

ENDORSEMENT CITY & SOUTHWEST ACOUSTIC ADVISOR

Review of	Construction Noise and Vibration Impact Statement Addendum Blues Point Revised Works Program	Document reference:	Sydney Metro City and South West Line Wide Works – CNVIS Addendum Report – Blues Point – Revised Works Program
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As approved Alternate Acoustics Advisor for the Sydney Metro City & Southwest project, I have reviewed and provided comment on the Construction Noise and Vibration Impact Statement (CNVIS) Addendum for Line-Wide Works Portion 3 – Blues Point – Revised Works Program, as required under A27 (d) of the project approval conditions (SSI 15-7400).

I reviewed and commented on a previous version of the CNVIS Addendum. I am satisfied that my comments have been addressed, that the CNVIS is technically valid, and includes appropriate noise and vibration mitigation and management. On this basis I endorse revision 3 of the CNVIS in respect of Line-Wide Works Revised Works Program at Blues Point.



Larry Clark, City & Southwest Alternate Acoustics Advisor

9 August 2021

TK685-03-11F02 CNVIS_ADD C2B_P3 BP RWP (r3)

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Sydney Metro City and South West Line Wide Works - CNVIS Addendum Report - Blues Point - Revised Works Program

1 Introduction

1.1 Overview of works

This technical memorandum is an addendum to the report *Construction Noise and Vibration Impact Statement: Portion 3 – Blues Point (Blues Point CNVIS¹)* and 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).

Sydney Metro have instructed Systems Connect to undertake a revised Works program (RWP) at the Blues Point Temporary Site to ensure key NSW Government program milestones are met and to reduce the duration of impacts on the surrounding community. The RWP involves the establishment of a heavy vehicle marshalling area on Blues Point Road along with the installation of fencing, gates and pedestrian access. The marshalling area will provide greater site flexibility and will expediate M&E deliveries, trackform, tunnel lining, removal of the acoustic shed, shaft backfill and site reinstatement.

In addition, the methodology for the shaft backfill has been revised. The material used for the back fill will be a cementitious product. The material will be loaded directly into the shaft via pump and/or craned down via mobile crane.

The work area is shown in APPENDIX C. Details of the type and duration of activities addressed in this addendum are also provided in Appendix C Table C1.

¹ *Sydney Metro City & Southwest – Line Wide Works, Construction Noise and Vibration Impact Statement: Portion 3 – Blues Point, reference: TK685-03-11F01 CNVIS C2S_P3 BP, revision 5, dated 4 March 2021*

This memorandum has been prepared to address the potential construction noise and vibration impacts from the RWP. The works will be undertaken during standard construction hours and out of hours works and will be completed between August 2021 and March 2022.

1.2 Justification for OOH construction works

The tunnel fit out works that are facilitated from the Blues Point Temporary Site are an essential component of the Project due to be completed and open to rail traffic in 2024. This completion date has been calculated assuming track work, tunnel systems works and fit out works within the tunnel, including ancillary surface support works, will be undertaken 24 hours a day, seven days per week.

Heavy vehicle deliveries to the Site are permitted between 6pm and 10pm, Ancillary surface support works are permitted at the site 24/7 (as noted above and as set out in CSSI 7400 and EPL 21423).

Due to time and space constraints it will not be possible to lift all materials into the tunnels during standard hours, to allow track works to continue 24 hours per day. The process will need to continue during the evening period (6pm to 10 pm) and for contingency between 10pm and 12am.

OOHW activity on the surface (inside the remainder of the acoustic enclosure) and in the tunnels, particularly after 10pm will be managed to minimise impacts on surrounding sensitive receivers. Activities will be completed within the acoustic enclosure or underground, within the tunnels during the night period (10 pm to 7am) to reduce potential noise impact and manage noise from site to within the NMLs (except for the vehicles entering and leaving the site).

Allowing track works and tunnel fit out works to occur as OOHW will:

- Ensure key NSW Government program milestones are met.
- Ensure delivery of community and rail commuter user benefits.
- Allow increased project efficiency.
- Reduce the overall duration of the construction phase and in turn reduce the duration of impacts on the surrounding community.

For the community, completion of construction works will allow restoration of amenity and, in many respects, an increase in the quality of this amenity.

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

2 Construction noise assessment

2.1 Detailed design outcomes

During the site design process, Renzo Tonin & Associates played a key role in assisting Systems Connect to determine the noise mitigation measures required to reduce the site's noise impact, incorporating existing mitigation measures from previous stages of the project. The key noise mitigation measures that have been included in the noise modelling results presented in this addendum are the following:

- Acoustic enclosure (new, smaller enclosure in the same location as previous shed) for deliveries;
- 2.8 metre high noise barriers around the site (including on top of the western and eastern capping beams;
- The installation of noise screens (e.g. Flexshield, Echo-barrier) on the northern side of the new perimeter fencing surrounding the proposed marshalling area.

2.2 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.

There are no concurrent construction activities anticipated for Blues Point.

2.3 Predicted construction noise levels

2.3.1 ICNG assessment

Predicted construction noise levels at the closest noise sensitive receivers for daytime, evening and night-time are respectively summarised in Table 2.1, Table 2.2 and Table 2.3 and compared to the ICNG NMLs (see APPENDIX B). Detailed noise predictions are presented in APPENDIX D.

Table 2.1: Predicted noise levels at the closest noise sensitive receivers during daytime (ICNG assessment)

NCA	Address	Type of receiver	Predicted levels $L_{Aeq,15min}$, dB(A)										ICNG NML $L_{Aeq,15min}$, dB(A)		
			BS-H	CC-H	LR-H	SE	DE	RT	TL	RS	BS-T	CC-T	LR-T	D(S)	D(O)
BP_01	14-28 BLUES POINT ROAD MCMAHONS POINT	Residential	66	77	66	67	61	62	61	66	65	60	63	61	56
BP_01	40 BLUES POINT ROAD MCMAHONS POINT	Residential	66	77	68	66	58	58	57	66	65	57	64	61	56
BP_02	1 WARUNG STREET MCMAHONS POINT	Residential	74	81	73	63	53	54	54	73	71	62	69	61	56
BP_02	3 WARUNG STREET MCMAHONS POINT	Residential	70	75	69	45	42	48	50	69	68	58	65	61	56
BP_02	5 WARUNG STREET MCMAHONS POINT	Residential	65	71	65	51	46	49	49	65	63	55	61	61	56
BP_02	3A WARUNG STREET MCMAHONS POINT	Residential	70	76	69	48	44	49	51	69	68	59	66	61	56
BP_02	1A HENRY LAWSON AVENUE MCMAHONS POINT	Residential	61	72	66	55	52	55	55	63	60	57	62	61	56
OSR	BARANGAROO RESERVE	Recreation	72	79	71	67	61	61	60	71	69	60	67	60	60

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 1 pm to 6 pm Saturday and 8 am to 6 pm Sunday and Public holidays - OOHW P1
H: includes construction with high noise impact plant (e.g. rockhammers and rollers)
T: includes construction without high noise impact plant

Table 2.2: Predicted noise levels at the closest noise sensitive receivers during Evening (ICNG assessment)

NCA	Address	Type of receiver	Predicted levels $L_{Aeq,15min}$, dB(A)										ICNG NML $L_{Aeq,15min}$, dB(A)	
			BS-H	CC-H	LR-H	SE	DE	RT	TL	RS	BS-T	CC-T	LR-T	E
BP_01	14-28 BLUES POINT ROAD MCMAHONS POINT	Residential	-	-	-	62	61	61	60	-	62	-	-	54
BP_01	40 BLUES POINT ROAD MCMAHONS POINT	Residential	-	-	-	59	58	58	57	-	63	-	-	54
BP_02	1 WARUNG STREET MCMAHONS POINT	Residential	-	-	-	55	53	54	53	-	70	-	-	54
BP_02	3 WARUNG STREET MCMAHONS POINT	Residential	-	-	-	40	42	48	50	-	66	-	-	54
BP_02	5 WARUNG STREET MCMAHONS POINT	Residential	-	-	-	50	46	49	49	-	61	-	-	54
BP_02	3A WARUNG STREET MCMAHONS POINT	Residential	-	-	-	45	44	49	51	-	66	-	-	54
BP_02	1A HENRY LAWSON AVENUE MCMAHONS POINT	Residential	-	-	-	55	52	55	55	-	56	-	-	54
OSR	BARANGAROO RESERVE	Recreation	-	-	-	63	61	61	60	-	68	-	-	60

Notes: E: evening period from 6 pm to 10 pm Monday to Sunday - OOHW P1
H: includes construction with high noise impact plant (e.g. rockhammers and rollers)
T: includes construction without high noise impact plant

Table 2.3: Predicted noise levels at the closest noise sensitive receivers during Night (ICNG assessment)

NCA	Address	Type of receiver	Predicted levels $L_{Aeq,15min}$, dB(A)											ICNG NML $L_{Aeq,15min}$, dB(A)	
			BS-H	CC-H	LR-H	SE	DE	RT	TL	RS	BS-T	CC-T	LR-T	N	
BP_01	14-28 BLUES POINT ROAD MCMAHONS POINT	Residential	-	-	-	-	59	-	-	-	-	-	-	45	
BP_01	40 BLUES POINT ROAD MCMAHONS POINT	Residential	-	-	-	-	54	-	-	-	-	-	-	45	
BP_02	1 WARUNG STREET MCMAHONS POINT	Residential	-	-	-	-	50	-	36	-	-	-	-	45	
BP_02	3 WARUNG STREET MCMAHONS POINT	Residential	-	-	-	-	41	-	34	-	-	-	-	45	
BP_02	5 WARUNG STREET MCMAHONS POINT	Residential	-	-	-	-	45	-	-	-	-	-	-	45	
BP_02	3A WARUNG STREET MCMAHONS POINT	Residential	-	-	-	-	44	-	34	-	-	-	-	45	
BP_02	1A HENRY LAWSON AVENUE MCMAHONS POINT	Residential	-	-	-	-	51	-	42	-	-	-	-	45	
OSR	BARANGAROO RESERVE	Recreation	-	-	-	-	58	-	35	-	-	-	-	60	

Notes: 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
H: includes construction with high noise impact plant (e.g. rockhammers and rollers)
T: includes construction without high noise impact plant

The results presented in Table 2.1 show that some receivers adjacent to the site are predicted to experience noise levels above the NMLs for the majority of the construction scenarios, in particular scenario CC-H. Some receivers in BP_01 and BP_02 are likely to experience highly intrusive noise levels during the daytime. Predicted noise levels are mostly consistent with the predicted noise levels in the CNVIS. There is likely to be an increase in noise levels to the nearest receivers in NCA BP01 as the heavy vehicle marshalling area on Blues Point Road is closer to these receivers.

The results presented in Table 2.2 show that some receivers adjacent to the site are predicted to experience noise levels above the evening NMLs for some of the construction scenarios, in particular for scenario BS-T (backfill of shaft). Predicted noise levels are less than 10dB above the NMLs at all receivers, except at 1, 3 and 3A Warung Street during BS-T works.

The results presented in Table 2.3 show that some receivers adjacent to the site are predicted to experience noise levels above the NMLs for DE works. Noise levels are predicted to be more than 5dB above the NMLs at three receivers. At no receivers are noise levels predicted to be more than 15dB above the NML.

It is noted that the noise predictions in this CNVIS Addendum represent a realistic worst-case scenario when all equipment within each scenario is being operating simultaneously and continuously for the assessment period. Actual noise levels can often be less than the predicted levels presented in this CNVIS when measured over the assessment period.

2.3.2 PPA Conditions E37/38 and E41/42 assessment

Predicted construction noise levels at the closest residential receivers are summarised in Table 2.4 and compared to the PPA Conditions E37/38. In addition, construction noise levels for the E2 period and night-time, are summarised respectively in Table 2.5 and Table 2.6 and compared to the PPA Conditions E41/E42. Detailed noise predictions are presented in APPENDIX D.

Table 2.4: Predicted noise levels at the closest noise sensitive receivers from 7am to 8pm (PPA Conditions E37/38)

NCA	Address	Type of receiver	Predicted levels $L_{Aeq,15min}$, dB(A)											External equivalent NML, Condition E37/38 (7am – 8pm) $L_{Aeq,15min}$, dB(A)
			BS-H	CC-H	LR-H	SE	DE	RT	TL	RS	BS-T	CC-T	LR-T	
BP_01	14-28 BLUES POINT ROAD MCMAHONS POINT	Residential	66	77	66	67	61	62	61	66	65	60	63	70
BP_01	40 BLUES POINT ROAD MCMAHONS POINT	Residential	66	77	68	66	58	58	57	66	65	57	64	70
BP_02	1 WARUNG STREET MCMAHONS POINT	Residential	74	81	73	63	53	54	54	73	71	62	69	70
BP_02	3 WARUNG STREET MCMAHONS POINT	Residential	70	75	69	45	42	48	50	69	68	58	65	70
BP_02	5 WARUNG STREET MCMAHONS POINT	Residential	65	71	65	51	46	49	49	65	63	55	61	70
BP_02	3A WARUNG STREET MCMAHONS POINT	Residential	70	76	69	48	44	49	51	69	68	59	66	70
BP_02	1A HENRY LAWSON AVENUE MCMAHONS POINT	Residential	61	72	66	55	52	55	55	63	60	57	62	70

Notes: H: includes construction with high noise impact plant (e.g. rockhammers and rollers)
T: includes construction without high noise impact plant
Bold indicates predicted noise level above external equivalent NML

Table 2.5: Predicted noise levels at the closest noise sensitive receivers during E2 (PPA Conditions E42)

NCA	Address	Type of receiver	Predicted levels $L_{Aeq,15min}$, dB(A)											External equivalent NML, Condition E42 (E2) $L_{Aeq,15min}$, dB(A)
			BS-H	CC-H	LR-H	SE	DE	RT	TL	RS	BS-T	CC-T	LR-T	
BP_01	14-28 BLUES POINT ROAD MCMAHONS POINT	Residential	-	-	-	62	61	61	60	-	62	-	-	55
BP_01	40 BLUES POINT ROAD MCMAHONS POINT	Residential	-	-	-	59	58	58	57	-	63	-	-	55
BP_02	1 WARUNG STREET MCMAHONS POINT	Residential	-	-	-	55	53	54	53	-	70	-	-	55
BP_02	3 WARUNG STREET MCMAHONS POINT	Residential	-	-	-	40	42	48	50	-	66	-	-	55
BP_02	5 WARUNG STREET MCMAHONS POINT	Residential	-	-	-	50	46	49	49	-	61	-	-	55
BP_02	3A WARUNG STREET MCMAHONS POINT	Residential	-	-	-	45	44	49	51	-	66	-	-	55
BP_02	1A HENRY LAWSON AVENUE MCMAHONS POINT	Residential	-	-	-	55	52	55	55	-	56	-	-	55

Notes: E2: Late evening period from 8pm to 10pm
H: includes construction with high noise impact plant (e.g. rockhammers and rollers)
T: includes construction without high noise impact plant
Bold indicates predicted noise level above external equivalent NML

Table 2.6: Predicted noise levels at the closest noise sensitive receivers during Night (PPA Conditions E42)

NCA	Address	Type of receiver	Predicted levels $L_{Aeq,15min}$, dB(A)											External equivalent NML, Condition E42 (N) $L_{Aeq,15min}$, dB(A)
			BS-H	CC-H	LR-H	SE	DE	RT	TL	RS	BS-T	CC-T	LR-T	
BP_01	14-28 BLUES POINT ROAD MCMAHONS POINT	Residential	-	-	-	-	59	-	-	-	-	-	-	55
BP_01	40 BLUES POINT ROAD MCMAHONS POINT	Residential	-	-	-	-	54	-	-	-	-	-	-	55
BP_02	1 WARUNG STREET MCMAHONS POINT	Residential	-	-	-	-	50	-	36	-	-	-	-	55
BP_02	3 WARUNG STREET MCMAHONS POINT	Residential	-	-	-	-	41	-	34	-	-	-	-	55
BP_02	5 WARUNG STREET MCMAHONS POINT	Residential	-	-	-	-	45	-	-	-	-	-	-	55
BP_02	3A WARUNG STREET MCMAHONS POINT	Residential	-	-	-	-	44	-	34	-	-	-	-	55
BP_02	1A HENRY LAWSON AVENUE MCMAHONS POINT	Residential	-	-	-	-	51	-	42	-	-	-	-	55

Notes:

N: Night-time period from 8pm to 10pm

H: includes construction with high noise impact plant (e.g. rockhammers and rollers)

T: includes construction without high noise impact plant

Bold indicates predicted noise level above external equivalent NML

The results presented in Table 2.4 show that receivers adjacent to the site are predicted to experience noise levels above the E37/38 requirement for some of the scenarios, in particular for scenario CC-H.

The results presented in Table 2.5 show that receivers adjacent to the site within BP-01 are predicted to experience noise levels above the E41/42 requirement for some of the scenarios during the evening period (up to 10pm), in particular for scenario BS-T (backfill of shaft). To reduce impact to as low as reasonably practicable the feasibility of installing a temporary acoustic enclosure (mobile tent or partial enclosure) is being investigated. Installation of a temporary enclosure would assist in reducing noise levels from the backfill activity (mostly concrete pours) towards the E41/42 NML.

The results presented in Table 2.6 show that only one receiver, 14-28 Blues Point Road within BP-01, is predicted to experience noise levels above the E41/42 requirement for scenario DE. Works will be limited as far as practicable during this time period, to reduce the potential for noise impact.

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)², additional mitigation measures must be considered. Recommended mitigation measures are presented in Section 2.4.

2.3.3 Sleep disturbance

For contingency, some activities on site may occur between 10pm and 12am. These activities would be limited to cranes, forklift activities, and some light vehicle movements. All heavy vehicle movements will cease prior to 10pm.

Metal-on-metal bangs from the transfer of equipment between the Blues Point marshalling area and laydown areas into the shaft may cause L_{max} noise levels greater than the sleep disturbance NML of 65 dB(A) L_{A1} (1 minute). Any transfer of equipment is expected to be infrequent and will only occur up to midnight.

These activities will be managed by limiting deliveries during the late evening period 8pm to 10pm so that the transfer of equipment and potentially rail, can occur prior to 10pm.

The potential of loose items or plant/equipment that could generate metal-on-metal bangs will be identified and managed accordingly. For M&E transfers, where practical the use of slings rather than chains will be utilised. If rail transfer is required, the utilisation of a special lifting attachment 'clamp' (which rigidly holds 7 rails at a time) will be adopted to minimise the duration of the transfer and limit the extent of bangs and clangs (the clamp does not contain lifting chains that come in contact with each other or the rails).

In addition, toolbox talks will be used to advise all personnel of the need to follow quiet work practices during OOHW periods and of the need to respect the residential receivers surrounding the work site.

² Transport for NSW Sydney Metro City & Southwest Construction Noise Strategy (ref: 610.14213-R3) 08 August 2016

Other management measures are outlined in Section 5.3 of the *Blues Point CNVIS* to aid in providing additional noise reduction benefits where noise is above the criterion.

2.4 Noise mitigation and management

2.4.1 Site noise control measures

In addition to the noise mitigation measures identified in the CNVIS (see Section 5.3.2), the following Table 2.7 presents additional noise control measures recommended to reduce and manage potential noise impacts. Table C1 in APPENDIX C notes specific management measures for the key construction stages to reduce noise impacts.

Table 2.7: Site noise control measures

Control type	Control measure	Typical use
At source control measure	Use of electric gantry crane instead of mobile crane	The use of an electric gantry crane inside the remainder of the acoustic shed would reduce noise levels from the works, in particular during the out of hours period. The reinstatement of the gantry crane was reviewed, and is not a feasible option. due to time required for procurement and installation of a new gantry crane exceeding time available before the acoustic enclosure , which house the crane is to be removed.
	Use of slings rather than chains	For transfer of materials from the heavy vehicle transfer area to the acoustic shed and shaft. Slings would limit the extent of clangs and bangs compared to chains.
Path mitigation measures	Retain existing acoustic shed	The remainder of existing acoustic shed will be retained for as long as practicable, to reduce noise from out-of-hours activities to the nearest receivers. The programming of the removal of the shed is critical to the completion of the works within the Project timing commitments.
	Temporary noise screens/ acoustic tent	Where the acoustic shed cannot be retained and where practicable, temporary noise screens and or enclosures (e.g. Flexshield, Echo-barrier, or similar) should be used to provide additional noise reduction (during shaft backfill works). For this site the nearest receivers to the north are at higher elevation than the site, so a three sided structure with roof would be optimal to reduce noise (primarily from concrete pumping) to the nearest receivers. Temporary noise screens can provide 5 to 10 dB noise reduction, where they can break line of site.

2.4.2 Consultation with affected receivers (PPA Condition E33)

As outlined in Section 5.4.1 of the *Blues Point 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 Blues Point Temporary Site.

Systems Connect will provide respite offers to noise affected residences identified in this report. The nature and level of respite offered will be based on the outcomes of noise modelling and associated predicted noise levels. Systems Connect Stakeholder and Communications Team will consult with

affected receivers and may customise respite offers. Respite may also be offered in response to complaints, following discussion with the Systems Connect Stakeholder and Communications Team. The respite offers will be made in consideration of the individual circumstances of the affected residents, the duration and the extent of impacts. Respite offers may include: customised earmoulds, noise cancelling headphones, movie tickets, coffee vouchers, meal vouchers or offers for family entertainment venues. The respite to be offered will be determined on a case-by-case basis. However, it is noted that respite offered will need to be appropriate. For example, during the COVID 19 pandemic respite offered at Blues Point may also include supermarket vouchers, in lieu of movie/restaurant vouchers. This is consistent with the approach Systems Connect has adopted in other areas along the alignment. Current or future COVID-19 and other restrictions will guide what respite offers can be provided.

2.4.3 Additional mitigation measures

Table 2.8 below will be used to advise the appropriate additional mitigation during construction.

Table 2.8: 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.

2.4.4 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 2.9, and have been selected as they present the best opportunity to validate the predicted noise levels.

Table 2.9: Nominated verification monitoring locations

NCA	Nominated receiver address	Monitoring location at 1 m from
BP_01	14-28 BLUES POINT ROAD MCMAHONS POINT	Eastern façade
BP_02	1A HENRY LAWSON AVENUE MCMAHONS POINT	Western façade
	1 WARUNG STREET MCMAHONS POINT	Southern façade

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.

3 Construction vibration impacts

3.1 Minimum working distances for vibration intensive plant

From the plant and equipment listed in APPENDIX C, the dominant vibration generating plant and equipment include:

- Roller (8t)
- Excavator w/rock hammer (36t)

A vibration assessment for an equivalent roller was addressed in the *Blues Point CNVIS*. For this addendum, an assessment of the excavator w/rock hammer is required. The recommended minimum working distances for vibration intensive plant are presented in Table 3.1 and Table 3.2. Site specific minimum working distances for vibration intensive plant items must be measured on site where plant and equipment are likely to operate close to or within the minimum working distances for cosmetic damage (Table 3.1).

Table 3.1: Minimum working distances (m) for cosmetic damage (continuous vibration)

Plant item	Minimum working distance (m) ³		
	Reinforced or framed structures (e.g. commercial buildings) ¹	Unreinforced or light framed structures (e.g. residential buildings) ¹	Sensitive structures (e.g. heritage structures) ²
Excavator with rock hammer (36t)	5	10	15

Notes 1) Initial screening test criteria reduced by 50% due to potential dynamic magnification in accordance with BS7385.

2) In accordance with Section 5.8.1 of CNVMP, a site inspection should determine whether a heritage structure is structurally unsound.

3) Minimum working distances are in 5m increments only to account for the intrinsic uncertainty of this screening method.

Table 3.2: Minimum working distances (m) for human annoyance (continuous vibration)

Plant item	Minimum working distances, m				
	Critical areas ^{1,4}	Residences		Offices ^{3,4}	Workshops ⁴
		Day ²	Night ²		
Excavator with rock hammer (36t)	30	25	-	20	10

Notes 1: Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring.
 2: Daytime is 7 am to 10 pm; Night-time is 10 pm to 7am.
 3: Examples include offices, schools, educational institutions and place of worship.
 4: Applicable when in use.

3.2 Vibration assessment

3.2.1 Structural damage

The numbers of buildings which are close to or within the minimum working distances for cosmetic damage are shown in Table 3.3.

Table 3.3: Number of buildings within minimum working distances for cosmetic damage

Works	Plant item	Number of buildings	
		Screening criteria for non-heritage structures	Screening criteria for heritage structures
Acoustic shed capping beam and slab	Excavator with rock hammer (36t)	0	0

The excavators (36t) with rock hammer will be used to remove the acoustic shed capping beam and slab.

There are no buildings within the minimum working distances established for cosmetic damage during use of the equipment.

3.2.2 Human annoyance

Properties where vibration levels may be above the vibration disturbance goals in Table 4.2 of the *Blues Point CNVIS* and there is a probability of adverse comment are shown in Table 3.4.

Table 3.4: Number of buildings within minimum working distances for human annoyance

Works	Plant item	Critical areas ^{1,4}	Residences ⁵		Offices ^{3,4}	Workshops ⁴
			Day ²	Night ²		
Acoustic shed capping beam and slab	Excavator with rock hammer (36t)	0	2	-	0	0

Works	Plant item	Critical areas ^{1,4}	Residences ⁵		Offices ^{3,4}	Workshops ⁴
			Day ²	Night ²		

Notes:

1. Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring.
2. Daytime is 7 am to 10 pm; Night-time is 10 pm to 7am.
3. Examples include offices, schools, educational institutions and place of worship.
4. Applicable when in use.
5. Hotels and childcare centres are included in the residence category.

During hammering there are 2 residential receivers that are within the minimum working distances for human annoyance. Properties are shown in APPENDIX F.

Rock hammers will not be used during evening and night. The above assessment is based on vibration-generating equipment operating at the closest location to a receiver. When vibration-generating equipment operates further from the closest point, vibration levels will reduce along with the probability of adverse comment. The above plant will be operating both within and outside the MWD for human annoyance during the activity, which is expected to take approximately 4 weeks to complete. The risk of annoyance is considered low. It is therefore recommended that attended vibration measurement is carried out in the event of complaint from the nearest receiver to confirm that vibration is within the acceptable range for human annoyance.

Attended vibration measurements are proposed to be carried out proactively and in response to vibration complaints. If measurement results indicate exceedances of the vibration objectives for human annoyance at these locations, vibration control and management measures will be provided to reduce vibration impact (see Section 6.3.1 of the *Blues Point CNVIS*).

After applying all feasible and reasonable vibration mitigation measures, if vibration monitoring still identifies that measured vibration levels are above the relevant vibration criteria for human annoyance, appropriate additional mitigation measures will be considered (see Section 6.3.2 of the *Blues Point CNVIS*).

3.3 Other assessments

Ground-borne noise, Construction related traffic and Cumulative impacts were respectively assessed in Sections 7, 8 and 9 of the *Blues Point CNVIS*.

For this assessment, the findings within the *Blues Point CNVIS* for Ground-borne noise, Construction related traffic and Cumulative impacts is unchanged (i.e. no adverse impacts). The number of heavy vehicle movements modelled in this addendum do not exceed the predicted heavy vehicle movements detailed in section 8 of the *Blues Point CNVIS*.

4 Conclusion

This technical memorandum is an addendum to the report *Blues Point CNVIS* to review the potential noise and vibration impacts for the proposed revised Works program at the Blues Point worksite. The works will be completed between August 2021 and March 2022.

Construction noise

The noise levels from 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 8dB(A) in the evening and 14dB(A) during the night, and above the internal noise level of CoA E41 by up to 7dB(A) in the E2 period and 4dB(A) during the night.

It is noted that the noise predictions in this CNVIS represent a realistic worst-case scenario when all equipment within each scenario is being operating simultaneously and continuously for the assessment period. Actual noise levels can often be less than the predicted levels presented in this CNVIS when measured over the assessment period. 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.

Construction vibration

A vibration assessment for work involving the removal of the capping beam and acoustic shed slab has found that there are no buildings within the minimum working distances established for cosmetic damage during use of the equipment. For human annoyance, it has been identified that there are some residential receivers that are within the minimum working distances.

The vibration management measures, outlined in Section 6.3 of the *Blues Point CNVIS* will be provided to reduce vibration impacts.

Ground-borne noise, Construction traffic and Cumulative impacts

For this assessment, the findings within the *Blues Point CNVIS* for Ground-borne noise, Construction related traffic and Cumulative impacts is unchanged (i.e. no adverse impacts).

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
30.07.2021	Initial issue	0	1	B. Carlyle	T. Gowen	T. Gowen
03.08.2021	Update following comments from Systems Connect	-	2	B. Carlyle	-	T. Gowen
09.08.2021	Update following comments from AA	-	3	B. Carlyle	-	T. Gowen
File Path: R:\AssocSydProjects\TK651-TK700\TK685 PK SMCSW Linewide Works (CPB UGL)\1 Docs\100 CONSTRUCTION\3-11 CNVIS C2S_P3 BP\TK685-03-11F02 CNVIS_ADD C2B_P3 BP RWP (r3).docx						

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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.

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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.

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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]	<p>The units that sound is measured in. The following are examples of the decibel readings of every day sounds:</p> <p>0dB The faintest sound we can hear</p> <p>30dB A quiet library or in a quiet location in the country</p> <p>45dB Typical office space. Ambience in the city at night</p> <p>60dB CBD mall at lunch time</p> <p>70dB The sound of a car passing on the street</p> <p>80dB Loud music played at home</p> <p>90dB The sound of a truck passing on the street</p> <p>100dB The sound of a rock band</p> <p>115dB Limit of sound permitted in industry</p> <p>120dB Deafening</p>
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 L _{eq} 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

Blues Point

NCA	Nearest construction work area	Receiver Type	Reference RBL	Existing Noise Levels, dB(A)			Residential NMLs based on ICNG (external)				Sleep Dist. L_{Amax}		Comments
				RBL Day	RBL Evening	RBL Night	NMLDS	NMLDO	NMLE	NMLN	Screening ¹	Max ¹	
Portion 2 & 3	Chatswood to Sydenham (C2S)												
BP_01	Blues Point	Residential apartments east of Blues Point Rd	C2S EIS B.16	51	49	40	61	56	54	45	55	65	
BP_02	Blues Point	Residential apartments west of Blues Point Rd	C2S EIS B.14	51	49	40	61	56	54	45	55	65	
BN_02	Barangaroo Station	Residential buildings north of Argyle St and Bettington St	C2S EIS B.12	50	45	40	60	55	50	45	55	65	
BN_04	Barangaroo Station	Mixed residential and commercial west of Harbour Bridge	C2S EIS B.13	62	62	52	72	67	67	57	67	65	
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 ‘maximum1’		
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:

1 - Levels are estimated assuming an open windows (i.e. 10dBA façade loss)

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 1 pm to 6 pm Saturday and 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

Blues Point

Work activity/ Work Area	Aspect	Indicative timing/ duration	Modelling ID	Plant/ Equipment (as provided by client)	Day	Evening	Night	Sound Power Level (Lw re: 1pW) in Noise Model, dB(A)			High noise plant (EPL E1)	Vibration intensive plant	Notes
					7am - 6pm	6pm - 10pm	10pm - 7am	L _{Aeq}	Penalty	L _{Amax}			
Revised Works Program Existing worksite plus HV Marshalling Area on Blues Point Road (surface works)	Site establishment Installation of fencing, gates and pedestrian access Establish laydown areas on Blues Point Road marshalling	August 2021 (from 15/8)	SE	Mobile crane (Franna)	1			99	-	103	-	-	
				Hand Tools	1			107	-	111	-	-	
				EWP	1			95	-	98	-	-	Evening works contingency only
				Truck Awaiting Offload (Idling)	2	2		99	-	111	-	-	
				Forklift 8T	2	2		99	-	103	-	-	
				Truck deliveries	8 per hour			106	-	111	-	-	Max 10 on occasion
	M&E Deliveries and unloading	December 2021 to March 2022	DE	Mobile Crane 130T	1	1	1	104	-	108	-	-	Night time works include movement of materials down shaft
				Truck deliveries	8-10 per hour	8-10 per hour		106	-	111	-	-	Material and concrete delivery.Total daytime truck movements 4-6 per hour.
				ForkLift 8T	1	1	1	99	-	103	-	-	
				Light Vehicles	1	1	1	89	-	100	-	-	
				Hoist/Alimac	1	1		96	-	101	-	-	
	Remaining Trackform	August 2021 (completion by 15/08)	RT	Truck deliveries	8-10 per hour	2-4 per hour		106	-	111	-	-	Material and concrete delivery.Total daytime truck movements 4-6 per hour.
				Concrete Truck	1	1		108	-	111	-	-	
				Concrete Pump	1	1		103	-	107	-	-	42m Boom. Evening works including end of pour overrun from 6pm
				Mobile Crane 130T	1	1		104	-	108	-	-	
				ForkLift 8T	1	1		99	-	103	-	-	
				Light Vehicles	1	1	1	89	-	100	-	-	
				Hoist/Alimac	1	1		96	-	101	-	-	
	Tunnel Lining - FRP	October 2021 to December 2021	TL	Mobile Crane 130T	1	1		104	-	108	-	-	Night time works include movement of materials down shaft
				Truck deliveries	8-10 per hour	2-4 per hour		106	-	111	-	-	Material and concrete delivery.Total daytime truck movements 4-6 per hour.
				Hand Tools - H/S Drill, Impact Sockets etc	1	1		107	-	118	-	-	
				Concrete Truck	1	1		108	-	111	-	-	
				Concrete Pump	1	1		103	-	107	-	-	42m Boom. 4 Days Pumping - Extended hours due to size and pour rate restriction.
				ForkLift 8T	1	1		99	-	103	-	-	
				Hoist/Alimac	1	1	1	96	-	101	-	-	
	Removal of Acoustic Shed	November 2021 to December 2021	RS	Mobile Crane 200T	1			106	-	110	-	-	Not Operating during OH demolition Works
				Truck deliveries	8-10 per hour			106	-	111	-	-	Material and concrete delivery.Total daytime truck movements 8-10 per hour.
				Hand Tools - H/S Drill, Impact Sockets etc	2			107	-	118	-	-	
				Mobile Crane 60T	1			104	-	108	-	-	
				EWP	2			95	-	98	-	-	
				Light Vehicles	1			89	-	100	-	-	
				Excavator 36T w shears	2			103	-	108	-	-	
	Backfill of Shaft	December 2021 to January 2022 (20 days)	BS	Hoist/Alimac	1			96	-	101	-	-	
				Mobile Crane 40T	1	1		104	-	108	-	-	Not operating normally. Only for rescue purposes.
				Truck deliveries	8-10 per hour	8-10 per hour		106	-	111	-	-	Material and concrete delivery.Total daytime truck movements 8-10 per hour.
				Concrete Truck	1	1		108	-	111	-	-	Concrete/ stabilised sand pour
				Concrete Pump	1	1		103	-	107	-	-	42m Boom. 4 Days Pumping - 2 agis on pump.
				Excavator 20T	2			103	-	108	-	-	
				Roller 8t	1			109	5	113	HN	X	
	Removal Concrere Capping and Surface	January 2022 to February 2022	CC	Light Vehicles	1	1		89	-	100	-	-	
				Excavator 13T	1			103	-	108	-	-	
				Truck deliveries	8-10 per hour			106	-	111	-	-	Material and concrete delivery.Total daytime truck movements 8-10 per hour.
				Excavator 36T w hammer	3			118	5	123	HN	X	
				Road Sweeper/ Water Cart	1			104	-	107	-	-	
				Roller 8t	1			109	5	113	HN	X	
	Backfill. Landscape Reinstatement (inc Demob)	February 2022 to March 2022	LR	Light Vehicles	1			89	-	100	-	-	
				Excavator 13T	1			103	-	108	-	-	
				Mobile Crane 40T	1			104	-	108	-	-	Not operating normally. Only for rescue purposes.
				Truck deliveries	8-10 per hour			106	-	111	-	-	Material and concrete delivery.Total daytime truck movements 8-10 per hour.
				Road Sweeper/ Water Cart	1			104	-	107	-	-	
				Excavator 20T	2			103	-	108	-	-	
				Roller 8t	1			109	5	113	HN	X	
				Light Vehicles	1			89	-	100	-	-	
				Excavator 13T	1			103	-	108	-	-	or bobcat



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

 Work Area

Acoustic Shed

— Potential addition

— Potential additional mitigation measure



Sheet 1 of 1

0 20 40 60 m
1:1000

FULL SIZE A3

NOTE: Do not scale from this drawing.



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

APPENDIX F Vibration minimum working distances

