

29 October 2020

TK685-03-13F01 CNVIS C2S\_P3 VIC (r2)

Systems Connect

Level 1, 116 Miller Street

North Sydney 2060

## **Sydney Metro City and South West - Line Wide Works - Construction Noise and Vibration Impact Statement: Victoria Cross**

### **1 Introduction**

This abridged Construction Noise and Vibration Impact Statement (CNVIS) 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] [1], for the Design and Construction of the Line-Wide Works (LWW) of the Sydney Metro City & Southwest Project (the Project).

This CNVIS applies to works at the Victoria Cross Station underground worksite and includes works to be undertaken wholly within the caverns and tunnels underground, with no works on the site surface. Works will be completed during standard construction hours as well as outside of standard construction hours. The construction hours of work are defined by the Project Planning Approval conditions as outlined in the CNVMP. This CNVIS forms part of the CNVMP for the Project.

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001. Appendix A contains a glossary of acoustic terms used in this report.

### **2 Description of construction works and hours**

#### **2.1 Summary of works addressed in this CNVIS**

This CNVIS provides an assessment of noise and vibration impacts from material distribution activities associated with the track works for the C2S Line Wide Works at the Victoria Cross Station underground worksite.

The site location and layout is identified on an aerial photograph located in APPENDIX B.

The proposed works, likely plant and equipment and indicative Project timing is presented in APPENDIX C. All proposed works will be undertaken wholly within the Victoria Cross caverns and tunnels underground, with no works on the site surface.

The primary construction activity would be material distribution, which involves the movement of materials from the tunnels on one end of Victoria Cross Station to the tunnels on the other side of the station. This includes the 120m lengths of rail, sleepers, mechanical and electrical components. This will take place inside the tunnels and the Victoria Cross station cavern. There will be no movement of Systems Connect material in the access tunnels from the surface or the station shafts. The noise assessment has considered the removed acoustic sheds over the surface access sites and the reflective potential of the access tunnels and adits.

There are no surface traffic movements on public roads at Victoria Cross Station, therefore construction traffic noise assessment is not required in this report.

CSSI 7400 Condition of Approval E39 requires Systems Connect to consult with proponents of other construction works in the vicinity of the worksite and take reasonable steps to coordinate works to minimise cumulative impacts of noise and vibration and maximise respite for affected sensitive receivers. As works will be wholly underground, the risk of cumulative impact is low.

## 2.2 Construction hours

In relation to the works at the Victoria Cross Station underground worksite, the construction hours for the Project are defined by Project Planning Approval (PPA) Conditions E36 and E44. The Environment Protection Licence (EPL) is consistent with these conditions.

The standard construction hours of work are defined by the CSSI-7400 Condition E36. The standard construction hours for the Project are summarised in the table below.

**Table 2-1: Standard construction hours**

| Construction Activity                                                | Monday to Friday   | Saturday           | Sunday/ Public holiday |
|----------------------------------------------------------------------|--------------------|--------------------|------------------------|
| Above ground activities: construction sites and construction traffic | 7:00 am to 6:00 pm | 8:00 am to 1:00 pm | No work                |

CSSI-7400 Condition E44 allows standard construction hours to be varied under specific conditions, where justified. The track works 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 will be undertaken 24 hours a day, seven days per week.

Relevant to the track works at the Victoria Cross Station underground worksite, construction may be undertaken outside standard construction hours in accordance with CSSI-7400 Condition E44(d) where:

- Construction noise generated by the works are that causes  $L_{Aeq(15 \text{ minute})}$  noise levels

- no more than 5 dB(A) above the rating background level at any residence in accordance with the Interim Construction Noise Guideline (DECC, 2009), and
- no more than the noise management levels specified in Table 3 of the Interim Construction Noise Guideline (DECC, 2009) at other sensitive land uses, and
- Continuous or impulsive vibration values, measured at the most affected residence are no more than those for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), and
- Intermittent vibration values measured at the most affected residence are no more than those for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006).

### 3 Nearest sensitive receivers

To assess and manage construction noise and vibration impacts, the residential areas surrounding the site have been divided into Noise Catchment Areas (NCAs) based on each area's similar acoustic environment prior to the start of construction work. The NCAs are based on those established in the EIS for the Project, with some modifications to allow for site specific characteristics. In addition, 'other' noise and vibration sensitive receivers such as passive recreation areas, recording studios, places of worship and heritage items surrounding the construction area have been identified.

All relevant noise and vibration sensitive receivers near the worksite are identified on an aerial photograph located in APPENDIX B.

### 4 Construction noise and vibration objectives

#### 4.1 Noise goals

##### 4.1.1 Noise management levels (NMLs)

Construction noise management levels (NMLs) have been determined using the Construction Environmental Management Framework (CEMF)[9], CSSI-7400 Conditions, in accordance with the Sydney Metro City & Southwest Construction Noise and Vibration Strategy (SMCSNVS) [8] and as set out in the CNVMP. The noise goals are presented in Table B1 of APPENDIX B.

#### 4.2 Construction vibration goals

As reported in Section 5.4 and 5.5 of the CNVMP [1], construction vibration goals have been determined using:

- for human exposure, the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: A Technical Guideline (Department of Environment and Conservation, 2006) [4]

- for structural damage, the vibration limits set out in the
  - British Standard BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from ground-borne vibration [5] and
  - German Standard DIN 4150-3: Structural Vibration - effects of vibration on structures [6].

## 5 Construction noise and vibration assessment

### 5.1 Construction noise assessment

The track works at the Victoria Cross Station underground worksite will be undertaken underground, completely within the tunnels and are not expected to contribute noise emission to the surface.

No airborne noise impact from the works are predicted. Noise generated by the works are expected to be:

- no more than 5 dB(A) above the rating background level at any residence in accordance with the Interim Construction Noise Guideline (DECC, 2009), and
- no more than the noise management levels specified in Table 3 of the Interim Construction Noise Guideline (DECC, 2009) at other sensitive land uses.

Therefore, Condition E44(d) is satisfied and works may be completed during and outside of standard construction hours.

### 5.2 Construction vibration assessment

There are no vibration significant plant identified in the plant and equipment schedule presented in APPENDIX C. Therefore, the proposed works are not vibration intensive. Construction vibration and ground-borne noise impacts are considered to be negligible.

Therefore, Condition E44(d) is satisfied and works may be completed during and outside of standard construction hours.

### 5.3 Noise and vibration mitigation measures

Noise and vibration mitigation and management measures presented in the CNVMP will be applied to the track works undertaken at the Victoria Cross Station underground worksite.

#### 5.3.1 Attended monitoring

Attended noise monitoring will be undertaken during works at one of the representative receivers identified in the table below for each surface access site. Nominated attended measurement locations have been selected with the best opportunity to verify that noise from the track works are before the NMLs.

**Table 5.1: Nominated verification monitoring locations**

| NCA                   | Nominated receiver address                   | Monitoring location        |
|-----------------------|----------------------------------------------|----------------------------|
| <b>Victoria Cross</b> |                                              |                            |
| VC_04                 | 237 Miller Street North Sydney (The Harvard) | Footpath on McLaren Street |

| NCA   | Nominated receiver address   | Monitoring location                                                                       |
|-------|------------------------------|-------------------------------------------------------------------------------------------|
| VC_07 | 77 Berry Street North Sydney | Footpath on Denison Street (in front of the entry/exit of the carpark of 77 Berry Street) |

Note: Monitoring on private property is subject to owner consent and where relevant, occupier consent

If verification monitoring shows that noise from the underground track works is audible and above the relevant NMLs at night, more detailed analysis would be conducted to determine additional on-site mitigation measures or other management measures. Additional on-site mitigation measures, such as providing temporary screening of adits where noise is escaping to the surface, and other management measures will be determined based on what aspect of the activity causes the measured exceedance, on a case-by-case basis.

Vibration monitoring would only be undertaken in response to a complaint in relation to vibration from the proposed track works.

### 5.3.2 Complaints handlings

Any noise or vibration complaints received and responded to will be managed in accordance with the CNVMP and the Community Consultation Strategy.

Transport for NSW operate a 24-hour construction complaints line (1800 171 386). Enquiries/ complaints may also be received through the Sydney Metro project email ([linewide@transport.nsw.gov.au](mailto:linewide@transport.nsw.gov.au)).

## 6 Conclusion

Works associated with the C2S track works at the Victoria Cross Station underground worksite have been identified and described in this report. The expected duration of construction activities is outlined in Table C1 of APPENDIX C.

Airborne noise, ground-borne noise and vibration generated by the proposed works are anticipated to be below the noise and vibration objectives established in Section 4. Therefore, works may be undertaken during and outside of Standard Construction Hours, in accordance with CSSI-7400 Condition E44(d).

## Document control

| Date                                                                                                                                                                             | Revision history              | Non-issued revision | Issued revision | Prepared | Instructed | Reviewed / Authorised |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------|-----------------|----------|------------|-----------------------|
| 7.10.2020                                                                                                                                                                        | Initial issue                 | 0                   | 1               | T. Gowen | -          | M. Tabacchi           |
| 29.10.2020                                                                                                                                                                       | Update to include AA comments | -                   | 2               | T. Gowen | -          | M. Tabacchi           |
| File Path: R:\AssocSydProjects\TK651-TK700\TK685 PK SMCSW Linewide Works (CPB UGL)\1 Docs\100 CONSTRUCTION\3-13 CNVIS C2S_P3 Vic Cross\TK685-03-13F01 CNVIS C2S_P3 VIC (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.

## References

- [1] Sydney Metro City & Southwest – Line Wide Works Contract Construction Noise and Vibration Management Plan (SMCSWLWC-SYC-1NL-PM-PLN-000032-A-CNVMP-C2B)
- [2] 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] Department of Environment and Climate Change 2009 NSW Interim Construction Noise Guideline
- [4] Department of Environment Conservation NSW 2006 Assessing Vibration; a technical guideline
- [5] British Standard BS 7385 Part 2 1993, Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration
- [6] German Standard DIN 4150-3:2016-12 Vibration in buildings – Part 3: Effects on structures
- [7] British Standard BS 6472-2008, Evaluation of human exposure to vibration in buildings (1-80Hz)
- [8] Transport for NSW Sydney Metro City & Southwest Construction Noise Strategy (ref: 610.14213-R3) 08 August 2016
- [9] Transport for NSW Sydney Metro Construction Environmental Management Framework August 2016

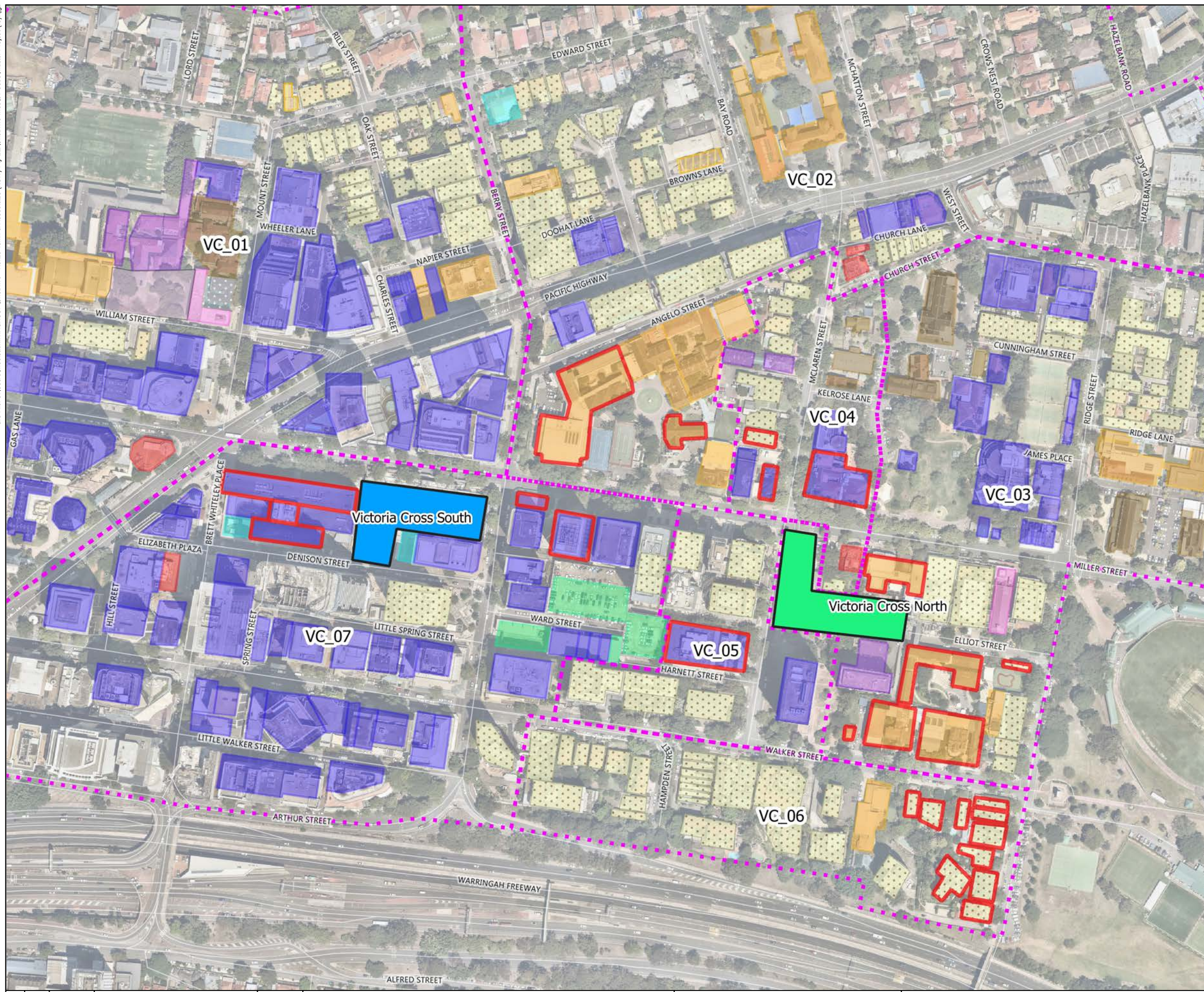
## APPENDIX A Glossary of terminology

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 <sub>Max</sub>   | The maximum sound pressure level measured over a given period.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| L <sub>Min</sub>   | The minimum sound pressure level measured over a given period.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

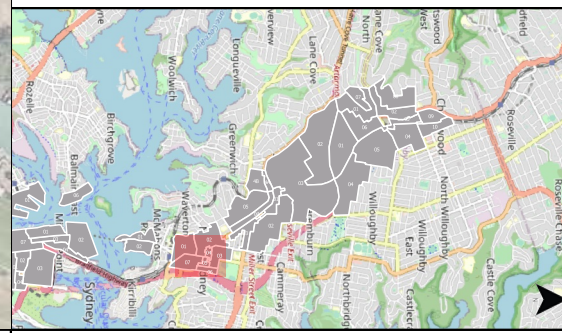
|                      |                                                                                                                                                                                                                                                                                                                                                            |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| L <sub>1</sub>       | The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.                                                                                                                                                                                                                                                        |
| L <sub>10</sub>      | The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.                                                                                                                                                                                                                                                       |
| L <sub>90</sub>      | The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L <sub>90</sub> noise level expressed in units of dB(A).                                                                                                                                                                                                              |
| L <sub>eq</sub>      | 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 <sub>eq</sub> 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**      **Nearest sensitive receivers and noise management levels**



 Victoria Cross North

 Victoria Cross South



0 50 100 150 m  
1:3000

FULL SIZE A3

NOTE: Do not scale from this drawing.



**RENZO TONIN**  
**& ASSOCIATES**  
*inspired to achieve*  
(02) 8218 0500 Fax (02) 8218 0501

Noise sensitive receivers  
Victoria Cross Sites

Table B1: Noise sensitive receivers and construction noise management levels

VICTORIA CROSS

| NCA                                                               | Nearest construction        | Receiver Type                                                                                                                         | Reference RBL                                      | Existing Noise Levels, dB(A) |             |           | Residential NMLs based on ICNG (external) |       |      |      | Sleep Dist. L <sub>Amax</sub>                                                                                       |                  | Comments |
|-------------------------------------------------------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------|-------------|-----------|-------------------------------------------|-------|------|------|---------------------------------------------------------------------------------------------------------------------|------------------|----------|
|                                                                   | work area                   |                                                                                                                                       |                                                    | RBL Day                      | RBL Evening | RBL Night | NMLDS                                     | NMLDO | NMLE | NMLN | Screening <sup>1</sup>                                                                                              | Max <sup>1</sup> |          |
| Portion 2 & 3                                                     | Chatswood to Sydenham (C2S) |                                                                                                                                       |                                                    |                              |             |           |                                           |       |      |      |                                                                                                                     |                  |          |
| VC_01                                                             | Victoria Cross Station      | Residential west of Pacific Hwy and west of Miller Street, south of Berry Street                                                      | C2S EIS B.17                                       | 55                           | 50          | 44        | 65                                        | 60    | 55   | 49   | 59                                                                                                                  | 65               |          |
| VC_02                                                             | Victoria Cross Station      | Residential west of Miller Street, north of Berry St                                                                                  | C2S EIS B.17                                       | 55                           | 50          | 44        | 65                                        | 60    | 55   | 49   | 59                                                                                                                  | 65               |          |
| VC_03                                                             | Victoria Cross Station      | Residential (low rise), north of McLaren Street                                                                                       | WM Report No 16200                                 | 54                           | 47          | 40        | 64                                        | 59    | 52   | 45   | 55                                                                                                                  | 65               |          |
| VC_04                                                             | Victoria Cross Station      | Residential (high rise), along McLaren St                                                                                             | RTA TH511-L03 29 McLaren St, North Sydney          | 49                           | 45          | 39        | 59                                        | 54    | 50   | 44   | 55                                                                                                                  | 65               |          |
| VC_05                                                             | Victoria Cross Station      | Residential (high rise), East of VC_03 and VC_04, west of Warringah Freeway                                                           | WM May-June 2015 - 138 Walker St                   | 59                           | 57          | 44        | 69                                        | 64    | 62   | 49   | 59                                                                                                                  | 65               |          |
| VC_06                                                             | Victoria Cross Station      | Commercial district with some residential (high rise), east of Miller Street and west of Warringah Freeway, surrounding southern site | Energy2U Alliance,ref60100174-RPT02.03, 16/09/2010 | 54                           | 51          | 46        | 64                                        | 59    | 56   | 51   | 61                                                                                                                  | 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 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

## APPENDIX C      Construction details

| Table C1: Construction Timetable/ Activities/ Equipment |                       |                                  |              |                                       |                                             |           |            |            |                                                         | VICTORIA CROSS |                   |                           |                           |                                      |
|---------------------------------------------------------|-----------------------|----------------------------------|--------------|---------------------------------------|---------------------------------------------|-----------|------------|------------|---------------------------------------------------------|----------------|-------------------|---------------------------|---------------------------|--------------------------------------|
| Work acitvity                                           | Details               | Indicative timing/<br>duration   | Modelling ID | Plant/ Equipment                      | Plant/ Equipment<br>(as provided by client) | Day       | Evening    | Night      | Sound Power Level (Lw re: 1pW) in Noise<br>Model, dB(A) |                |                   | High noise plant (EPL E1) | Vibration intensive plant | Notes                                |
|                                                         |                       |                                  |              |                                       |                                             | 7am - 6pm | 6pm - 10pm | 10pm - 7am | L <sub>Aeq</sub>                                        | Penalty        | L <sub>Amax</sub> |                           |                           |                                      |
| Track Works                                             | Material distribution | November 2020 to<br>January 2021 |              | Excavator w bucket (25t)              | Excavator 20 tonne (rubber tyre )           | 1         | 1          | 1          | 103                                                     | -              | 108               | -                         | -                         | All works underground within tunnels |
|                                                         |                       |                                  |              | Front end loader                      | Front end loader                            | 1         | 1          | 1          | 110                                                     | -              | 115               | -                         | -                         |                                      |
|                                                         |                       |                                  |              | -                                     | Rail trolley                                | 2         | 2          | 2          | -                                                       | -              | -                 | -                         | -                         |                                      |
|                                                         |                       |                                  |              | Hiab                                  | Hiab truck                                  | 2         | 2          | 2          | 98                                                      | -              | 102               | -                         | -                         |                                      |
|                                                         |                       |                                  |              | Light vehicles / traffic control utes | Light vehicle                               | 2         | 2          | 2          | 89                                                      | -              | 100               | -                         | -                         |                                      |



Title

Description

- Sydney Metro City Corridor
  - Sydney Metro City Alignment
- City Station Layout
- C-CAPPING-BEAM
  - C-CAVERN
  - C-CROSSOVER
  - C-DIVE-HATCH\_OUTLINE
  - C-NOZZLE
  - C-PILE-HDLN
  - C-PILE-SOLDIER
  - C-UNIT

Systems Connect  
access area

NOT USED FOR CONSTRUCTION

This map is a user generated static output from the New SCLWW GIS tool and is for reference only. Data layers appearing on this map may or may not be accurate, current, or otherwise reliable.

## ENDORSEMENT CITY & SOUTHWEST ACOUSTIC ADVISOR

|                       |                                                                                             |                            |                                                                                                                                      |
|-----------------------|---------------------------------------------------------------------------------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>Review of</b>      | <b>Construction Noise and Vibration Impact Statement for Line-Wide works Victoria Cross</b> | <b>Document reference:</b> | <b>Construction Noise and Vibration Impact Statement: Victoria Cross<br/>Prepared by Renzo Tonin Associates for Systems Connect.</b> |
| <b>Prepared by:</b>   | Larry Clark, Alternate Acoustics Advisor                                                    |                            | <i>TK685-03-13F01 CNVIS C2S_P3 Vic (r2)</i>                                                                                          |
| <b>Date of issue:</b> | 2 November 2020                                                                             |                            | <i>Dated 29 October 2020</i>                                                                                                         |

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) for Line-Wide works: Victoria Cross (r2), as required under A27 (d) of the project approval conditions (SSI 15-7400).

I previously reviewed and commented on revision 1 of the CNVIS. Revision 2 has been updated to satisfy my comments. The CNVIS applies to material distribution activities associated with the track works at the Victoria Cross Station underground worksite and includes works to be undertaken wholly within the caverns and tunnels underground, with no works on the site surface. Systems Connect confirms that:

- "material distribution" is the movement of materials from the tunnels on one end of Victoria Cross Station to the tunnels on the other side of the station. This includes the 120m lengths of rail, sleepers, mechanical and electrical components, etc. This will take place inside the tunnels and the Victoria Cross cavern.
- There will be no movement of Systems Connect material in the access tunnels from the surface or the station shafts.
- The noise assessment takes into account the removed acoustic sheds over the surface access sites and the reflective potential of the access tunnels and adits.

No airborne noise impacts from the works are predicted. Condition of Approval E33 is therefore not relevant.

I am satisfied that revision 2 of the CNVIS is technically valid, and includes appropriate noise and vibration mitigation and management. On this basis I endorse r2 of the Construction Noise and Vibration Impact Statement in respect of Line-Wide works at Victoria Cross.



Larry Clark, City & Southwest Alternate Acoustics Advisor

Hugh Chapman  
Associate Director Environment  
Sydney Metro  
Transport for NSW  
PO Box K659  
HAYMARKET NSW 1240

2 November 2020

Ref: CSW LWW VC CNVIS (r2) Rev0

Dear Hugh

**RE: Endorsement of Sydney Metro City & Southwest – Victoria Cross -  
Construction Noise and Vibration Impact Statement (r2)**

Thank you for providing the following document for Environmental Representative (ER) review and endorsement as requested by Sydney Metro.

- Sydney Metro City & Southwest - Construction Noise and Vibration Impact Statement – Victoria Cross r2

The document was prepared by Renzo Tonin & Associates on behalf of Systems Connect.

I have reviewed the CNVIS and can confirm that it complies with the requirements of SSI-7400 MCoA E33 and Section 9.2(b) of the Construction Environmental Framework (CEMF) Chatswood to Sydenham (February 2017).

As an approved ER for the Sydney Metro City & Southwest project, I consider that the CNVIS is consistent with the requirements under the CEMF and SSI-7400 and is endorsed for implementation.

Yours sincerely



Peter Hatton  
Environmental Representative – Sydney Metro – City and South West