate Impact	Moderate Impact	
2	22 - 26 Clarke St	La Dimora Café	Public Buildings	7m	Moderate Impact	Low Impact	
3	20 Clarke St	AG McDonald Consulting	Office Buildings	0m	High Impact	High Impact	
3	20 Clarke St	Austin Thompson & Associates	Office Buildings	0m	High Impact	High Impact	
3	20 Clarke St	Awareness Institute	Health Buildings	0m	High Impact	High Impact	
3	20 Clarke St	BRMM	Office Buildings	0m	High Impact	High Impact	
3	20 Clarke St	Business Payment Solutions & Speedydebit	Office Buildings	0m	High Impact	High Impact	
3	20 Clarke St	Dijtal Pty Ltd	Office Buildings	0m	High Impact	High Impact	
3	20 Clarke St	DMC Digital Pty Ltd	Office Buildings	0m	High Impact	High Impact	

Property Numbers	Address	Business	Business Category	Distance	Impact		Sensitive Equipment
					Noise	Vibration	
3	20 Clarke St	Enzyme International	Office Buildings	0m	High Impact	High Impact	
3	20 Clarke St	InsideOut PR	Office Buildings	0m	High Impact	High Impact	
3	20 Clarke St	ISM Studios	Studio Buildings	0m	High Impact	High Impact	
		The company works on TV commercial music and voice overs. ISM also has a smaller recording booth on 20 Clarke st. The sensitive receiver is expecting ground & structure borne noise to be an issue. Expected noise impact is high.					
3	20 Clarke St	KTBR Business Centre / IT Solution	Office Buildings	0m	High Impact	High Impact	
3	20 Clarke St	Mantech Recruitment	Office Buildings	0m	High Impact	High Impact	
3	20 Clarke St	Melinz Kim & Associates Pty Ltd	Office Buildings	0m	High Impact	High Impact	
3	20 Clarke St	Mondo	Studio Buildings	0m	High Impact	High Impact	
		Recording studio working with Advertising and Audio books. The Recording booth is highly sound proofed with a floating floor. Expected noise transmission loss is in the range of 35 - 40dBA. Mondo is on level 2 and closest to the 20 Clarke st demolition site with expected high noise impact.					
3	20 Clarke St	Optiled Australia Pty Ltd	Office Buildings	0m	High Impact	High Impact	
3	20 Clarke St	SomnoMed Ltd	Office Buildings	0m	High Impact	High Impact	
3	20 Clarke St	Sourcefire Australia	Office Buildings	0m	High Impact	High Impact	
3	20 Clarke St	The DMC Initiative	Office Buildings	0m	High Impact	High Impact	
3	20 Clarke St	The Property Lab	Office Buildings	0m	High Impact	High Impact	
3	20 Clarke St	TSD	Office Buildings	0m	High Impact	High Impact	

Property Numbers	Address	Business	Business Category	Distance	Impact		Sensitive Equipment
					Noise	Vibration	
		Video recording business. TSD is in the same location as Mondo but the recording booth is at a distance from the closest demolition. The expected noise transmission loss for the TSD recording booth is between 20 - 25dBA					
4	10 - 12 Clarke St	Trinity International Computers - It	Shop Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	George - Taylor	Shop Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Crows Nest - Cosmetic & Vein Clinic	Health Buildings	5m	Moderate Impact	Moderate Impact	
4	10 - 12 Clarke St	Nebula Hair Salon	Shop Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Martins Barber Shop	Shop Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Scuro Expresso-Café	Public Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Molemap Dermatologists	Health Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	College Of Professional Psychology	Educational Buildings	5m	Moderate Impact	Low Impact	
4	10 - 12 Clarke St	Synergise Associates	Health Buildings	5m	Moderate Impact	Low Impact	
4	10 - 12 Clarke St	Mike George Planning	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Ludvic & Associates	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Neville Thomas Services	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Agility Professional Services	Office Buildings	5m	Low Impact	Low Impact	

Property Numbers	Address	Business	Business Category	Distance	Impact		Sensitive Equipment
					Noise	Vibration	
4	10 - 12 Clarke St	Arthur Murray Dance Studio And Social Club	Studio Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Navigate Pty Ltd	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Contemporary Architecture	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	The Radio Sales Network Pty Ltd	Office	5m	Moderate Impact	Low Impact	
4	10 - 12 Clarke St	Grant Broadcasters Pty Ltd	Studio Buildings	5m	Moderate Impact	Low Impact	
4	10 - 12 Clarke St	Peak Conditioning	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Pinnacle Rehab	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Allied Health Australia	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Angel Mahchut Pty Ltd	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Mary Szirmai Tax Agent	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Construction & Contact Services	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Ccs Legal	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Cp Communications	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Darok (Aust) Pty Ltd	Office Buildings	5m	Low Impact	Low Impact	

Property Numbers	Address	Business	Business Category	Distance	Impact		Sensitive Equipment
					Noise	Vibration	
4	10 - 12 Clarke St	National Project Consultants	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Lobana Trading Co. Pty Ltd	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Digital Pulse	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Filmday	Film ProductionBuildings	5m	Low Impact	Low Impact	No recording on site
4	10 - 12 Clarke St	The Pulse	Studio Buildings	5m	Low Impact	Low Impact	No recording on site
4	10 - 12 Clarke St	Lustre Pictures	Film Production Buildings	5m	Low Impact	Low Impact	No recording on site
4	10 - 12 Clarke St	Brintons Pty Limited	Office Buildings	5m	Low Impact	Low Impact	
4	10 - 12 Clarke St	Labsonic	Office Buildings	5m	Moderate Impact	Moderate Impact	
		Audio post production studio for TV features and series. The company has a recording booth on the 5th floor with an expected noise transmission loss of 25 - 30dBA. ADR (Post singing) done in the studio. The studio can be booked from 9am to 6pm. A typical project will take 3 - 4 months to complete. The sensitive receiver is at a horizontal distance of 5 m from the closest demolition with moderate noise impact predicted.					
5	6 - 8 Clarke St	Zync Communications	Office	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Joellen Design	Office	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Dyslexia Answered	Health	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Da Design Fire Services	Office	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Filthy Look Films	Film Production	5m	Moderate Impact	Low Impact	
5	6 - 8 Clarke St	Carolyn Andrews	Health	5m	Moderate Impact	Low Impact	

Property Numbers	Address	Business	Business Category	Distance	Impact		Sensitive Equipment
					Noise	Vibration	
		Psychotherapy - Patient consultation needs to be undertaken in a quiet environment. The consultation room is fitted with extra internal of magnetite type. Expected noise impact is moderate.					
5	6 - 8 Clarke St	Dsg Digital Signage	Shop	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Eastway	Studio	5m	Moderate Impact	Low Impact	
5	6 - 8 Clarke St	Hurricane Event Management	Office Buildings	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Custom Creative	Office Buildings	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Base 3d Architectural Visualisation	Office Buildings	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Mcnally Architects - Sublease? I&D Studio	Office Buildings	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Neubreed Design	Office Buildings	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Zar Zar Café	Public Buildings	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Savvy Graphics	Office Buildings	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	The Idea Shed	Office Buildings	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	You&Co	Office Buildings	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Red Door	Office Buildings	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Zaknic Pagano Construction	Office Buildings	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Dvho	Office Buildings	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Ruff Cut Hairdresser	Shop Buildings	5m	Low Impact	Low Impact	

Property Numbers	Address	Business	Business Category	Distance	Impact		Sensitive Equipment
					Noise	Vibration	
5	6 - 8 Clarke St	Pace Athletics Crows Nest	Shop Buildings	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Ccm Travel	Office Buildings	5m	Low Impact	Low Impact	
5	6 - 8 Clarke St	Ism Studio	Studio Buildings	5m	Moderate Impact	Low Impact	Floating floor recording room. 35 - 40 dBA transmission loss
		The company works on TV commercial music and voice overs. The sensitive receivers recording booth is well insulated with floating floor. Noise transmission loss is expected to be in the range of 35 - 40 dBA. ISM is situated on level 2, furthest in the building from the demolition works.					
6	4 Clarke St	Wildfire Printing	Shop Buildings	14m	Low Impact	Low Impact	
6	4 Clarke St	Shore Style Framing	Shop Buildings	14m	Low Impact	Low Impact	
6	4 Clarke St	Layor Pty Ltd -Yoga Studio	Indoor Sports Buildings	14m	Low Impact	Low Impact	
6	4 Clarke St	Jenson Young - Architecture	Office Buildings	14m	Low Impact	Low Impact	
6	4 Clarke St	Niche Corporation	Office Buildings	14m	Low Impact	Low Impact	
6	4 Clarke St	Kohinor Scaffolding	Office Buildings	14m	Low Impact	Low Impact	
6	4 Clarke St	Seemee4 Productions - Sound Production	Gearing Game production	14m	Low Impact	Low Impact	No recording room
6	4 Clarke St	Health Practice Creation - Migration Lawyer	Office Buildings	14m	Low Impact	Low Impact	
6	4 Clarke St	Hk Securities On Line Trading	Office Buildings	14m	Low Impact	Low Impact	
6	4 Clarke St	Thornton Consulting	Office Buildings	14m	Low Impact	Low Impact	

Property Numbers	Address	Business	Business Category	Distance	Impact		Sensitive Equipment
					Noise	Vibration	
6	4 Clarke St	Mrx Group - Construction (Related To Kohinor)	Office Buildings	14m	Low Impact	Low Impact	
6	4 Clarke St	Quantum Savvy - Finance	Office Buildings	14m	Low Impact	Low Impact	
6	4 Clarke St	Human Engineering - Physiotherapist	Health Buildings	14m	Low Impact	Low Impact	
7	7 - 11 Clarke St	Kiss My Laser	Health Buildings	25m	Low Impact	Low Impact	
7	7 - 11 Clarke St	Erebouni Jewellery	Shop Buildings	25m	Low Impact	Low Impact	
7	7 - 11 Clarke St	Artistry Coffee Craft Co	Public Buildings	25m	Low Impact	Low Impact	
7	7 - 11 Clarke St	Burlington Hair	Shop Buildings	25m	Low Impact	Low Impact	
7	7 - 11 Clarke St	Bean To Crows	Public Buildings	25m	Low Impact	Low Impact	
7	7 - 11 Clarke St	Style Beauty & Thai Massage	Shop Buildings	25m	Low Impact	Low Impact	
7	7 - 11 Clarke St	Inglis Academy (Art)	Shop Buildings	25m	Low Impact	Low Impact	
7	7 - 11 Clarke St	Ciao Ciao Pizza	Public Buildings	25m	Moderate Impact	Low Impact	
7	7 - 11 Clarke St	The Brunch Bar	Public Buildings	25m	Low Impact	Low Impact	
7	7 - 11 Clarke St	Virginia Lindsay Psychotherapy + Bounce Back To Life	Health Buildings	25m	Low Impact	Low Impact	
7	7 - 11 Clarke St	New Paths Psychology	Health Buildings	25m	Low Impact	Low Impact	

Property Numbers	Address	Business	Business Category	Distance	Impact		Sensitive Equipment
					Noise	Vibration	
7	7 - 11 Clarke St	Carolyn White Management.	Office Buildings	25m	Low Impact	Low Impact	
7	7 - 11 Clarke St	Mercer White Theatrical Services		25m	Low Impact	Low Impact	
7	7 - 11 Clarke St	Clinical Psychologists Jo Lambe & Karen Baikie	Health Buildings	25m	Low Impact	Low Impact	
8	31 - 33 Hume st	Rooney & Bye	Office Buildings	23m	Low Impact	Negligible	
8	31 - 33 Hume st	Siss Data Services	Office Buildings	23m	Low Impact	Negligible	
8	31 - 33 Hume st	Milk Money/ Chase Editor	Office Buildings	23m	Low Impact	Negligible	
8	31 - 33 Hume st	Curves Gym	Indoor Sports Buildings	23m	Low Impact	Negligible	
8	31 - 33 Hume st	Cadex It	Office Buildings	23m	Low Impact	Negligible	
9	35 Hume st	Dalcorp	Office Buildings	27m	Low Impact	Negligible	
10	39 Hume st	Benchmark Sleep Services	Health Buildings	33m	Low Impact	Negligible	
10	39 Hume st	Imagine Childcare Group	Educational Buildings	33m	Low Impact	Negligible	
10	39 Hume st	Snapcracker Research + Strategy	Office Buildings	33m	Low Impact	Negligible	
10	39 Hume st	Lodestone	Office Buildings	33m	Low Impact	Negligible	
10	39 Hume st	Heartkids Australia	Office Buildings	33m	Low Impact	Negligible	
11	41 Hume st	Ausby	Office Buildings	41m	Low Impact	Negligible	
11	41 Hume st	Lighting Art & Science	Office Buildings	41m	Low Impact	Negligible	

Property Numbers	Address	Business	Business Category	Distance	Impact		Sensitive Equipment
					Noise	Vibration	
11	41 Hume st	Australian Security Industry Association Ltd	Office Buildings	41m	Low Impact	Negligible	
12	43 Hume st	Xpo Training Room	Educational Buildings	44m	Low Impact	Negligible	
12	43 Hume st	Western & Northern Sydney Psychology Clinics	Health Buildings	44m	Low Impact	Negligible	
12	43 Hume st	Blanford Bal & Comm	Office Buildings	44m	Low Impact	Negligible	
13	45 Hume st	Arbon Publishing	Office Buildings	49m	Low Impact	Negligible	
13	45 Hume st	Ehotelier	Office Buildings	49m	Low Impact	Negligible	
13	45 Hume st	Gault & Millau	Office Buildings	49m	Low Impact	Negligible	
13	45 Hume st	Mawland	Educational Buildings	49m	Low Impact	Negligible	
13	47 Hume st	Australian Fitness Network	Office Buildings	50m	Low Impact	Negligible	
14	Corner Clarke & Hume st	Kellys Place Childcare	Educational Buildings	20m	Moderate Impact	Low Impact	
15	34 - 38 Oxley	Glo Skin	Health Buildings	22m	Low Impact	Low Impact	
15	34 - 38 Oxley	Cavalier Café	Public Buildings	22m	Low Impact	Low Impact	
15	34 - 38 Oxley	Northside Community Church	Public Buildings	22m	Low Impact	Low Impact	
15	34 - 38 Oxley	TVT (Australia) PTY LTD	office Buildings	22m	Low Impact	Low Impact	
15	34 - 38 Oxley	Tech Plot Fund	office Buildings	22m	Low Impact	Low Impact	

Property Numbers	Address	Business	Business Category	Distance	Impact		Sensitive Equipment
					Noise	Vibration	
15	34 - 38 Oxley	Good Shift	office Buildings	22m	Low Impact	Low Impact	
16	545 Pacific Highway	Residential	Residential Buildings	22m	Moderate Impact	Low Impact	
17	471 Pacific Highway	Clay & Flax	Shop Buildings	11m	Moderate Impact	Low Impact	
17	471a Pacific Highway	Oregon Furniture Specialist	Shop Buildings	11m	Moderate Impact	Low Impact	
18	473 - 475 Pacific Hwy	Oil Paintings Community	Public Buildings	0m	High Impact	High Impact	
18	473 - 475 Pacific Hwy	La Trende Curtains	Shop Buildings	0m	High Impact	High Impact	
19	348 Pacific Hwy	Furniture & Moore	Shop Buildings	27m	Low Impact	Low Impact	
20	360 Pacific Highway	Siekaup Furniture	Shop Buildings	26m	Low Impact	Low Impact	
20	360 Pacific Highway	Moss Furniture	Shop Buildings	26m	Low Impact	Low Impact	
20	360 Pacific Highway	Sydneyside Furniture	Shop Buildings	26m	Low Impact	Low Impact	
20	360 Pacific Highway	Commercial	Office Buildings	26m	Low Impact	Low Impact	
20	360 Pacific Highway	Logoworks - Showroom	Office Buildings	26m	Low Impact	Low Impact	
20	360 Pacific Highway	Atlas Digital - Marketing Psychologist And Dietician	Health Buildings	26m	Low Impact	Low Impact	
20	360 Pacific Highway	Imex - Specialist Parts Supplier	Office Buildings	26m	Low Impact	Low Impact	

Property Numbers	Address	Business	Business Category	Distance	Impact		Sensitive Equipment
					Noise	Vibration	
20	360 Pacific Highway	Nation Wide Capital Finance (Moving Out An It Business Moving In)	Industrial Buildings	26m	Low Impact	Low Impact	
20	360 Pacific Highway	Forward Learning (World Book Agent) - Sales	Shop Buildings	26m	Low Impact	Low Impact	
20	360 Pacific Highway	Turtle Sport - Marketing	Office Buildings	26m	Low Impact	Low Impact	
20	360 Pacific Highway	Matrix Print - Print Broker	Office Buildings	26m	Low Impact	Low Impact	
20	360 Pacific Highway	Start Grow Run - Business Consultants	Office Buildings	26m	Low Impact	Low Impact	
20	360 Pacific Highway	Ambit - It	Office Buildings	26m	Low Impact	Low Impact	
21	366 - 368 Pacific Hwy	Advance Mirrors - Showroom	Shop Buildings	35m	Low Impact	Low Impact	
22	370 Pacific Hwy	The Purple Corporation - Office	Office Buildings	26m	Low Impact	Low Impact	
23	372 Pacific Highway	Comfort & Fit -Showroom	Shop Buildings	26m	Low Impact	Low Impact	
24	374 Pacific Highway	Vacant		35m	Low Impact	Low Impact	
25	376 Pacific Highway	Latex Bedding - Showroom	Shop Buildings	26m	Low Impact	Low Impact	
25	376 Pacific Highway	Not Bread Alone - Cafe	Public Buildings	26m	Low Impact	Low Impact	
26	378 Pacific Hwy	Derucci	Shop Buildings	26m	Low Impact	Low Impact	

Property Numbers	Address	Business	Business Category	Distance	Impact		Sensitive Equipment
					Noise	Vibration	
26	378 Pacific Hwy	Spine And Health	Health Buildings	26m	Low Impact	Low Impact	
26	378 Pacific Hwy	Body Measure	Health Buildings	26m	Low Impact	Low Impact	
27	382 Pacific Hwy	Vision Training Gym	Indoor Sports Buildings	25m	Low Impact	Low Impact	
27	382 Pacific Hwy	Sofa Bed Studio	Shop Buildings	25m	Low Impact	Low Impact	
28	388 Pacific Highway	Fancy Costumes	Shop Buildings	25m	Low Impact	Low Impact	
29	390 Pacific Highway	Bad Backs (Medical Supply Store)	Shop Buildings	25m	Low Impact	Low Impact	
30	402 - 420 Pacific Hwy	Residential	Residential Buildings	25m	Moderate Impact	Low Impact	
30	402 - 420 Pacific Hwy	Coco Republic	Shop Buildings	25m	Low Impact	Low Impact	
30	402 - 420 Pacific Hwy	Residential	Residential Buildings	25m	Moderate Impact	Low Impact	

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Impact Category

- Low Impact
- Moderate Impact
- High Impact
- Demolition Zone

Monitoring Category

- Noise
- Regenerated Noise
- Vibration
- Noise & Vibration

Sensitive Receiver Category

- Commercial
- Residential
- Educat/Childcare
- Industrial
- Heritage
- Place of worship
- (5) Property no.
- Monitored RBL

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Sydney Metro Demolition - Crows Nest
Noise and Vibration Receivers & Land Uses

Date: 23/08/2017
Created by: RO
Report No: 0116 041 03

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The contents within this document are based on third party data. The accuracy of the information can not be guaranteed

Appendix C - Heritage Specialist Advice on Monitoring Methods and Locations

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MEMO

DATE: 5 May 2017 **AMBS Ref**: 16278 VM

TO: Rauf Osterman, Director Osterman Consulting

FROM: Jennie Lindbergh, Director Historic Heritage, AMBS Ecology & Heritage

SUBJECT: Sydney Metro Demolitions – Vibration Monitoring, St Leonards Centre, Crows Nest

Background

The Sydney Metro City & Southwest Chatswood to Sydenham Metro was approved as a State Significant Development (SSD) on 7 January 2017. The Minister's Conditions of Approval (CoA) that are relevant to vibration monitoring on heritage structures are:

> *E30 The Proponent must conduct vibration testing before and during vibration generating activities that have the potential to impact on heritage items to identify minimum working distances to prevent cosmetic damage. In the event that the vibration testing and monitoring shows that the preferred values for vibration are likely to be exceeded, the Proponent must review the construction methodology and, if necessary, implement additional mitigation measures.*
>
> *E31 The Proponent must seek the advice of a heritage specialist on methods and locations for installing equipment used for vibration, movement and noise monitoring of heritage-listed structures.*

The standard equipment and methodology to be used for monitoring heritage structures adjacent to buildings to be demolished is described below.

Equipment

The noise and vibration monitoring equipment consists of:
- a logger for data storage, communication and power supply;
- a vibration sensor – Geophone;
- a Noise sensor – Microphone; and,
- associated data cables

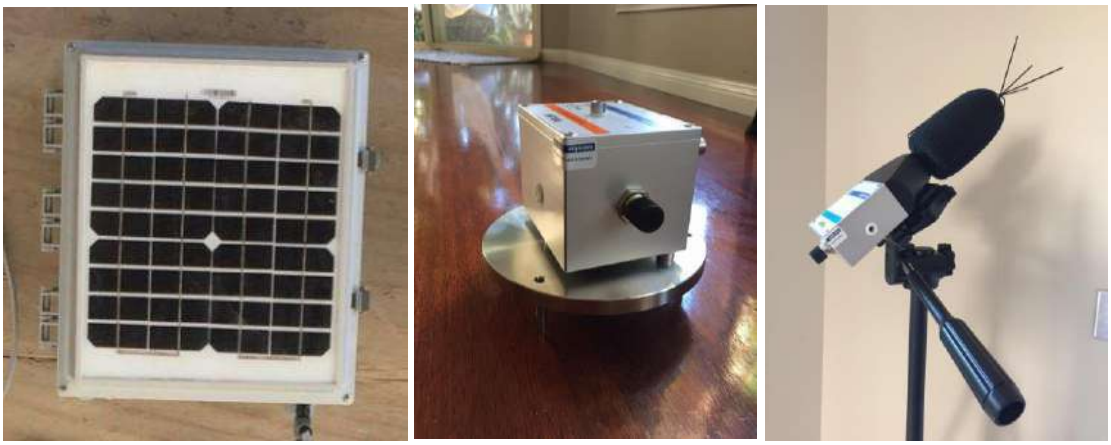

Figure 1 The components of the vibration monitoring; the logger (left), geophone set on comfort plate (centre) and microphone (left).

The *logger* can be installed on a wall or a pole or at ground level.

The preferred installation of the *geophone* is on the foundation of the structure being monitored. The best level of coupling is achieved when the geophone is coupled using a bolt positioned through the centre of the geophone. The process requires an 8mm masonry brass expander to be inserted into an 8mm drill hole and the geophone fastened using a 6mm stainless bolt through the centre of the geophone. In rare cases when drilling into the foundation is not permitted, the geophone may be installed on nearby structures. There is also the option of fastening a plate to the foundation using a two part epoxy putty. The geophone is then screwed onto the plate. The least preferred option is the use of a comfort plate. A comfort plate is generally for internal use when measuring for human comfort and is not ideal for vibration monitoring for cosmetic/structural damage.

The *microphone* can be installed on a pole or wall using the bolt hole in the centre of the sensor or it can be zip tied to an object. There is also the possibility to install the microphone on a tripod when in a secure environment. The preferred height of installation is 1.5 metres but for practical reasons (to prevent theft or damage) the monitor can be positioned at a height of 2.5 to 3 metres.

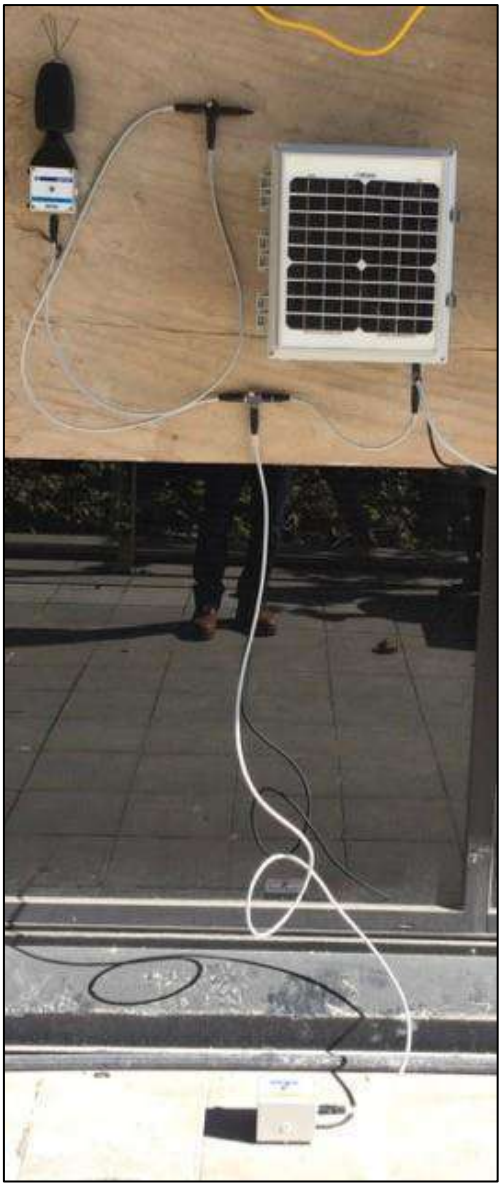

Figure 2 Typical layout of the vibration monitoring equipment.

St Leonards Centre

The following describes the methodology proposed to be used at the St Leonards Centre, 28 - 34 Clarke Street, Crows Nest. The St Leonards Centre is a six storey commercial building designed in the late Twentieth Century, Brutalist style with heavily modelled facades featuring bastion tower elements of textured off form reinforced concrete. The St Leonards Centre is Item 0141 on the heritage schedule of the North Sydney Local Environmental Plan 2013, having historical, aesthetic and rarity significance with good integrity. The Statement of Significance is:

> *28 Clarke Street is an unusual example of a six storey, late Twentieth Century commercial building built c. 1972 designed by Kerr and Smith, Architects and Planners, in the late Twentieth Century Brutalist style and is a dominant building is the local streetscape. A building whose domineering presence and intrusive character is barely balanced by its intrinsic architectural interest.*

Figure 3 The St Leonards Centre (Source: North Sydney Council).

Vibration Monitoring

The preferred location for the monitoring equipment is at the wall of the adjoining building at 22-26 Clarke Street within the screened outdoor air handling area of the St Leonards Centre. In addition:

- Fixings are not to be made through any flashings, waterproof membranes or roof sheeting.
- Care is to be taken to avoid damage during fixing and removal of the equipment and any damage is to be made good.
- Following removal of the monitoring equipment, any damage is to be made good based on the principle of like-for-like.

Figure 4 View of the boundary wall and screen to the air handling/air conditioning area on Clarke Lane (left), and view through the steel louvres to the space behind (right).

Conclusion

Installation of the vibration monitoring would have a negligible effect on the fabric of the St Leonards Centre that is mitigated by monitoring the building, in its entirety, against damage from vibration. There would not be an adverse effect on the local heritage significance of the building and as such, the work complies with the requirements of Conditions E30 and E31 of the Minister's Conditions of Approval.

Appendix D - High Impact Receivers Consultation Register

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Site	Address	Description	Stakeholders	CNVIS consultation
Crows Nest	2-4 Clarke St	Tenant	Seemee4 Productions - Sound Production	No recording room.
Crows Nest	2-4 Clarke St	Tenant	Australian Screen & Music Sound Studio	Business has closed/ relocated.
Crows Nest	6-8 Clarke St (Lvl 2)	Tenant	ISM Studios 1	Meeting/ inspection early 2017. Floating floor recording room. 35 - 40 dBA transmission loss. The company works on TV commercial music and voice overs. The sensitive receivers recording booth is well insulated with floating floor. Noise transmission loss is expected to be in the range of 35 - 40 dBA. ISM is situated on level 2, furthest in the building from the demolition works.
Crows Nest	6-8 Clarke St	Tenant	Eastway studio	Television production services business - editing facility.
Crows Nest	6-8 Clarke St	Tenant	Carolyn Andrews Psychotherapy	Meeting/ inspection early 2017. Operating hours: Appointments Monday to Friday 6.30am to 6pm.Psychotherapy - Patient consultation needs to be undertaken in a quiet environment. The consultation room is fitted with extra internal of magnetite type.
Crows Nest	6-8 Clarke St	Tenant	Filthy Look Films	Meeting mid-2017. Film and TV production company operating out of one room overlooking Clarke Lane on west side of building. Conduct a small amount of filming on site most mostly post-production activities. Office/ studio operating hours highly variable.
Crows Nest	10-12 Clarke St	Tenant	Labsonics	Meetings/ inspection early to mid-2017. Audio post production studio for TV features and series. The company has a recording booth on the 5th floor with an expected noise transmission loss of 25 - 30dBA. ADR (Post singing) done in the studio. A typical project will take 3 - 4 months to complete. The sensitive receiver is at a horizontal distance of 5 m from the closest demolition with moderate noise impact predicted. Currently in a busy period May to September/ October - recording sessions booked 9am-6pm, Monday to Friday. Previous demo at 479 Pacific Highway meant they were unable to use studio, however contractor was able to timetable around their sessions. Labsonics are looking at installing a modular booth with a floating floor within their vocal recording booth in order to mitigate potential impacts.
Crows Nest	10-12 Clarke St	Tenant	Molemap – Dermatologists	Meeting/ inspection early 2017. Potentially vibration sensitive - treatment machines.
Crows Nest	10-12 Clarke St	Tenant	Suite 501: Filmday, The Pulse and Lustre Pictures	Meeting/ inspection mid-2017. Three companies sharing space. Audio recording room located at rear on Clarke Street side of the building furthest from site. Audio recording room only used occasionally.
Crows Nest	10-12 Clarke St	Tenant	Crows Nest - Cosmetic & Vein Clinic	Phone call with Strata Manager mid-2017. Specialises in non-surgical treatment of varicose veins, cosmetic medicine and liposculpture. Located on Clarke Street side of the building furthest from site.
Crows Nest	10-12 Clarke St	Tenant	Nectar Coffee House	Doorknock mid-2017. Busy periods: 8am-10am and 12pm-2pm Previous name: Scuro Expresso-Café
Crows Nest	36 Hume St	Childcare	Kelly's Place Childcare	Meetings mid-2017. Operating hours 7.30am-6pm, Monday to Friday. Core sleep period 12pm-2pm. Meeting on 23/8/2017 with the 2 Directors to update on Hazmat removal works and upcoming demolition. No iommediate concerns but will keep in touch with Community Stakeholder Manger Heather Jackson who will keep them updated
Crows Nest	20 Clarke St	Tenant	TSD - Audio Production Studio/ Mondo Media Studio	Meetings/ inspections mid-2017. Vocal recording booth located on Level 2 on west side of the building, closest to the 20 Clarke st demolition site with expected high noise impact. Vocal recording requires complete quiet. Recording sessions typically last 5 to 6 hours and occur on most week days starting at 7.30am.The Recording booth is highly sound proofed with a floating floor. Expected noise transmission loss is in the range of 35 - 40dBA. Mondo Media share studio with TSD Audio Production working with Advertising and Audio books. Owners have decided to relocate, have signed a lease on new premises which they are curently fitting out.
Crows Nest	20 Clarke St	Tenant	Awareness Institute	Doorknocks mid-2017. Business has relocated to St Leonards.

Crows Nest	Gnd/ 20 Clarke St	Tenant	ISM Studios 2	Meeting/ inspection early to mid-2017: The company works on TV commercial music and voice overs. ISM 2 has a small recording booth on ground floor of 20 Clarke st. The sensitive receiver is expecting ground & structure borne noise to be an issue. Expected noise impact is high.
Crows Nest	Suite 101/ 22 - 26 Clarke St	Day surgery, incl 2 operating theatres	Crows Nest Day Surgery	Meeting and inspection early to mid-2017. The day surgery has two operating theatres on site that are in use all day. Some of the surgeons use microscopes during the operations. The operating theatres face the demolition site at approximately 5m distance. Expected noise and dust sensitivity is high with moderate vibration sensitivity. Meeting with Heather Jackson on 23/8/2017. Concerns raised about vibration, dust and noise during demolition works. Seeking to install vibration moniotr before works begin and meeting with owners of practice is currently being arranged.
Crows Nest	Suite 102/ 22 - 26 Clarke St	Tenant	Crows Nest Eye Surgery	Assessment and consultation is carried out on site using diagnostic laser equipment. No operations are carried out on site which is situated furthest in the building from the demolition. The equipment falls within the category of normal vibration sensitivity. Expected vibration impact is low to moderate. Heather Jackson doorknocked stakeholder on 22/8/17 to update on demolition works . Consultation are generally carried out on Wednesdays and alternate Thursdys/Fridays between 8:30-5:30pm
Crows Nest	Suite 103/ 22 - 26 Clarke St	Tenant	Dental on Clarke/ Special Needs Dentistry	Doorknock mid-2017. Located on Clarke Street side of the building. Appointments Monday to Friday and Saturdays. Phone call with Heather Jackson (HJ) on 23/8/17. Will attend meeting to be organised with day surgery. HJ to ring back on 25/8/17 to update on scheduling of demolition works and queries about access along Clarke Lane to garage entrances during demolition.
Crows Nest	28-34 Clarke St	Oxley Corporate Centre; 10-storey office building with 5 levels of basement car parking	Commercial tenants	Phone call with Managing Agent mid-2017. A number of owner occupied small businesses including dental surgeon.
Crows Nest	Oxley St/ cnr Pole Ln	Church	Northside Community Church	Sunday services: 9.30am and 6pm.
Crows Nest	545-553 Pacific Highway	16-storey residential building with retail/ commercial suites on the ground and lower ground floors	Commerical/ Residential	Noise monitor has been installed on this unit block. Monthly community update outlining demolition works during August 2017 was delivered with the September update due for delivery early September. Tenants have been notified of out-of-hours works for awning removal and hoarding installation on Pacific Highway from 27 August. Heather Jackson, Stakeholder Engagement Manager has been in discussions with strata manager for the block and offered to hold an information session for tenants. This has been refused for demolition works but will be arranged prior to TSE (tunnel and station excavation) works.
Crows Nest	34 - 36 Oxley St	Precision Apartments, a 9-storey building comprising two ground level retail units, and 77 residential units	Commerical/ Residential	Monthly community update outlining demoilition works during August 2017 was delivered. September community update due for delivery early September. Tennants have been notified of out-of-hours works for awning remoavl and hoarding installation on Pacific Highway. Tennants have been offered further consultation/ information sessions via strata manager but no uptake of these to date.
Crows Nest	420 Pacific Highway	Atrium Apartments, a 3-storey residential building containing 75 apartments, a ground floor retail showroom and a commercial suite on each of the first and second floors	Coco Republic on Gnd Floor Residential	Monthly community update outlining demoilition works during August 2017 was delivered. September community update due for delivery early September.Tennants have been offered further consultation/ information sessions via strata manager but no uptake of these to date.
Crows Nest	473-475 Pacific Highway	2-storey building, ground floor shops and residential units on top floor	Oil Paintings Plus La Tende Curtains 4 residential units	Doorknock mid-2017. Two retail shops on ground floor. La Tende Curtains operating hours 10am-5pm. Closed Tuesdays. Oil Paintings Plus operating hours 10.30am-3.30pm. Closed Sunday and Wednesday by appointment. Noise monitor due to be moved from one of residential units to oil painting plus in week beginning 28 August

Appendix E - Crows Nest Day Surgery Vibration Data

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MP_11, 22-26 Clarke st - Operating Theatre 1
Bars
png
Sensor: V12 #: 25760 Standard: (35) AS 2187.2-2006 250 mm/s 2-250Hz Master(s) serial no.: 2108
Unit: mm/s Latest calibration: 2017-07-20 Quantity: Velocity Interval time: 2 min
V, L, T
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Operating hours
16:00
2017-08-30
22:00
04:00
2017-08-31
10:00
16:00
22:00
04:00
2017-09-01
10:00
16:00
22:00
V
L
T
Selected range 2 days 7 hours 59 min | Coverage V: 81.43%, L: 81.43%, T: 81.43%
Elaborate report
MP_10, 22-26 Clarke St
Bars
png
Sensor: V12 #: 25750 Standard: (35) AS 2187.2-2006 250 mm/s 2-250Hz Master(s) serial no.: 2108
Unit: mm/s Latest calibration: 2017-07-05 Quantity: Velocity Interval time: 2 min
V, L, T
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
16:00
2017-08-30
22:00
04:00
2017-08-31
10:00
16:00
22:00
04:00
2017-09-01
10:00
16:00
22:00
V
L
T