APPROVAL
CITY & SOUTHWEST ACOUSTICS ADVISOR

	Sydney Metro City & Southwest Line-wide Works - CNVIS Addendum Report - Northern Connection Hill Street Laydown Area		TK685-03-02F04 CNVIS_ADD C2B_P3 NC Hill St laydown (r1)
	Daniel Weston Acoustics Advisor		Prepared by Renzo Tonin & Associates Pty Ltd
	2 February 2022		25 January 2022

As approved Acoustics Advisor for the Sydney Metro City & Southwest project, and as required under A27 (d) of the project approval conditions (SSI 15-7400), I have reviewed and provided comment on the Construction Noise and Vibration Impact Statement (CNVIS) for proposed Northern Connection Hill Street Laydown Area. A portion of the proposed works are required outside of standard construction hours due to need to undertake the works under rail shutdown possession to manage worker safety.

Based on this review and subsequent discussions with the head contractor (Systems Connect), I am satisfied that the CNVIS is technically valid and includes appropriate noise and vibration mitigation and management. On this basis, I endorse the CNVIS referenced herein.

Daniel Weston, City & Southwest Acoustics Advisor

25 January 2022
TK685-03-02F04 CNVIS_ADD C2B_P3 NC Hill St laydown (r1)

Systems Connect
Level 3, 116 Miller Street
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Sydney Metro City & Southwest Line-wide Works - CNVIS Addendum Report - Northern Connection Hill Street Laydown Area

1 Introduction

1.1 Overview of works

This technical memorandum is an addendum to the report *Construction Noise and Vibration Impact Statement: Portion 3 - Northern Connection* (Northern Connection CNVIS[1]) and the *CNVIS Addendum Report – Northern Connection North MPR Works (MPR Addendum CNVIS[2])*. The addendum report has been prepared on behalf of Systems Connect in accordance with the Construction Noise and Vibration Management Plan (CNVMP) [SMCSWLWC-SYC-1NL-PM-PLN-000032] for the Design and Construction of the Line-Wide Works (LWW) of the Sydney Metro City & Southwest Project (the Project).

The MPR 60 CSR Ancillary Works and MPR 61 Segregation Fencing have triggered the need for additional space for laydown of materials and spoil. The laydown area at Hill Street, Roseville, located to the north of Boundary Street, Roseville is an existing Sydney Trains access point and has been used extensively previously by others for laydown and support during rail possession works. The works to be carried out on the site will include material deliveries and storage, plant mobilisation, loading of materials onto hi-rail, tipping of material onto a stockpile and stockpile management and loading out of possession spoil. The work areas and work details are presented in APPENDIX C. The works are anticipated to commence in March 2022 and could take up to six weekend possessions to complete.

This memorandum has been prepared to address the potential construction noise and vibration impacts from the use of the laydown area as this is outside the areas assessed in the *Northern Connection CNVIS*

[1] *Sydney Metro City & Southwest – Line Wide Works, Construction Noise and Vibration Impact Statement: Portion 3 - Northern Connection, reference: TK685-03-02F01 CNVIS C2B_P3 Northern Connection, revision 8, dated 24 February 2021*
[2] *Sydney Metro City and South West Line Wide Works - CNVIS Addendum Report - Northern Connection North MPR Works, reference: TK685-03-02F03 CNVIS_ADD C2B_P3 NC Nth MPR works, revision 3, dated 15 September 2021*

and *MPR Addendum CNVIS*. The works will be possession based and will be undertaken during standard construction hours and out of hours works.

1.2 Justification for OOH construction works

The works supported by the Hill Street Laydown Area would be completed within the rail corridor between Mowbray Road and Chatswood Station under Rail Possession. The existing rail traffic would impose major risks to rail users and construction workers due to the extreme proximity between all parties involved. Conducting works during rail shutdown possessions would minimise the risks of rail traffic and work site interaction. Works would need to be conducted 24 hours per day during the weekend rail possession periods to support the planned works to be completed within the shutdown period. The works in the laydown area have been scheduled to limit the need for works in the more sensitive evening and night period as far as practicable.

EPL Condition L4.13 allows construction activities to be undertaken outside of standard construction hours for works which must be undertaken during rail possessions.

Any work outside standard construction hours must be undertaken in accordance with the Out of Hours Works Procedure and the CNVMP.

2 Construction Noise and Vibration objectives

2.1 Noise Management Levels

Construction noise management levels have been determined using the NSW Interim Construction Noise Guideline (ICNG, DECC 2009).

Table B1 in APPENDIX B identifies the adopted construction noise management levels (NMLs) for the nearest noise sensitive receivers during standard construction hours and OOHW. The NMLs for residential receivers are based on background noise monitoring provided in the Technical Report A6(iii)[3] [1] and in Sydney Metro EIS[4]. The construction NMLs are derived from the lowest measured RBLs within each NCA and are considered conservative.

2.2 Construction vibration goals

There are no vibration significant works proposed within the Hill Street Laydown area (see Table C1 in APPENDIX C). No assessment of vibration impact is required.

[3] Richard Heggies & Associates (2001). Parramatta Rail Link, Ambient Noise Investigations, Technical Report A6(iii), dated: 7 March 2001, reference: RHA Report 10-1087-R3, revision 2

[4] Sydney Metro EIS: "SLR Consulting Australia Pty Ltd 2016 Sydney Metro Chatswood to Sydenham - Technical Paper 2: Noise and Vibration Report Number 610.14718R1 – 28 April 2016

3 Construction noise assessment

3.1 Construction activities

Key details regarding the location and layout of the noise generating plant that will operate during these works were informed by the Construction and Environmental Teams and are summarised in Table C1 in APPENDIX C. Table C1 presents the list of plant proposed to be used for these works and their assumed sound power levels.

The proposed laydown area would support works assessed in the *Northern Connection CNVIS* and the *MPR Addendum CNVIS*. Hi-rail movements between the laydown area and the Northern Connection worksite would be infrequent compared to rail traffic on the Northern Line (less than 4 x hi-rail movements per hour). Similarly, delivery trucks to and from the laydown area will be limited to typically less than 4 per hour and during the day period only. Assessment of construction related rail noise and road traffic noise is therefore not warranted.

3.2 Predicted construction noise levels

Predicted construction noise levels at the closest noise sensitive receivers are summarised in Table 3.1 and compared to the ICNG NMLs (see APPENDIX B). Detailed noise predictions are compared to ICNG NMLs and presented in APPENDIX D.

The results presented in Table 3.1 show that receivers adjacent to the rail corridor are predicted to experience noise levels above the NMLs for all assessment periods. The nearest affected receivers in NCAs CDS_03 and CDS_04 are likely to experience highly intrusive noise levels during the night-time period due to their close proximity to the works.

Table 3.1: Predicted noise levels at the closest noise sensitive receivers

NCA	Address	Type of receiver	NML	Predicted levels $L_{Aeq,15min}$, dB(A)					NML	Predicted levels $L_{Aeq,15min}$, dB(A)				
				Pre	PA1	PA2	PA3	Post		Pre	PA1	PA2	PA3	Post
			Standard construction hours (DS)						Day OOH Period (D(O))					
HS_01	19-21 PACIFIC HIGHWAY, ROSEVILLE, NSW	Residential	55	**59**	**64**	**59**	-	**61**	50	**59**	**64**	**59**	-	**61**
HS_01	25 PACIFIC HIGHWAY, ROSEVILLE, NSW	Residential	55	55	**60**	**63**	-	**57**	50	**55**	**60**	**63**	-	**57**
HS_01	43 PACIFIC HIGHWAY, ROSEVILLE, NSW	Residential	55	45	48	**59**	-	46	50	45	48	**59**	-	46
HS_02	1 HILL STREET, ROSEVILLE, NSW	Residential	69	57	60	62	-	59	64	57	60	62	-	59
HS_02	3 HILL STREET, ROSEVILLE, NSW	Residential	69	53	56	63	-	55	64	53	56	63	-	55
HS_02	3A HILL STREET, ROSEVILLE, NSW	Residential	69	50	54	58	-	52	64	50	54	58	-	52
			Evening Period (E)						Night Period (N)					
HS_01	19-21 PACIFIC HIGHWAY, ROSEVILLE, NSW	Residential	52	-	-	**59**	-	-	43	-	-	**59**	-	-
HS_01	25 PACIFIC HIGHWAY, ROSEVILLE, NSW	Residential	52	-	-	**63**	-	-	43	-	-	**63**	-	-
HS_01	43 PACIFIC HIGHWAY, ROSEVILLE, NSW	Residential	52	-	-	**59**	-	-	43	-	-	**59**	-	-
HS_02	1 HILL STREET, ROSEVILLE, NSW	Residential	60	-	-	**62**	-	-	44	-	-	**62**	-	-
HS_02	3 HILL STREET, ROSEVILLE, NSW	Residential	60	-	-	**63**	-	-	44	-	-	**63**	-	-
HS_02	3A HILL STREET, ROSEVILLE, NSW	Residential	60	-	-	58	-	-	44	-	-	**58**	-	-

Notes: D(S): standard construction hours from 7 am to 6 pm Monday to Friday and from 8 am to 1 pm Saturday

D(O): out-of-hours day period from 1pm to 6pm Saturday, 8 am to 6 pm Sunday and Public holidays - OOHW P1

E: evening period from 6 pm to 10 pm Monday to Sunday - OOHW P1

N: night-time period from 10 pm to 7 am Monday to Friday, from 10 pm am to 8 am Saturday, Sunday and Public holidays - OOHW P2

BOLD text indicates predicted noise level above the NML

The results presented in Table 3.1 show that the predicted noise levels are above the ICNG noise goals for receivers adjacent to the rail corridor.

In accordance with Planning Project Approval (PPA) Condition E32 and APPENDIX A2 of the *Sydney Metro City and Southwest Construction noise and Vibration Strategy* (SMCSNVS)[5], additional mitigation measures must be considered. Recommended mitigation measures are presented in Section 3.3.

3.3 Noise mitigation and management

3.3.1 Site noise control measures

In addition to the noise mitigation measures identified in the CNVIS (see Section 5.4.2), the following Table 3.2 presents additional noise control measures recommended to reduce and manage potential noise impacts.

Table 3.2: Site noise control measures

Control type	Control measure	Typical use
Path mitigation measures	Temporary or Mobile noise screens	Where practicable, a mobile noise screen would be used to reduce noise from moving plant items e.g. excavator. Temporary screens utilise temporary construction fencing, with acoustic blanket/ quilt (e.g. Echo-barrier, FlexShield or similar) attached to one side. Mobile noise screens utilise aluminium mobile scaffold (or similar), with acoustic blanket/ quilt attached on up to four sides (including the top, where there is no solid platform). Mobile noise screens can provide 5 to 10 dB noise reduction, where they can break line of sight.

3.3.2 Consultation with affected receivers (PPA Condition E33)

As outlined in Section 5.4.1 of the *Northern Connection CNVIS*, consistent with requirements in PPA Conditions E33, Systems Connect will continue to consult with potentially affected stakeholders including business and residential receivers regarding specific mitigation measures applicable to the construction works at the Hill Street laydown area supporting the Northern Connection works.

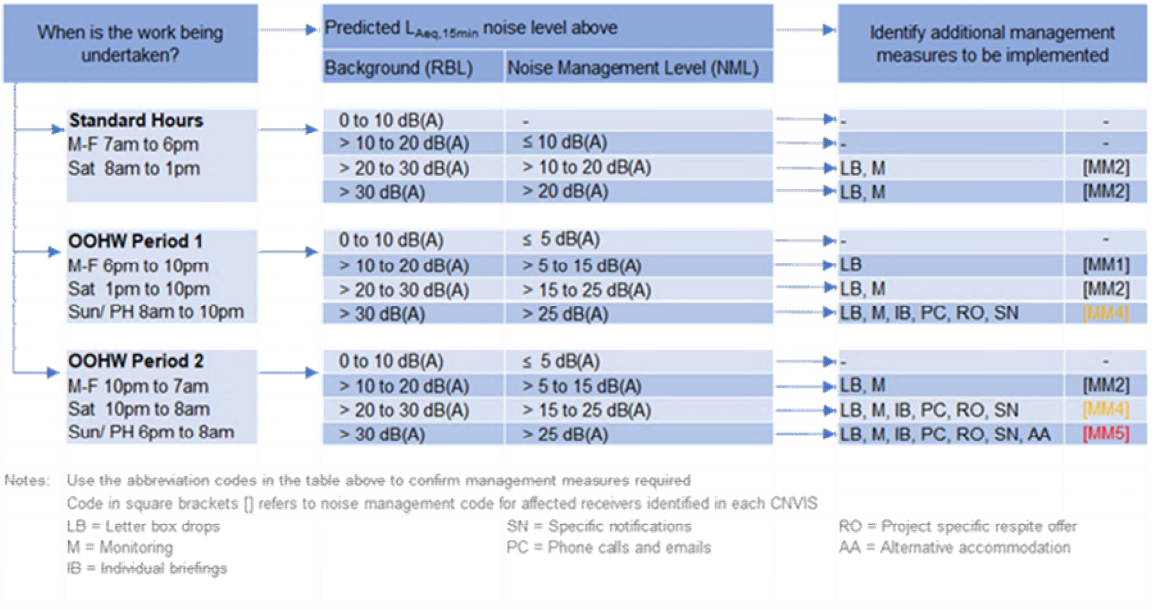
In consultation with the affected receivers, Systems Connect will provide respite offers to noise affected residences identified in this report and in response to complaints following discussion with the Systems Connect Community Team. The respite offers are made in consideration of the individual circumstances of the affected residents, the duration and the extent of impacts. Respite offers may include customised earmolds, noise cancelling headphones or meal vouchers. The respite to be offered will be tailored to circumstances noting that not all respite offers will be appropriate during the COVID 19 pandemic. Current or future COVID 19 restrictions will guide what respite offers can be provided, for example, meal vouchers may be replaced by general-use Eftpos/Mastercard vouchers during Government mandated stay at homes orders. Offers of alternative accommodation will also be considered and made in appropriate circumstances.

[5] Transport for NSW Sydney Metro City & Southwest Construction Noise Strategy (ref: 610.14213-R3) 08 August 2016

3.3.3 Additional mitigation measures

Figure 3-1 will be used to advise the appropriate additional mitigation during construction.

Figure 3-1: Additional airborne noise mitigation measures



When is the work being undertaken?	Predicted $L_{Aeq,15min}$ noise level above		Identify additional management measures to be implemented	
	Background (RBL)	Noise Management Level (NML)		
Standard Hours M-F 7am to 6pm Sat 8am to 1pm	0 to 10 dB(A)	-	-	-
	> 10 to 20 dB(A)	≤ 10 dB(A)	-	-
	> 20 to 30 dB(A)	> 10 to 20 dB(A)	LB, M	[MM2]
	> 30 dB(A)	> 20 dB(A)	LB, M	[MM2]
OOHW Period 1 M-F 6pm to 10pm Sat 1pm to 10pm Sun/ PH 8am to 10pm	0 to 10 dB(A)	≤ 5 dB(A)	-	-
	> 10 to 20 dB(A)	> 5 to 15 dB(A)	LB	[MM1]
	> 20 to 30 dB(A)	> 15 to 25 dB(A)	LB, M	[MM2]
	> 30 dB(A)	> 25 dB(A)	LB, M, IB, PC, RO, SN	[MM4]
OOHW Period 2 M-F 10pm to 7am Sat 10pm to 8am Sun/ PH 6pm to 8am	0 to 10 dB(A)	≤ 5 dB(A)	-	-
	> 10 to 20 dB(A)	> 5 to 15 dB(A)	LB, M	[MM2]
	> 20 to 30 dB(A)	> 15 to 25 dB(A)	LB, M, IB, PC, RO, SN	[MM4]
	> 30 dB(A)	> 25 dB(A)	LB, M, IB, PC, RO, SN, AA	[MM5]

Notes: Use the abbreviation codes in the table above to confirm management measures required
Code in square brackets [] refers to noise management code for affected receivers identified in each CNVIS
LB = Letter box drops
M = Monitoring
IB = Individual briefings
SN = Specific notifications
PC = Phone calls and emails
RO = Project specific respite offer
AA = Alternative accommodation

APPENDIX E presents a summary of the additional noise mitigation measures applicable for construction activities where, after application of all reasonable and feasible mitigation options, construction noise levels are still above the relevant NMLs.

Note that the additional mitigation measures MM4 and MM5 only apply to the apartments facing the laydown area.

3.3.4 Noise monitoring

Attended noise monitoring will be undertaken to verify that the construction activities are consistent with the assessed noise modelling scenarios and that noise levels resulting from construction works are not higher than the levels predicted in this CNVIS. Attended monitoring on private property is subject to obtaining the property owner/occupier's consent (where required).

Attended noise monitoring will be undertaken in the NCAs most impacted by the works. The nominated monitoring locations are identified in Table 3.3, and have been selected as they present the best opportunity to validate the predicted noise levels.

Table 3.3: Nominated verification monitoring locations

NCA	Nominated receiver address	Monitoring location at 1 m from
HS_01	25 PACIFIC HIGHWAY, ROSEVILLE, NSW	North-eastern boundary facing laydown area
HS_02	3 HILL STREET, ROSEVILLE, NSW	South-western boundary facing laydown area

NCA	Nominated receiver address	Monitoring location at 1 m from

Note: 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.

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

4 Conclusion

This technical memorandum is an addendum to the report *Northern Connection CNVIS* and the *MPR Addendum CNVIS* to review the potential noise impacts for the proposed Hill Street laydown are to be used to support the MPR 60 CSR Ancillary Works and MPR 61 Segregation Fencing works at the Northern Connection worksite. The works are anticipated to commence in March 2022 and could take up to six weekend possessions to complete.

Construction noise

The noise levels from the proposed works are predicted to be above the NMLs at the nearest noise sensitive receivers for all assessment periods. For the OOHW period, predicted noise levels are expected to be above the ICNG NMLs up to 11dB(A) in the evening and 20dB(A) during the night.

It is noted that the noise predictions in this CNVIS represent a realistic worst-case scenario when the works occur at worst-case intensity and the worst-case location throughout the assessment periods. Actual noise levels can often be less than the predicted levels presented in this CNVIS when measured over the assessment period, depending on the location of the works within the corridor relative to the receivers. Additional mitigation measures will be implemented in accordance with the CNVMP and the SMCSNVS. Noise monitoring will be undertaken to verify compliance with the predicted noise levels.

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
23.12.2021	Unchecked draft	-	0	T. Gowen	-	
25.01.2022	Report finalised for review	-	1	R. Zhafranata	T. Gowen	T. Gowen

File Path: R:\AssocSydProjects\TK651-TK700\TK685 PK SMCSW Linewide Works (CPB UGL)\1 Docs\100 CONSTRUCTION\3-02 CNVIS C2B_P3 Northern Connection\TK685-03-02F04 CNVIS_ADD C2B_P3 NC Hill St laydown (r1).docx

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.

APPENDIX B Noise management levels

Table B1: Noise Sensitive Receivers and Construction Noise Management Levels (airborne noise) **NORTHERN CONNECTION - HILL ST LAYDOWN**

NCA	Receiver Type	Applicable Worksite	Reference RBL	Existing Noise Levels, dB(A)			Airborne NMLs based on ICNG (external)				Sleep Dist. L_{Amax}		Comments
				RBL Day	RBL Evening	RBL Night	NMLDS	NMLDO	NMLE	NMLN	$L_{Aeq(15min)}$	L_{AFmax}	
Portion 2 & 3	**Chatswood to Sydenham (C2S) - ECRL section**												
HS_01	Residential buildings west of Pacific Hwy and Northern rail line. Traffic noise affected.	Rosehill Laydown	HS-01	45	47	38	55	50	50	43	43	53	
HS_02	Residential buildings east of Pacific Hwy and Northern rail line. Traffic noise affected.	Rosehill Laydown	HS-02	59	55	39	69	64	60	44	44	54	
HS_03	Residential apartments and commercial buildings surrounding Chatswood Station	Rosehill Laydown	HS-03	53	48	43	63	58	53	48	48	58	
HS_04	Retail and commercial buildings east of Chatswood Station	Rosehill Laydown	HS-04	-	-	-	-	-	-	-	-	-	See 'other sensitive receivers'
Portion 2 & 3	**Chatswood to Sydenham (C2S)**												
CDS_01	Residential buildings on Pacific Hwy and along Mowbray Road, south of Mowbray Rd. Traffic noise affected.	Chatswood Dive	RTA TH511-L02 516 Pacific Hwy, Chatswood	55	54	42	65	60	59	47	47	57	
CDS_02	Residential apartments on Pacific Highway opposite site and along Mowbray Road, north of Mowbray Rd. Traffic noise affected.	Chatswood Dive	RTA TH511-L02 516 Pacific Hwy, Chatswood	55	54	42	65	60	59	47	47	57	
CDS_03	Residential apartments north of Nelson St and west of rail line	Chatswood Dive	C2S EIS B.24	50	47	39	60	55	52	44	44	54	
CDS_04	Residential buildings north of Mowbray Rd, east of railway line (behind rail barrier)	Chatswood Dive	C2S EIS B.25	41	40	35	51	46	45	40	40	52	
CDS_05	Residential buildings south of Mowbray Rd, east of railway line (behind rail barrier)	Chatswood Dive	C2S EIS B.22	42	41	34	52	47	46	39	40	52	
CDS_06	Residential apartments south of Mowbray Rd and west of rail line	Chatswood Dive	C2S EIS B.24	50	47	39	60	55	52	44	44	54	
CDS_07	Residential buildings west of Pacific Hwy and south of Mowbray Road, shielded by CDS_01	Chatswood Dive	C2S EIS B.22	42	41	34	52	47	46	39	40	52	
CDS_08	Residential buildings west of Pacific Hwy and north of Mowbray Road, shielded by CDS_02	Chatswood Dive	C2S EIS B.25	41	40	35	51	46	45	40	40	52	
Other sensitive receivers													
Studio building (music recording studio)							45	45	45	45			Source: AS2107 'maximum', assuming a conservative façade loss of 20 dB(A)
Studio building (film or television studio)							50	50	50	50			Source: AS2107 'maximum', assuming a conservative façade loss of 20 dB(A)
Cinema space, theatre, auditorium							55	55	55	55			Source: AS2107 'maximum', assuming a conservative façade loss of 20 dB(A)
Hotel (Sleeping areas: Hotels near major roads)							60	60	60	60			Source: AS2107 'maximum', assuming a conservative façade loss of 20 dB(A)
Classrooms at schools and other educational institutions							55	55	55	55			Source: ICNG, assuming a conservative façade loss of 10 dB(A)
Chilcare centre (internal play and sleeping areas)							50	50	50	50			Source: AAAC - guideline for Child Care Centre Acoustic Assessment, assuming a conservative façade loss of 10 dB(A)
Hospital wards and operating theatres							65	65	65	65			Source: ICNG, assuming a conservative façade loss of 20 dB(A)
Places of worship							55	55	55	55			Source: ICNG, assuming a conservative façade loss of 10 dB(A)
Library (reading areas)							65	65	65	65			Source: AS2107 'maximum', assuming a conservative façade loss of 20 dB(A)
Office building (general office areas)							65	65	65	65			Source: AS2107 'maximum', assuming a conservative façade loss of 20 dB(A)
Hotel (bars and lounges)							70	70	70	70			Source: AS2107 'maximum', assuming a conservative façade loss of 20 dB(A)
Community centres – Municipal Buildings							60	60	60	60			Source: AS2107 'maximum', assuming a conservative façade loss of 10 dB(A)
Restaurant, bar (Bars and lounges/ Restaurant)							70	70	70	70			Source: AS2107 'maximum', assuming a conservative façade loss of 20 dB(A)
Railway platform and concourse areas							75	75	75	75			Source: AS2107 'maximum', assuming a conservative façade loss of 20 dB(A)
Café/ Restaurant/ Bar (outdoors)							60	60	60	60			Source: AS2107 'maximum[1,]
Passive recreation areas (e.g. area used for reading, meditation)							60	60	60	60			Source: ICNG
Active recreation areas (e.g. sports fields)							65	65	65	65			Source: ICNG
Commercial premises (including offices and retail outlets)							70	70	70	70			Source: ICNG
Industrial premises							75	75	75	75			Source: ICNG

Notes: D(S): standard construction hours from 7 am to 6 pm Monday to Friday and from 8 am to 6 pm Saturday
D(O): out-of-hours day period from 8 am to 6 pm Sunday and Public holidays - OOHW P1
E: evening period from 6 pm to 10 pm Monday to Sunday - OOHW P1
NS: night shoulder period from 10 pm to 12 am Monday to Sunday - OOHW P1
N: night-time period from 10 pm to 7 am Monday to Friday, from 10 pm am to 8 am Saturday, Sunday and Public holidays - OOHW P2
MS: morning shoulder period from 5 am to 7 am Monday to Friday, from 6 am to 8 am Saturday, Sunday and Public holidays - OOHW P1

APPENDIX C Construction timetable/ activities/ management

Table C1: Construction timetable/ activities/ equipment **NORTHERN CONNECTION - HILL ST LAYDOWN**

Activity/ Work Area	Aspect	Plant/ Equipment (as provided by client)	Day	Evening	Night	Timing of Activity	Sound Power Level (Lw re: 1pW) in Noise Model, dB(A)			High noise plant	Vibration intensive plant	Notes
			7am - 6pm	6pm - 10pm	10pm - 7am		L_{Aeq}	Penalty	L_{Amax}			
Pre-possession	Material deliveries and storage	Franna Crane 25T	1	-	-	1-3 days	98	-	102	-	-	2hr/day
1-3 days leading up to possession	Plant mobilisation	Flatbed truck	1	-	-	Mon - Fri 7am-6pm	106	-	111	-	-	1hr/day (deliveries to site)
Possession - Activity 1	Material loading onto a HiRail trailer	Excavator 13T	1	-	-	Saturday 8am-1pm	103	-	108	-	-	
		Flatbed truck	1	-	-		106	-	111	-	-	
Possession - Activity 2	Tipping off of material to a stockpile	Excavator 8T	1	1	1	Saturday morning to	101	-	114	-	-	stockpile management
		Hydrema dump truck	1	1	1	Sunday morning	109	-	119	-	-	tipping only
Possession - Activity 3	General plant access to the rail corridor	HiRail equipment access only.				Saturday morning &	-	-	-	-	-	Use of Sydney Trains dedicated rail corridor access gate and track
		No physical work.				Sunday afternoon only	-	-	-	-	-	access point for hi-rail equipment.
Post-possession	Loading out of possession spoil	Excavator 8T	1	-	-	3-5 days	101	-	114	-	-	1 truck at a time. Maximum 4 trucks/hr with up to 2hrs between trips
3-5 days following possession		Bogie	1	-	-	Mon - Fri 7am-6pm	106	-	111	-	-	of trucks.

LEGEND

Noise Sensitive Receivers
- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

- Project NCAs
- Hills Street Laydown Worksite

NCA	NML D(S)	NML D(O)	NML E	NML N
HS-01	55	50	52	43
HS-02	69	64	60	44

Noise Management Levels (NMLs) are estimated assuming open windows (i.e. 10dBA façade losss)

D(S): standard construction hours from 7 am to 6 pm Monday to Friday and from 8 am to 6 pm Saturday
D(O): out-of-hours day period from 8 am to 6 pm Sunday and Public holidays - OOHW P1
E: evening period from 6 pm to 10 pm Monday to Sunday - OOHW P1
N: night-time period from 10 pm to 7 am Monday to Friday, from 10 pm am to 8 am Saturday, Sunday and Public holidays - OOHW P2

Landuse Revision Checkdate: 14/12/21
Plot Date: 25/01/22 - 09:44 Layout: TM365 Gen Template
GIS File: R:\Assocs\Syd\Projects\TM651-TK700\TM635 PK SMCSW Lanewide Works (CPB UGL)\00 Project Database\01 GIS\TM685 A10 Northern Connection - SS.qgz

0 50 100 150 200 250 300 m

REV	BY	DATE	DESCRIPTION	APPROVER
r0	SS	25/01/22	Prepare figures	RZ

A3 Original | Co-ordinate System: MGA Zone 56

0 20 40 60 80 100 m
1:2,500
FULL SIZE A3
NOTE: Do not scale from this drawing.

CLIENT
Systems Connect

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SYDNEY METRO

Northern Connection Laydown Area: Hills Street Laydown Worksite

Land use, Work areas, NCAs

Sheet 1 of 1

APPENDIX D Detailed predicted construction noise levels

The detailed predicted levels have been provided to Systems Connect in a spreadsheet table in order to more adequately mitigate and manage potential noise impacts.

APPENDIX E Additional noise mitigation

The additional mitigation measures have been provided to Systems Connect in a spreadsheet table in order to more adequately mitigate and manage potential noise impacts.