

ENDORSEMENT CITY & SOUTHWEST ACOUSTIC ADVISOR

Review of	Construction Noise and Vibration Impact Statement Addendum: Victoria Cross South – Crane Lifting works	Document reference:	SYDNEY METRO CITY & SOUTHWEST-TSE WORKS Construction Noise and Vibration Impact Statement Addendum – VXS – Crane Lifting works
Prepared by:	Larry Clark Alternate Acoustics Advisor		<i>TH511-02 01.04.03 F06 VC South Cranage (r2)</i> <i>Dated 28 October 2020</i>
Date of issue:	30 October 2020		

As approved Alternate Acoustics Advisor for the Sydney Metro City & Southwest project, I have reviewed revision 2 of the Construction Noise and Vibration Impact Statement (CNVIS) addendum for the Victoria Cross South Crane Lifting works, as required under A27 (d) of the project approval conditions.

The CNVIS addendum is for crane lifting works as part of the demobilisation of Victoria Cross South (VXS) worksite. A 220T and a 400T crane will be setup along Berry Street (cranes will not be operating concurrently). Materials and plant/equipment will be lifted from the VXS station box to trucks parked on Berry Street and removed from site. This will include:

- minor crane lifting works (220t crane) on 1-night shift November 2020 to December 2020;
- main crane lifting works (400t crane) on up to 3 weekend periods, each weekend period from Friday night to Monday morning. The Road Occupancy Licence (ROL) will span from 8pm Friday to 5am Monday, however the crane is only scheduled to operate during night shift on Fridays, Saturdays and Sundays.

I previously commented on Revision 1 of the CNVIS Addendum. JHCPBG has confirmed that:

- Lifting operations cannot be undertaken on the Denison St platform as there is not enough space for the 220T nor 400T crane to set up and perform lifts. Additionally, the noise impact would be greater as the crane would be operating adjacent to the sensitive receiver. Lifting cannot occur from Miller St due to boom arm length.
- Ratchet straps will be used to restrain materials whilst chains will be used to restrain plant. The Sydney Metro and contractor staff will be tool boxed in the requirement to minimise metal on metal noise.

Revision 2 retains a minor transcription error in Table 2-4, of 69dBA being predicted for 50 Berry Street instead of the correct value of 73dBA. However, this does not affect the outcome of the assessment.

I am satisfied that revision 2 the CNVIS Addendum adequately addressed my comments, is technically valid, and includes appropriate noise and vibration mitigation and management measures. On this basis I endorse revision 2 of the CNVIS Addendum.



Larry Clark, City & Southwest Alternate Acoustics Advisor

28 October 2020

TH511-02 01.04.03 F06 VC South Cranage (r2)

John Holland CPB Ghella JV
Level 3, 140 Sussex Street,
Sydney, NSW, 2000

Sydney Metro Chatswood to Sydenham – TSE Works - VXS - Crane Lifting works - CNVIS Addendum

1 Introduction

1.1 Overview of works

This technical memorandum is an addendum to the report Construction Noise and Vibration Impact Statement: Victoria Cross Constructions sites¹ (*Victoria Cross CNVIS*). It has been prepared on behalf of John Holland CPB Ghella Joint Venture (JHCPBG) in accordance with the Construction Noise and Vibration Management Plan (*CNVMP*)² for the Design and Construction of the Tunnel and Station Excavation (TSE) Works of the Sydney Metro City & Southwest Project (the Project).

JHCPBG is proposing to carry out Out-Of-Hour (OOH) crane lifting works as part of the demobilisation of Victoria Cross South (VXS) worksite. The proposed construction activities will include:

Construction activity	Timeframe and duration
Minor crane lifting works (220T crane)	November 2020 to December 2020 1 night-shift
Main crane lifting works (400T crane)	November 2020 to December 2020 Up to 3 weekend periods from Friday night to Monday morning

This memorandum has been prepared to address the potential construction noise and vibration impacts from the proposed construction activities. The works have been assessed in conjunction with all concurrent activities. Construction details are summarised in Section 2.1 below.

¹ TH511-02 01.04.03 F01 VC CNVIS (r7), dated 21 September 2018

² Sydney Metro City & Southwest – TSE Works Construction Noise and Vibration Management Plan (SMCSTSE-JCG-TPW-EN-PLN-002012)

1.2 Justification for out of hours construction works

OOH crane lifting works are required to be carried out at VXS worksite as part of the demobilisation of the site. This will include materials and plant/equipment needing to be removed from site prior to completion of works.

A mobile crane will be setup along Berry Street and will lift plant/equipment and material from the station box over the hoarding to the trucks parked in a lane closure along Berry Street. The lifting works would require a Road Occupancy Licence (ROL) which would only be issued for the weekend period.

2 Construction noise assessment

2.1 Construction activities

For the crane lifting works, a 220T and a 400T cranes will be setup along Berry Street (cranes will not be operating concurrently). Materials and plant/equipment will be lifted from the VXS station box to trucks parked on Berry Street and removed from site. The work area for the crane lifting works is shown in Figure 2.1.

Figure 2.1 – Crane lifting at VXS



Table 2-1 presents the list of plant and equipment that are proposed to be used during these works and the associated sound power levels.

Table 2-1: Construction activities and associated sound power levels

Construction Work Area	Key plant and equipment	Assessment periods			Sound power level, dB(A)	
		Day	Evening	Night	L _{Aeq}	L _{A1}
Crane lifting works	220 T mobile crane	1	1	1	104	108
	400 T mobile crane	1	1	1	106	110
	Trailer trucks	8-10 per period	8-10 per period	8-10 per period	106	111

2.2 Predicted noise levels

Noise results are summarised in Table 2-2, Table 2-3, Table 2-4 and Table 2-5.

Table 2-2: Predicted construction noise levels at the closest noise sensitive receivers during standard construction hours

NCA	Address	Type of receiver	ICNG NMLs (<i>reference only</i>)	Assumed façade loss, dB(A)	External equivalent NML, PPA Condition E37	Predicted level L_{Aeq} 15 minute
					L_{Aeq} 15 minute	Crane lifting works
VC_07	79-81 BERRY STREET NORTH SYDNEY (residential level)	Residential apartment from level 5	75	20	80	52
VC_07	80 BERRY STREET NORTH SYDNEY	Residential	75	20	80	53
VC_02	211-223 PACIFIC HIGHWAY NORTH SYDNEY	Residential	65	20	80	52
OSR	50 BERRY STREET NORTH SYDNEY	Commercial	70	20	80	73
OSR	65 BERRY STREET NORTH SYDNEY	Commercial	70	20	80	69
OSR	53 BERRY STREET NORTH SYDNEY	Commercial	70	20	80	64
OSR	199 MILLER STREET NORTH SYDNEY	Bistro/Restaurant (Rag & Famish Hotel)	70	20	80	70

Table 2-3: Predicted construction noise levels at the closest noise sensitive receivers during OOH day period

NCA	Address	Type of receiver	ICNG NMLs (<i>reference only</i>)	Assumed façade loss, dB(A)	External equivalent NML, PPA Condition E37	Predicted level L_{Aeq} 15 minute
					L_{Aeq} 15 minute	Crane lifting works
VC_07	79-81 BERRY STREET NORTH SYDNEY (residential level)	Residential apartment from level 5	70	20	80	52
VC_07	80 BERRY STREET NORTH SYDNEY	Residential	70	20	80	53
VC_02	211-223 PACIFIC HIGHWAY NORTH SYDNEY	Residential	60	20	80	52
OSR	50 BERRY STREET NORTH SYDNEY	Commercial	70	20	80	73
OSR	65 BERRY STREET NORTH SYDNEY	Commercial	70	20	80	69
OSR	53 BERRY STREET NORTH SYDNEY	Commercial	70	20	80	64
OSR	199 MILLER STREET NORTH SYDNEY	Bistro/Restaurant (Rag & Famish Hotel)	70	20	80	70

Table 2-4: Predicted construction noise levels at the closest noise sensitive receivers during evening period

NCA	Address	Type of receiver	ICNG NMLs (reference only)	Assumed façade loss, dB(A)	External equivalent NML, PPA Condition E37 (6:00 pm to 8:00pm)	External equivalent NML, PPA Conditions E41/E42 ¹ (8:00 pm to 10:00pm)	Predicted level L _{Aeq} 15 minute
					L _{Aeq} 15 minute	L _{Aeq} 15 minute	Crane lifting works
VC_07	79-81 BERRY STREET NORTH SYDNEY (residential level)	Residential apartment from level 5	68	20	80	65	52
VC_07	80 BERRY STREET NORTH SYDNEY	Residential	68	20	80	65	53
VC_02	211-223 PACIFIC HIGHWAY NORTH SYDNEY	Residential	55	20	80	65	52
OSR	50 BERRY STREET NORTH SYDNEY	Commercial	70	20	80	-	69
OSR	65 BERRY STREET NORTH SYDNEY	Commercial	70	20	80	-	69
OSR	53 BERRY STREET NORTH SYDNEY	Commercial	70	20	80	-	64
OSR	199 MILLER STREET NORTH SYDNEY	Bistro/Restaurant (Rag & Famish Hotel)	70	20	80	-	70

Notes: 1) Based on the North Sydney Local Environmental Plan 2013 land zoning map LZN_002A, the closest residential receivers are in B3 (commercial), R4 (residential) and B4 (mixed used) areas. For this assessment, all residential receivers are conservatively assumed to be in residential zones, with a corresponding internal NML of L_{Aeq(15minute)} 45 dB(A) between 8pm and 7am.

Table 2-5: Predicted construction noise levels at the closest noise sensitive receivers during night-time period

NCA	Address	Type of receiver	ICNG NMLs (reference only)	Assumed façade loss, dB(A)	External equivalent NML, PPA Conditions E41/E42 ¹	Predicted level L _{Aeq} 15 minute
					L _{Aeq} 15 minute	Crane lifting works
VC_07	79-81 BERRY STREET NORTH SYDNEY (residential level)	Residential apartment from level 5	57	20	65	52
VC_07	80 BERRY STREET NORTH SYDNEY	Residential	57	20	65	53
VC_02	211-223 PACIFIC HIGHWAY NORTH SYDNEY	Residential	49	20	65	52
OSR	50 BERRY STREET NORTH SYDNEY	Commercial	70	20	-	73
OSR	65 BERRY STREET NORTH SYDNEY	Commercial	70	20	-	69
OSR	53 BERRY STREET NORTH SYDNEY	Commercial	70	20	-	64
OSR	199 MILLER STREET NORTH SYDNEY	Bistro/Restaurant (Rag & Famish Hotel)	70	20	-	70

Notes: 1) Based on the North Sydney Local Environmental Plan 2013 land zoning map LZN_002A, the closest residential receivers are in B3 (commercial), R4 (residential) and B4 (mixed used) areas. For this assessment, all residential receivers are conservatively assumed to be in residential zones, with a corresponding internal NML of L_{Aeq(15minute)} 45 dB(A) between 8pm and 7am.

The tables above indicate that noise levels are predicted to be below the external equivalent NMLs in PPA Conditions E37(day-time) and E41/E42(night-time) at all noise sensitive receivers.

Measures to minimise and manage noise impacts are outlined in Section 2.3

2.2.1 Sleep disturbance

The predicted L_{Amax} noise levels associated with these works are expected to be below the screening level for sleep disturbance. No additional mitigation or management measures are therefore required.

2.3 Noise management and mitigation measures

2.3.1 Consultation with affected receivers (PPA Condition E33 and E34)

As outlined in Section 5.4.1 of the Victoria Cross CNVIS, consistent with requirements in PPA Conditions E33 and E34, JHCPBG has commenced and will continue to consult with potentially affected stakeholders including business and residential receivers regarding specific mitigation measures applicable to the proposed construction works at the Victoria Cross site.

Noise affected receivers have been notified of the upcoming lifting works, however, no response has been received. Therefore no specific mitigation measures have been identified.

2.3.2 Noise mitigation and management measures

Based upon the assessment, as the predicted noise levels are expected to be below the external equivalent NMLs in PPA Conditions E37 and E41/E42, additional noise mitigation or management measures are not required.

Nevertheless, toolbox talks will be used to advise all personnel of the need to follow quiet work practices especially during OOH works, including avoiding excessive acceleration from a stopped position and vigorous slamming of truck doors and warning personnel of the need to respect the residential receivers surrounding the works. It is noted that crane works were undertaken along Berry Street at the beginning of November 2020 and no complaints were received from the surrounding residential receivers.

In addition, attended noise monitoring will be undertaken at the location identified in Table 2.6 to verify that noise levels from construction works are not above the levels predicted in this memorandum or the relevant NMLs.

Table 2.6: Nominated verification monitoring location

NCA	Nominated receiver address	Monitoring location at 1 m from	Predicted noise level, dB(A) L _{Aeq} 15 minute
VC_07	79-81 BERRY STREET NORTH SYDNEY	Northern facade	52 (57) ²

1. Monitoring on private property is subject to owner consent and where relevant, occupier consent. If property access is denied, monitoring will still be carried out outside property boundaries, where it is safe to do so.
2. The noise levels presented is at the nearest noise-sensitive receiver, which is the residential apartment located on level 5. The noise level in brackets (XX) is the noise level that is predicted at ground level adjacent to the building, to assist with verifying the predicted noise levels.

If verification monitoring shows that the external noise levels from the construction works are above the predicted levels or the relevant NMLs, investigation will be undertaken to understand the cause of the exceedance and relevant reasonable and feasible mitigation measures will be implemented.

All noise monitoring will follow the procedures outlined in Appendix D of the CNVMP.

3 Other assessments

3.1 Cumulative impacts

All concurrent work activities have been assessed in this report.

3.2 Construction related road traffic assessment

The proposed number of trailer trucks are specified in Table 2-1. It is noted that the maximum combined number of heavy and light vehicles will not be greater than what has been already assessed in the *Victoria Cross CNVIS*. Therefore, consistent with the conclusions of the *Victoria Cross CNVIS*, construction traffic due to the proposed works is expected to have minor noise impact on surrounding public roads.

3.3 Vibration and ground-borne noise assessment

The proposed works are not vibration intensive and so construction vibration or ground-borne noise impacts are considered to be negligible and have not been considered further in this addendum assessment.

4 Conclusion

This technical memorandum is an addendum to the report *Victoria Cross CNVIS* to review the potential noise and vibration impacts for the proposed crane lifting works at VXS worksite.

Construction noise

Based upon the assessment, as the predicted noise levels are expected to be below the external equivalent NMLs in PPA Conditions E37 and E41/E42, additional noise mitigation or management measures are not required. Nevertheless, noise monitoring will be undertaken to verify compliance with the predicted noise levels or the relevant NMLs.

Cumulative impacts

All concurrent work activities have been assessed in this report.

Vibration and ground-borne noise assessment

The proposed works are not vibration intensive and so construction vibration or ground-borne noise impacts are considered to be negligible.

Construction related road traffic assessment

Construction traffic due to the proposed works is expected to have minor noise impact on surrounding public roads.

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
19.10.2020	Final	-	0	R. Zhafranata	-	M. Tabacchi
20.10.2020	Minor edits	-	1	R. Zhafranata	-	M. Tabacchi
28.10.2020	Update following AA's comments	-	2	R. Zhafranata	-	M. Tabacchi
File Path: R:\AssocSydProjects\TH501-TH550\TH511 pk Sydney Metro City & Southwest\T2 Design\1 Docs\04 VC\03 CNVIS\TH511-02 01.04.03 F06 VC South Cranage (r2).docx						

Important Disclaimers:

The work presented in this document was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian/New Zealand Standard AS/NZS ISO 9001.

This document is issued subject to review and authorisation by the suitably qualified and experienced person named in the last column above. If no name appears, this document shall be considered as preliminary or draft only and no reliance shall be placed upon it other than for information to be verified later.

This document is prepared for the particular requirements of our Client referred to above in the 'Document details' which are based on a specific brief with limitations as agreed to with the Client. It is not intended for and should not be relied upon by a third party and no responsibility is undertaken to any third party without prior consent provided by Renzo Tonin & Associates. The information herein should not be reproduced, presented or reviewed except in full. Prior to passing on to a third party, the Client is to fully inform the third party of the specific brief and limitations associated with the commission.

In preparing this report, we have relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, we have not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

We have derived data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination and re-evaluation of the data, findings, observations and conclusions expressed in this report.

We have prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

The information contained herein is for the purpose of acoustics only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the specialist field of acoustics engineering including and not limited to structural integrity, fire rating, architectural buildability and fit-for-purpose, waterproofing and the like. Supplementary professional advice should be sought in respect of these issues.

External cladding disclaimer: No claims are made and no liability is accepted in respect of any external wall and/or roof systems (eg facade / cladding materials, insulation etc) that are: (a) not compliant with or do not conform to any relevant non-acoustic legislation, regulation, standard, instructions or Building Codes; or (b) installed, applied, specified or utilised in such a manner that is not compliant with or does not conform to any relevant non-acoustic legislation, regulation, standard, instructions or Building Codes.

APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
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.
Assessment period	The period in a day over which assessments are made.
Assessment point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of every day sounds: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 120dB Deafening
dB(A)	A-weighted decibels. The A-weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L _{Max}	The maximum sound pressure level measured over a given period.
L _{Min}	The minimum sound pressure level measured over a given period.

L ₁	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L ₁₀	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L ₉₀	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L _{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.