ACOUSTICS AND AIR

SOUTHWEST METRO EARLY WORKS

CONSTRUCTION NOISE & VIBRATION MANAGEMENT PLAN – EARLY WORKS

SMCSWSSJ-JHL-WEC-EM-PLN-000003
REV 12

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PREPARED FOR

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TERMS & DEFINITIONS

The following general terms, abbreviations and definitions are used in this plan.

Term	Explanation
CCS	Community Communications Strategy
CEMP	Construction Environmental Management Plan
CNVS	Sydney Metro City & Southwest Construction Noise and Vibration Strategy V0.4, August 2017
CNVIS	Construction Noise and Vibration Impact Statement
CNVMP	Construction Noise and Vibration Management Plan
CoA	Conditions of Approval
CSSI	Critical Sate Significant Infrastructure
DPI&E	Department of Planning, Industry and Environment (formerly Department of Planning and Environment – DP&E)
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPA	NSW Environment Protection Authority
ER	Environmental Representative
HNAML	Highly Noise Affected Management Level
ICNG	NSW Department of Environment and Climate Change – NSW Interim Construction Noise Guideline, July 2009
INP	NSW Environment Protection Authority – NSW Environmental Noise Management – Industrial Noise Policy, January 2000 and relevant application notes
JHLOR	John Holland Laing O'Rourke Joint Venture
JH	John Holland
Laing O'Rourke	Laing O'Rourke Australia Construction Pty Limited
LGA	Local Government Area
LOR	Laing O'Rourke Australia Construction Pty Limited
Minister, the	NSW Minister for Planning
NCA	Noise Catchment Area
NML	Noise Management Level
OEH	Office of Environment and Heritage
OOHW	Out of Hours Works
PEM	Project Environment Manager
RNP	NSW Department of Environment, Climate Change and Water – NSW Road Noise Policy, March 2011

Term	Explanation
SM	Sydney Metro
SMEW	Southwest Metro Early Works
SWM	Southwest Metro (scope approved under CSSI 8256 – previously known as Sydenham to Bankstown Upgrade)
SSI	State Significant Infrastructure
TfNSW	Transport for New South Wales
the Project	Southwest Metro Early Works

GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

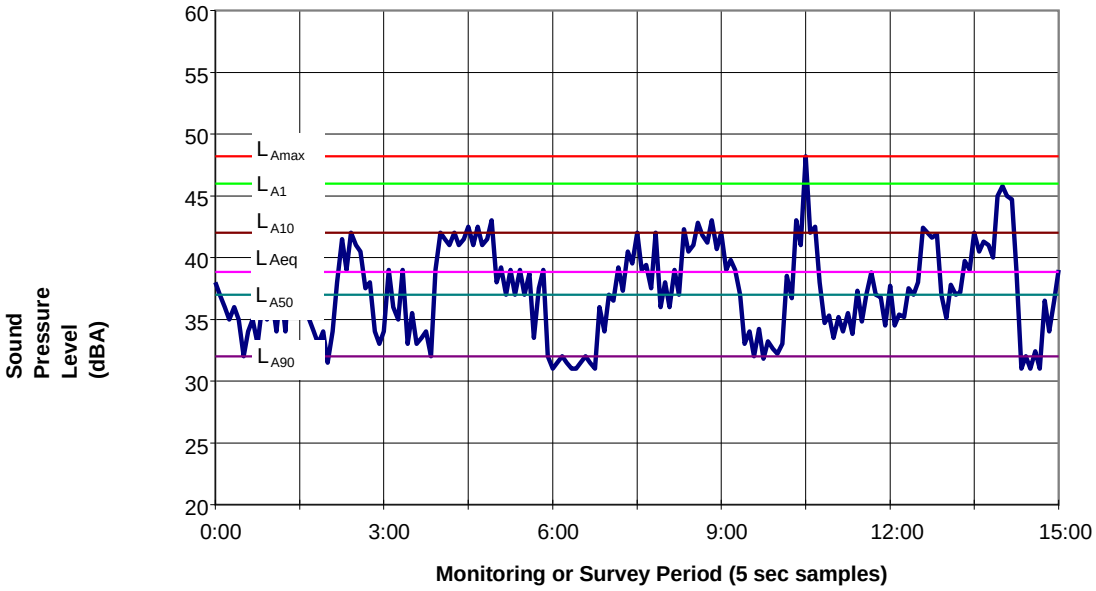
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

Typical Graph of Sound Pressure Level vs Time



1 INTRODUCTION

Sydney Metro City & Southwest is a new 30km metro line extending from the end of Sydney Metro Northwest at Chatswood under Sydney Harbour, through new CBD stations and southwest to Bankstown. It is due to open in 2024 with the capacity to run a metro train every two minutes each way through the centre of Sydney. The Sydney Metro City & Southwest comprises of two components:

- Chatswood to Sydenham project
- Sydenham to Bankstown upgrade, now known as Southwest Metro (SWM)

As part of the Southwest Metro project, it is proposed to carry out early stage construction works relating to the T3 Bankstown Line. These early works, known as Southwest Metro Early Works (SMEW) will extend from Sydenham to Campsie. The works will be undertaken by John Holland & Laing O'Rourke joint venture (JHLOR).

This Construction Noise & Vibration Management Plan (CNVMP) has been prepared in accordance with the requirements of the Conditions of Approval for Sydney Metro Sydenham to Bankstown Upgrade, (SSI 8256) and in accordance with the *Sydney Metro Construction Environmental Management Framework (CEMF)*.

The Plan demonstrates how risks associated with noise and vibration during the construction stage will be mitigated.

1.1 Scope of Works

The Southwest Metro Early Works will be undertaken within the rail corridor between Marrickville and Campsie, extending as far as Loch Street, Campsie.

The proposed permanent works include:

- Rail embankment stabilisation, including retaining walls – specifically Retaining Wall 1 (RW1) from the western side of Canterbury Station to the Cooks River, Retaining Wall 2 (RW2) from the Cooks River to Wairoa Street, Canterbury and Retaining Wall 3 (RW3) from Wairoa St to Oswald Lane, Canterbury. All retaining walls are on the southern side (down side) of the track.
- Fencing – works will occur over a series of zones within the rail corridor. These works will not occur on stations.
- Civil enabling works for a traction substation – western side of Campsie Station.
- Installation and commissioning of Combined Service Route (CSR, GST, GLT, ULXs) – works will occur over a series of zones within the rail corridor. GST will be attached to a number of bridges between Marrickville and Campsie. These works will not occur on stations.
- Sydney Trains signalling, communications and HV diversions – works will occur over a series of zones within the rail corridor. These works will not occur on stations.

- Installation of drainage/works to existing swales (table drains) – an existing vegetated swale conveys water from the southern side of the corridor between Campsie Station and the Cooks River, crossing Wairoa Street via a culvert. The swale collects water from the existing embankment that will be stabilised by RW2 and RW3.
- Works associated with establishment of a site compound on Close Street, Canterbury. This includes demolition of existing building, earthworks for setup of laydown area and installation of new temporary site offices and supporting activities such as investigations, tree removal/trimming and service installations.
- Supporting works, including vegetation clearing, investigation works and upgrades to access roads.

Some supporting works may occur within the Sydney Metro City & Southwest Sydenham to Bankstown Upgrade project boundary between Loch St, Campsie and Bankstown. In particular;

- A generator will be installed temporarily adjacent to Belmore Station for emergency back-up power provisions during Sydney Trains high voltage feeder outages associated with SMEW. The generator will be installed for short durations, nominally three weeks, during Sydney Trains high voltage feeder outages and removed once the outages have ended.
- Relocation of existing Sydney Trains Service route at Lakemba, Wiley Park, Punchbowl and Bankstown
- Trimming and removal of vegetation to facilitate Sydney Trains Service route at Lakemba, Wiley Park, Punchbowl and Bankstown

SMEW temporary works include:

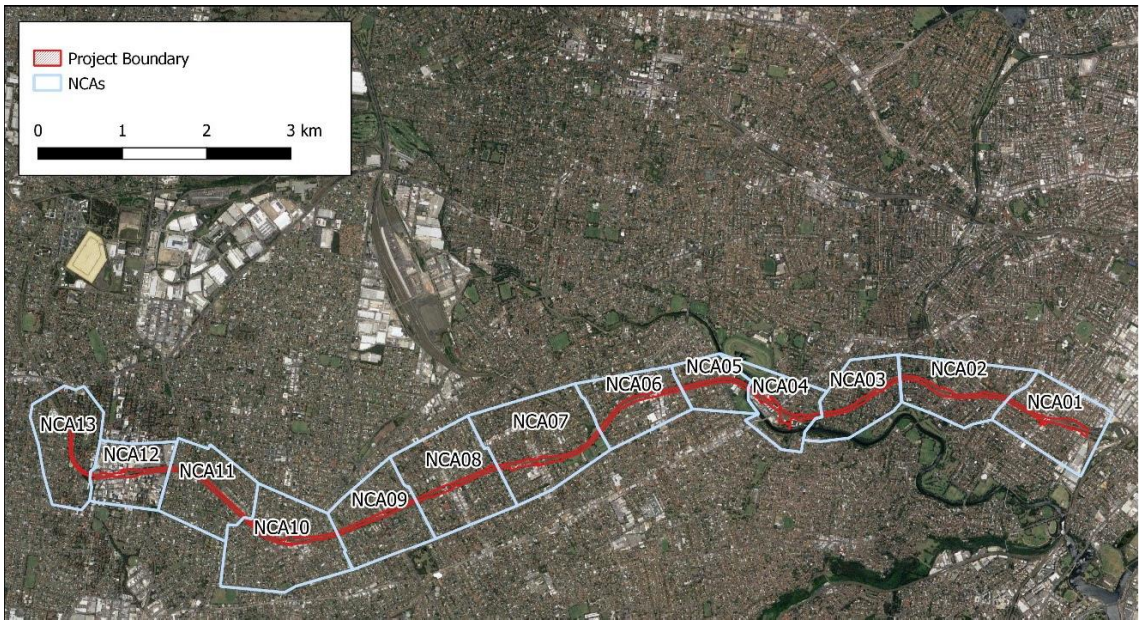
- Temporary arrangements to divert and control pedestrians, public transport users, cyclists, public transport and traffic and to provide public access, amenity, security and safety during all stages of design and construction of the works.
- Temporary arrangements for people and vehicles to safely access all property, including publicly accessible space affected by the Contractor's activities.
- Temporary arrangements for people and vehicles to safely access the site.
- Temporary access stairs, walkways and platforms within the site.
- Temporary construction hoardings, fencing, access gates and barriers on and around the site.
- All environmental safeguards and measures necessary to mitigate environmental effects which may arise during the design and construction of the works.
- Cleaning, maintenance, repair, replacement and reinstatement, as required, of all areas occupied by the Contractor during design and construction of the works.
- Temporary site facilities required for design and construction of the works.
- Temporary infrastructure, safety screens and ground support installed or erected to undertake design and construction of the works.

- Temporary arrangements for Utility Services, including water, electricity, stormwater, sewerage, gas and electronic communications.
- Temporary power supply
- Non-destructive investigation works.

It is noted that a site minor ancillary facility may be established for the works. The location is yet to be determined. The location will comply with the requirements of the conditions of approval.

Figure 1-1 presents the site and surrounding area.

Figure 1-1 Project site & surrounding area



1.2 Consultation

In accordance with CoAs C3(a) and C8(a) the CNVMP and the Construction Monitoring Program (CMP) for noise and vibration must be prepared in consultation with relevant government agencies. Table 1-1 provides a summary of the consultation undertaken. The CNVMP and CMP are updated based on this consultation as it occurs.

Table 1-1 Summary of consultation

CoA SSI-8256	Agency Consultation	Requirements & date submitted	Key issues raised	CSWMP Section Reference
C3(a), C7, C8(a), C10	Department of Planning, Industry and Environment	Submitted for Approval		
	City of Canterbury-Bankstown	Submitted 20/04/2019 Attended Management Plan Consultation Workshop on 29/04/2019 Follow up email sent 7/05/2019	No issues raised	N/A

	Response received 21/05/2019		
Inner West Council	Submitted 20/04/2019 Attended Management Plan Consultation Workshop on 29/04/2019 Follow up email sent 7/05/2019 Response received 14/05/2019	i. An additional CNVMP will be developed for any other Sydney Metro packages ii. Cumulative noise impacts iii. Appropriate sleep disturbance criteria iv. Appropriate mitigation measures	Appendix E

Consultation records can be found in Appendix E.

1.3 Objectives & Targets

JHLOR have set a number of construction noise and vibration objectives and targets as shown in Table 1-2.

Table 1-2 Objectives & targets

Objectives	Performance targets
• Minimise unreasonable noise and vibration impacts on residents and businesses. • Avoid structural damage to buildings or heritage items as a result of construction vibration. • Undertake active community consultation. • Maintain positive, cooperative relationships with schools, childcare centres, local residents and building owners. • Apply the CNVS throughout the project, including standard and additional mitigation measures, monitoring, auditing and reporting, document reviews, assessment methodology and guidance (unless superseded by the requirements of an EPL).	• Noise and vibration management levels will be achieved in accordance with the EPL, CoA and CNVS. • Noise levels would be minimised with the aim of achieving the noise management levels where feasible and reasonable. • The Project would avoid any damage to buildings from vibration.

These objectives conform to Sydney Metro's objectives as described in the Construction Environmental Management Framework and the CNVS.

2 LEGAL & OTHER REQUIREMENTS

2.1 Policy & Guidelines

Table 2-1 details the legislation and planning instruments considered during development of this Plan.

Table 2-1 Legislation & Planning Instruments

Legislation	Description	Relevance to this CNVMP
Environmental Planning and Assessment Act 1979	This Act establishes a system of environmental planning and assessment of development proposals for the State.	The approval conditions and obligations are incorporated into this CNVMP.
Protection of the Environment Operations Act 1997	This Act includes all the controls necessary to regulate pollution and reduce degradation of the environment, provides for licensing of scheduled development work, scheduled activities and for offences and prosecution under this Act.	This plan defines how JHLOR will manage works to comply with this Act. The works will be conducted in accordance with the requirements of the EPL.

The construction noise and vibration management plan has been prepared in accordance with the requirements and conditions of approval outlined in the *Conditions of Approval for Sydney Metro Sydenham to Bankstown Upgrade SSI 8256*.

CoA C4 states that the CNVMP must be prepared in accordance with the Construction Environmental Management Framework (CEMF) and the documents listed in CoA A1. These documents are:

- *Sydney Metro City & Southwest Sydenham to Bankstown Environmental Impact Statement – Volumes 1A-C and 2–6 (the EIS);*
- *As modified by the Sydney Metro City & Southwest Sydenham to Bankstown Submissions and Preferred Infrastructure Report – Volumes 1, 2A-F and 3 G-J (the SPIR); and*
- *The Sydney Metro City & Southwest Sydenham to Bankstown Submissions Report (the SR).*

The CNVMP also addresses applicable requirements in the following documents:

- *Interim Construction Noise Guideline* (DECC, 2009) – *ICNG*
- *Sydney Metro City & Southwest Construction Noise and Vibration Strategy* (2017) – *CNVS*
- *NSW Industrial Noise Policy* (NSW EPA, 2000) – *INP*
- *The Sydney Metro Construction Environmental Management Framework v3.2 – CEMF*
- *Assessing Vibration: A Technical Guideline* (DEC, 2006) (for human exposure)

- *BS 7385 Part 2 -1993 "Evaluation and measurement for vibration in buildings Part 2"* (as applicable to Australian conditions)
- *German Standard DIN 4150-3: Structural Vibration – effects of vibration on structures*
- *Environmental Protection Licence EPL 21147*

2.2 Environment Protection License

SMEW will be delivered in accordance with the Laing O'Rourke EPL 21147. It is noted that this EPL also includes works occurring for the Sydney Metro City and Southwest Chatswood to Sydenham – Sydenham Station Junction project (SSI_7400).

2.3 Roles & Responsibilities

The roles and responsibilities are presented in Table 2-2.

Table 2-2 Roles & responsibilities

Roles	Responsibilities
Project Leader	• Ensure that sufficient resources are allocated for the implementation of this CNVMP. • Ensure all appropriate noise and vibration mitigation measures are implemented. • Authorise cessation of construction activities on-site if exceedances are identified, in accordance with this CNVMP. • Authorise all monitoring reports and any revisions to this CNVMP.
Site Supervisor	• Oversee the overall implementation of this CNVMP. • Ensure all appropriate noise and vibration mitigation measures are implemented. • Ensure works occur within standard construction hours unless the appropriate out of hours works approval is in place. • Manage deliveries to mitigate noise impacts.
Environment Manager	• Oversee the overall implementation of this CNVMP. • Consider and advise senior management on compliance obligations. • Ensure that the outcomes of compliance monitoring / incident reporting are systematically evaluated as part of ongoing management of construction activities. • Ensure all appropriate noise and vibration mitigation measures are implemented. • Where standard mitigation measures are deemed insufficient, undertake reasonable steps to manage adverse impacts and implement all additional measures. • Authorise cessation of construction activities on-site if exceedances are identified, in accordance with this CNVMP. • Ensure construction activity records / monitoring records/ incident reports are kept and maintained on-site.

Roles	Responsibilities
	• Ensure audits of construction site activity records / monitoring records/ incident reports are undertaken as needed, findings are shared with relevant site personnel and corrective actions are implemented. • Ensure all relevant personnel have and understand the most up-to-date copy of this CNVMP.
Communication and Stakeholder Relations Manager	• Leadership and management of the Communications, Stakeholder and Community Relations Team. • Build and maintain effective working relationship with Sydney Metro's representative and Stakeholder and Community Liaison team. • Develops and oversees the implementation of the CCS and subplans. • Responsible for a stakeholder and community relations induction and training program for all personnel involved in the performance of the project. • Approves the Communications, Stakeholder and Community Relations team roles, role descriptions and responsibilities. • Ensures the Community Communications Strategy and key activities are integrated into the project schedule. • Attends the weekly Sydney Metro Construction meetings • Issues and crisis management. • Manages media issues and acts as media spokesperson for JHLORJV (subject to media protocols). • Responsible for the Communications and Stakeholder Management KPI as well as the Communications and Stakeholder management component of the Quality of Information and Relationship with the Principal's representative KPI. • Required to be on call 24 hours based on the team rotation. • Liaise directly with the Independent Environment Representative as required and where appropriate to facilitate any environmental management requirements, including those identified within the Planning Approvals.
Community Place Manager	• Build and maintain effective working relationship with community, businesses, and stakeholders. • Support the successful delivery of the project's Community Communication's Strategy and requirements. • Implementation of the Community Communications Strategy and any relevant subplans. • Establish effective working relationships with local stakeholder to support the effective delivery of the project. • Required to be on call 24 hours based on the team rotation to respond to enquiries and complaints. • Review, approve and oversee the development and distribution of all notification, newsletter, social media, photography, and other communication material.

Roles	Responsibilities
	• Maintain the Consultation Manager database and generate reports as required. • Drives Communications and Stakeholder Management KPIs as well as the Communications and Stakeholder management component of the Quality of Information and Relationship with the Principal's representative KPI.
Site Personnel and Subcontractors	• Understand and implement mitigation as required in the CNVMP and any additional required measures identified during construction. • Participate in (or conduct if authorised) relevant training to implement the requirements of this CNVMP.
Noise and Vibration Monitoring Personnel (JHLOR / Consultants)	• Undertake relevant training, where required, to implement the requirements of this CNVMP. • Undertake all monitoring activities in accordance with this CNVMP. • Ensure regular maintenance and calibration of monitoring equipment. • Ensure all relevant monitoring quality control / assurance procedures are effectively implemented.
Independent Environmental Representative	• Receive and respond to communication from the Planning Secretary in relation to the environmental performance of the CSSI. • Consider and inform the Planning Secretary on matters specified in the terms of this approval. • Consider and recommend to the Proponent any improvements that may be made to work practices to avoid or minimise adverse impact to the environment and to the community. • Review documents identified in Conditions C1, C3 and C8 and any other documents that are identified by the Planning Secretary, to ensure they are consistent with requirements in or under this approval and if so: (B) make a written statement to this effect before submission of such documents to the Planning Secretary (if those documents are required to be approved by the Planning Secretary); or (ii) make a written statement to this effect before the implementation of such documents (if those documents are required to be submitted to the Planning Secretary for information or are not required to be submitted to the Secretary). • Regularly monitor the implementation of the documents listed in Conditions C1, C3 and C8 to ensure implementation is being carried out in accordance with the document and the terms of this approval. • As may be requested by the Planning Secretary, help plan, attend or undertake audits of the development commissioned by the Department including scoping audits, programming audits, briefings and site visits, but not independent environmental audits required under Condition A34 of this approval.

Roles	Responsibilities
	• As may be requested by the Planning Secretary, assist the Department in the resolution of community complaints; • Assess the impacts of minor ancillary facilities as required by Condition A19 of this approval. • Assess and make determination on out of hours applications for works not subject to an EPL in accordance with CoA-E25. • Consider any minor amendments to be made to the documents listed in Conditions C1, C3 and C8 and any document that requires the approval of the Planning Secretary that comprise updating or are of an administrative or minor nature and are consistent with the terms of this approval and the documents listed in Conditions C1, C3 and C8 or other documents approved by the Planning Secretary and, if satisfied such amendment is necessary, approve the amendment. This does not include any modifications to the terms of this approval. • Prepare and submit to the Planning Secretary and other relevant regulatory agencies, for information, an Environmental Representative Monthly Report detailing the ER's actions and decisions on matters for which the ER was responsible in the preceding month. The Environmental Representative Monthly Report must be submitted within seven (7) days following the end of each month for the duration of the ER's engagement for the CSSI. • Must complete project induction covering LORs' environmental management system.

It is noted that the site team, including the Environmental Manager, Environmental Coordinator, Construction Manager, Site Superintendent and Site Supervisors will attend site inspections with the ER upon request.

The ER may request information relating to noise and vibration management from JHLOR, the primary contact being the Environmental Manager.

3 EXISTING ENVIRONMENT & PROPOSED WORKS

3.1 Existing Environment

The Project site is surrounded by properties of varying types, including industrial, commercial, residential and recreational. During the noise assessment for the EIS, background noise monitoring of the areas surrounding the site was undertaken. The following Noise Catchment Areas (NCA) and associated rating background levels (RBL) have been taken from the EIS. The corresponding background monitoring location from the EIS is also shown.

Note that the background monitoring results used to establish noise criteria in the EIS for NCA 01 and NCA 02 were reported incorrectly. There were discrepancies between the values used for each NCA in different tables of the report, which led to uncertainty with which results were correct. Results from different monitoring locations, that did not have these discrepancies were instead used. These new monitoring locations were equally as appropriate or better for representing each NCA.

Table 3-1 Rating background levels

NCA	EIS background monitoring ID	Area	Day RBL 7am-6pm	Evening RBL 6pm-10pm	Night RBL 10pm-7am
NCA 01	B.02	Marrickville	38	38	33
NCA 02	B.03	Dulwich Hill	38	38	33
NCA 03	B.06	Hurlstone Park	38	38	34
NCA 04	B.07	Canterbury	40	40	35
NCA 05	B.09		36	36	32
NCA 06	B.10	Campsie	45	42	35
NCA 07	B.13	Belmore	41	41	35
NCA08	B.14	Lakemba	47	47	41
NCA09	B.16	Wiley Park	44	44	36
NCA10	B.19	Punchbowl	47	47	41
NCA11	B.20	Bankstown	47	47	39

Maps detailing the boundaries of each NCA are included in Appendix A. These maps also indicate the land use type for each building with the NCA.

The different noise catchment areas contain a variety of receiver types (i.e. residential receivers, non-residential receivers, sensitive non-residential receivers) and as such a number of noise and vibration management requirements are applicable to all NCAs.

3.2 Proposed Construction Works

A schedule of the proposed construction works has been developed that details each construction activity, its proposed timeframe (2019) and the likely plant and equipment required. The proposed works are presented in Table 3-2. This information is to be used to produce a project specific construction noise and vibration impact statement (CNVIS), as required by CoA E27.

It should be noted that no blasting is proposed as part of the Sydney Metro Early Works.

Table 3-2 Proposed construction works

Activity	Details	Timeframe	Plant	Note
CSR & Drainage Construction/ Relocation/HV relocations	Construct and commissioning of the new CSR routes including signals / comms / HV - Site wide	Jun 19 to March 21	vacuum truck, 6t excavator, 2t tipper, hand tools, grinders, multi-crane, wacker packer, EWP	Some CSR work may occur during the pre-Construction phase pending Pre-Construction Minor Works Approval
	Construction of drainage - adjacent to retaining wall	Oct 20	13t excavator, trench roller, telehandler, bogie, vacuum truck	
	High Voltage diversions and signalling - Site wide	Aug 19 to Jan 21	EWP, multi-crane	
Retaining Wall	Construction of retaining walls involving piling, lifting and earthworks - Three locations surrounding the Cooks River Bridge	Aug 19 to Oct 20	13t excavator, bored piling rig, concrete truck, concrete pump, vacuum truck, multi-crane, 130t crane, 24t excavator, 6t vibratory roller, truck and dog, bogie	
Fencing	Installing security fencing – Various areas along length of the corridor	Jun 19 to Oct 20	tipper, multi-crane, concrete truck, concrete pump, hand tools, grinders, telehandler	Some fencing work may occur during the pre-Construction phase pending Pre-Construction Minor Works Approval
Concrete Injected Columns	Installation of concrete injected columns near the western end of the Cooks River Bridge	Nov 19 to June 20	Excavator with vibration attachment, concrete truck, concrete pump	
Emergency Generators	Temporary backup generators near 5 stations including Belmore	Nov 19 to Jan 21	Generators	
Site	Demolition of existing	March 21 to	30t excavator (with	Site Compound

Activity	Details	Timeframe	Plant	Note
Compound	building	November 21	hammer attachment), bogies, watercart, generators, hand tools, concrete saw	
Site Compound	Earthworks	March 21 to May 21	14t vibratory roller, dump truck, bogies, 13t excavator, front end loader, water cart, smooth drum roller, vacuum truck, chainsaws	Site Compound
Site Compound	New site office installation	March 21 to May 21	100t crane, delivery trucks, hand tools, generators	Site Compound
Site Support	General activities that will occur to support the main construction works	Jun 19 to Jan 21	6t excavator, 2t tipper, hand tools, vacuum truck, site utes, water cart, street sweeper, drill rig, delivery trucks, semi-trailer, concrete truck, concrete pump, lighting tower, 13t excavator, bogie, truck and dog, chainsaw, tree mulcher, stump grinder, EWP	Site support may occur during the pre-Construction phase pending Pre-Construction Minor Works Approval

It is noted that an emergency back-up generator will be installed within NCA7, adjacent to the padmount at Belmore Station – access via Railway Parade, Belmore. JHLOR does not expect the generator to come into use. There are no other works planned within NCA7.

Access gates to the rail corridor are at the following locations:

- Access A (via Fraser Park Football Club interior road off Marrickville Road, Marrickville)
- Access B (via Victoria Road, Marrickville)
- Access C (via Unnamed Lane off Warburton Street, opposite Wooley Lane, Marrickville)
- Access D (via Randall Street, Marrickville)
- Access E (via Kays Avenue East, Marrickville)
- Access F (via Ewart Street east of Terrace Road, Marrickville)
- Access G (via Ewart Street west of Terrace Road, Marrickville)
- Access H-1 (via Floss Street, Hurlstone Park)
- Access I (via Railway Street, Hurlstone Park)
- Access J (via Keir Avenue, Hurlstone Park)
- Access K (via Hurlstone Avenue, Hurlstone Park)
- Access L (via Hutton Street, Hurlstone Park)
- Access M (via Hutton Street at Sugar House Road, Hurlstone Park)
- Access N (via rail service road near Church Street footbridge, Hurlstone Park)
- Access O (via Charles Street, Canterbury)
- Access P (via Wairoa Street and Cooks River Path, Canterbury)
- Access Q (via South Parade opposite Wonga Street, Canterbury)
- Access R (via South Parade opposite Park Street, Campsie)
- Access S (via South Parade opposite Duke Street, Campsie)
- Access T (via Lilian Street, Campsie)
- Access U (via Railway Parade, Belmore) – light vehicles only
- Access V (20 Charles Street, Canterbury)
- Access W (via Ewart Lane, Dulwich Hill) – light vehicles only
- Access X (via Railway Parade, opposite Croydon Street North, Lakemba)
- Access Y (via Shadforth St, Wiley Park)
- Access Z (via Urunga Pde, Punchbowl)
- Access AA (via South Terrace and Scott St, Bankstown)
- Access AB – (via Close St, Canterbury)

JHLOR may be required to establish additional site compounds to support SMEW.. Where site compounds are to be established, JHLOR will review noise and vibration impacts in relation to the

requirements of the Planning Approval, EPL, relevant guidelines and legislation.

4 CONSTRUCTION NOISE & VIBRATION CRITERIA

4.1 Construction Hours

JHLOR will undertake works in accordance with the Laing O'Rourke Environmental Protection Licence (EPL) 21147. No scheduled activities will occur outside the EPL 21147 premise boundary.

CoA-E19 states the construction hours as per the Planning Approval. **CoA-E20** states that if the works are to be undertaken under an EPL, than the hours stipulated within the EPL must be complied with. As such, JHLOR will undertake works in accordance with the hours stipulated within the Laing O'Rourke EPL. It is noted that the standard construction hours within the EPL differ to those as stated under **CoA-E19**. Works under the EPL are permitted to occur up until 1pm on Saturdays, whereas works may occur up until 6pm under **CoA-E19**.

CoA– E19 states that construction must only be undertaken during the following standard construction hours:

- 7:00am to 6:00pm Mondays to Fridays, inclusive;
- 8:00am to 6:00pm Saturdays; and
- No work on Sundays or public holidays.

CoA-E20 states "*Work may be undertaken outside the hours specified in the following circumstances:*

a) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or
b) where it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm; or
c) where different Construction hours are permitted or required under an EPL in force in respect of the CSSI; or
d) Work approved under an Out-of-Hours Work Protocol for Work not subject to an EPL as required by Condition E25; or
e) Construction that causes Laeq(15 minute) noise levels:
    i. 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
    ii. no more than the 'Noise affected' noise management levels specified in Table 3 of the Interim Construction Noise Guideline (DECC, 2009) at other sensitive land uses, and
    iii. continuous or impulsive vibration values, measured at the most affected residence are no more than the maximum values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), and
    iv. intermittent vibration values measured at the most affected residence are no more than the maximum values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or
f) where a negotiated agreement has been reached with a substantial majority of sensitive receivers who are within the vicinity of and may be potentially affected by the particular Construction, and the noise management levels and/or limit for ground-borne noise and vibration (human comfort) cannot be achieved. All agreements must be in writing and a copy forwarded to the Planning Secretary at least one (1) week before the commencement of activities."

Works are to comply with Condition L4.1; "*Unless permitted by another condition of this licence, construction works and activities must:*

a) only be undertaken between the hours of 0700 and 1800 Monday to Friday; and
b) only be undertaken between the hours of 0800 and 1300 Saturday; and
c) not be undertaken on Sundays or Public Holidays."

The CNVS presents a methodology for determining numerical limits – or Noise Management Levels (NMLs) – for the impacts of construction noise on residences and other land uses according to the time period during which the noise occurs. This methodology was derived from the *ICNG* but has been refined for the Sydney Metro project.

Where JHLOR must undertake works outside of standard construction hours, and the activities are not permitted under the Laing O'Rourke EPL 21147, JHLOR will seek a variation from the NSW EPA to the licence in accordance with the requirements of the EPL.

4.2 Airborne Construction Noise

Noise Management Levels (NMLs) for residential land uses are presented in Table 4-1.

Table 4-1 Residential noise management levels

Time of day	Management level $L_{Aeq(15min)}$	How to apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise affected RBL + 10dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq(15min)}$ is greater than the noise affected level, the proponent would apply all feasible and reasonable work practices to minimise noise. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75dB	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent would consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent would communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.

Outside Recommended Standard Hours	Noise affected RBL + 5dB	A strong justification would typically be required for works outside the recommended standard hours. The proponent would apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dBA above the noise affected level, the proponent would negotiate with the community. For guidance on negotiating agreements see section 7.2.2 of the ICNG.

The NMLs for other land uses as outlined in the CNVS, applicable to this project are presented in Table 4-2.

Table 4-2 Non-residential noise management levels

Land use	Noise management level
Commercial premises	External noise level $L_{Aeq(15min)}$ 70dB
Industrial premises	External noise level $L_{Aeq(15min)}$ 75dB
Classrooms at schools and other educational institutions	Internal noise level $L_{Aeq(15min)}$ 45dB
Hospital wards and operating theatres	Internal noise level $L_{Aeq(15min)}$ 45dB
Places of worship	Internal noise level $L_{Aeq(15min)}$ 45dB
Active recreation areas (such as parks and sports grounds or playgrounds)	External noise level $L_{Aeq(15min)}$ 65dB
Passive recreation areas (such as outdoor grounds used for teaching, outdoor cafes or restaurants)	External noise level $L_{Aeq(15min)}$ 60dB
Child care centres	External noise level $L_{Aeq(1hr)}$ 55dB Internal noise level $L_{Aeq(1hr)}$ 40dB
Hotel – bars and lounges (day and evening period)	Internal noise level $L_{Aeq(15min)}$ 50dB
Hotel – sleeping areas (night period)	Internal noise level $L_{Aeq(15min)}$ 40dB
Cafés, bars and restaurants	Internal noise level $L_{Aeq(15min)}$ 50dB
Libraries	Internal noise level $L_{Aeq(15min)}$ 45dB
Recording Studios	Internal noise level $L_{Aeq(15min)}$ 25dB
Theatres / Auditoriums	Internal noise level $L_{Aeq(15min)}$ 30dB

The noise management levels for residential, commercial and industrial receivers are applicable to external areas of the premises. When assessing other sensitive non-residential receivers with internal noise criteria, such as education facility, place of worship or medical centre, a 10dB reduction through a partially open window can be assumed, as detailed in the ICNG and CNVMP (except where the building is air conditioned). This allows for equivalent predictions to external areas of the premises.

4.3 High Impact Noise

CoA-E24 places further restrictions on the hours that 'high noise impact' generating activities may occur, except as permitted by an EPL. Construction works and activities with the potential to generate high noise impact will be scheduled to occur between the hours of;

- 8:00am to 6:00pm Mondays to Fridays, inclusive;
- 8:00am to 1:00pm Saturdays; and
- In continuous blocks not exceeding three hours each with a minimum respite from those activities and Works of not less than one hour between each block.

EPL Condition L4.4 states: "*Unless otherwise specified by another condition of this licence, the following applies in relation to high noise impact works:*
High noise impact works and activities must only be undertaken:

1. *between the hours of 8:00am to 6:00pm Monday to Friday;*
2. *between the hours of 8:00am to 1:00pm Saturday; and*
3. *in continuous blocks not exceeding 3 hours each with a minimum respite from those activities and works of not less than 1 hour between each block.*

For the purposes of this condition 'continuous' includes any period during which there is less than a 1hour respite between ceasing and recommencing any of the work that is the subject of this condition."

Therefore the requirements of **CoA-E24** and EPL condition L4.4 align.

Notwithstanding CoA-E24, OOHW, including High Impact Noise, can be carried out under the circumstances prescribed in CoA-E20 (refer to Section 4.1 of this Plan for full list of circumstances listed under CoA-E20).

Other conditions relating to high impact noise include REMM NVC6 and REMM NVC10.

As per REMM NVC6, noise intensive plant for construction activities, including ballast tampers will not be used during the night time period (10.00pm to 7.00am) unless:

- during a weekend rail possession or shut down;
- a requirement of a road authority, emergency services or Sydney Coordination Office requires works to be undertaken during this period.

REMM NVC10 states "*High noise and vibration generating activities including ballast tamping may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block and these works."* JHLOR will schedule high noise and vibration generating activities in accordance with this REMM.

4.4 Sleep Disturbance

Section 12.2 of the Sydney Metro City and Southwest – Sydenham to Bankstown Upgrade Environmental Impact Statement (EIS) states "The appropriate screening criterion for sleep disturbance is a maximum level of 15 dB above the RBL, during the night time period (10pm to 7am). Where this criterion is met, sleep disturbance is unlikely for the majority of people, but where it is not met, a more detailed analysis is required."

The CNVS provides further assessment of sleep disturbance, indicating that one or two events per night, with maximum internal noise levels of 65-70dBA, are not likely to affect health and

wellbeing significantly.

Sleep disturbance rating background levels are presented in Table 4-3.

Table 4-3 Sleep disturbance rating background levels

NCA	Area	Night RBL 10pm-7am	Sleep disturbance screening criterion L_{AMAX}
NCA 01	Marrickville	33	48
NCA 02	Dulwich Hill	33	48
NCA 03	Hurlstone Park	34	49
NCA 04	Canterbury	35	50
NCA 05		32	47
NCA 06	Campsie	35	50
NCA07	Belmore	35	50
NCA08	Lakemba	41	56
NCA09	Wiley Park	36	51
NCA10	Punchbowl	41	56
NCA11	Bankstown	39	54

4.5 Construction Traffic Noise

As described in the CNVS there are no specific traffic noise criteria relating to construction work. Criteria are therefore adopted from *Road Noise Policy* (RNP) published by the EPA.

The CNVS states that construction traffic noise management levels are set 2dB above the existing road traffic noise levels during the day and night periods. Where the road traffic noise levels are predicted to increase by more than 2dB as a result of construction traffic, consideration is to be given to reasonable and feasible mitigation measures. In considering these mitigation measures, consideration would also be given to the actual noise levels associated with the construction traffic and whether or not these levels comply with the criteria in the *RNP*. These criteria are presented in Table 4-4.

REMM NVC15 requires that the routes for construction haulage vehicles and bus services associated with the Temporary Transport Strategy would be selected on the basis of compliance with the relevant road traffic noise criteria, where reasonable and feasible. Where compliance with the noise criteria is not possible, reasonable and feasible noise mitigation would be implemented.

Table 4-4 Road traffic noise criteria

Road type	Period	Criteria
Freeway Arterial Sub Arterial	Day	$L_{Aeq(15\ hour)}$ 60dB
	Night	$L_{Aeq(9\ hour)}$ 55dB
Local	Day	$L_{Aeq(15\ hour)}$ 55dB
	Night	$L_{Aeq(9\ hour)}$ 50dB

4.6 Building Damage Vibration Goals

Vibration due to construction has the potential to cause damage, both cosmetic and structural, to surrounding buildings. In accordance with CoA E29 the *German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures* is to be applied when assessing the potential for building damage.

The vibration guide values for building damage for typical buildings as outline in *DIN 4150-3-1999* are provided in Table 4-5.

Table 4-5 Vibration guide values for building damage – DIN 4150-3

Guideline values for velocity – mm/s (peak)				
Structure	**At foundation at a frequency of**			**Top storey (horizontal)**
	1 to 10 Hz	**10 to 50 Hz**	**50 to 100 Hz[1]**	**All frequencies**
Residential	5	5 to 15	15 to 20	15
Commercial / Industrial	20	20 to 40	40 to 50	40
Vibration Sensitive Structures, such as Heritage Structures	3	3 to 8	8 to 10	8

These values are generally considered very conservative for Australian buildings. Alternative values for vibration goals are found in the British Standard BS 7385-2:1993. CoA E29 requires these vibration criteria be applied "as applicable to Australian Conditions". The building damage vibration goals from this standard are summarised in Table 4-6.

Table 4-6 Vibration guide values for building damage – BS 7385-2

Type of building	**Peak Particle Velocity (PPV in mm/s) in the frequency range of predominant pulse**	
	4 Hz to 15 Hz	**15 Hz & above**
Reinforced or framed structures Industrial and heavy commercial buildings	50mm/s at 4 Hz and above	
Unreinforced or light framed structures Residential or light commercial type buildings	15mm/s at 4 Hz increasing to 20mm/s at 15 Hz	20mm/s at 15 Hz increasing to 50mm/s at 40 Hz and above

The British Standard states that "A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive."

Additionally, the CNVS provides screening criteria for construction activities that have the potential to cause building damage. These criteria, based on a conservative 50% of the *British Standard BS 7385-2:1993* levels, measured as Peak Component Particle Velocity (PCPV), are:

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

The CNVS suggests that heritage structures should not be assumed to be more sensitive to vibration sources and should be assessed by the same screening criteria, unless they are found to be structurally unsound after inspection. If a heritage structure is found to be structurally unsound, screening criteria of 2.5mm/s PCPV apply.

The proposed approach to assess building damage due to vibration is to apply the screening criteria outlined in the CNVS. It is not expected that the screening criteria will be exceeded for the proposed works, except possibly when working near the Cooks River Bridge. This bridge is an identified heritage structure, however, is of reinforced construction and already subject to vibration due to the rail line that it holds. It is therefore not structurally unsound and the same screening criteria apply.

Where the vibration screening level is expected to be exceeded for a particular structure, are more detailed assessment of the structure would be carried out to determine more appropriate vibration limits, as required by REMM NVC3. Additionally, if the structure is a heritage item then its heritage values will also be considered. A heritage specialist will also be consulted throughout the process as required by REMM NVC4. This is to occur before works occur near the heritage item, as construction methodologies are finalised.

Other vibration sensitive structures and utilities, such as medical facilities, underground pipelines and fibre optic cables are to be assessed on a case by case basis using limits provided by manufactures.

As required by CoA E18 all vibration sensitive receivers have been identified. There are a number of medical facilities which were identified during the land use survey. Fourteen exist within the commercial district along Beamish Street in Campsie, as well as one on Canterbury Road, Canterbury, two on Crinan Road, Campsie and four on Illawarra Road, Marrickville. These facilities have all been identified as small general practices and dental practices however there is still potential for them to house vibration sensitive medical equipment.

As required in the CNVS, attended vibration monitoring of each specific item of vibration intensive plant is to be conducted before beginning construction works to establish a more accurate minimum working distance. CoA E30 also requires that a heritage specialist be consulted when installing equipment used for vibration, movement and noise monitoring around heritage listed structures.

Continuous vibration monitoring with audible and visual alarms is required by the CNVS at the nearest sensitive receiver when activities are to occur inside the safe working distances.

4.7 Human Comfort Vibration Goals

In accordance with Assessing vibration: A technical guide (DEC, 2006), human comfort levels relating to vibration from continuous, impulsive and intermittent sources are measured as a Vibration Dose Value (VDV).

In the context of impact to human comfort continuous, impulsive and intermittent sources are defined within Assessing Vibration: A Technical Guide (DEC NSW 2006) as;

- Continuous vibration continues uninterrupted for a defined period (usually throughout daytime and/or night time).
- Impulsive vibration is a rapid build up to a peak followed by a damped decay that may or may not involve several cycles of vibration (depending on frequency and damping). It can

also consist of a sudden application of several cycles at approximately the same amplitude, providing that the duration is short, typically less than 2 seconds. Impulsive vibration will be experienced on no more than three occurrences in an assessment period

- Intermittent vibration can be defined as interrupted periods of continuous (e.g. a drill) or repeated periods of impulsive vibration (e.g. a pile driver), or continuous vibration that varies significantly in magnitude. It may originate from impulse sources (e.g. pile drivers and forging presses) or repetitive sources (e.g. pavement breakers), or sources which operate intermittently, but which would produce continuous vibration if operated continuously (for example, intermittent machinery, railway trains and traffic passing by).

Table 4-7 indicates the preferred and maximum Vibration Dose Value for intermittent vibration.

Table 4-7 Vibration Dose Value goals

Place	Time	Vibration dose ($m/s^{1.75}$)	
		Preferred	Maximum
Residences	Daytime	0.20	0.40
	Night time	0.13	0.26
Offices	Day or night time	0.40	0.80
Workshops	Day or night time	0.80	1.60

It is not always practical to measure VDV during construction works, as the calculation relies upon duration, intensity and characteristic frequency of the measured vibration events throughout a work day.

In some cases, it may be necessary to relate to an instantaneous measurement, such as Peak Particle Velocity (PPV). Appendix C of Assessing vibration: A technical guide (DEC, 2006) provides guidance on relating measurements of continuous and impulsive vibration to PPV. The criteria are included within Table 4-8.

Table 4-8 Criteria for exposure to continuous and impulsive vibration

Place	Time	Peak Particle Velocity (mm/s)	
		Preferred	Maximum
Continuous vibration			
Residences	Day	0.28	0.56
	Night	0.20	0.40
Offices	Day or Night	0.56	1.1
Workshops	Day or Night	1.1	2.2
Impulsive vibration			
Residences	Day	8.6	17.0
	Night	2.8	5.6
Offices	Day or Night	18.0	36.0
Workshops	Day or Night	18.0	36.0

4.8 Ground-Borne Noise

Structure-borne or ground-borne noise is noise generated by vibration transmitted through the ground into a structure that may lead to noise "regenerated" within a space in the building. The Construction Noise and Vibration Strategy provides criteria for both residential and commercial

receivers, at various time periods. The ground-borne noise criteria are presented in Table 4-9.

Table 4-9 Ground-borne noise management levels

Period	Receiver	$L_{Aeq,15min}$ (Internal)
Day (7.00am-6.00pm)	Residential	45
	Commercial	50
Evening (6.00pm-10.00pm)	Residential	40
Day (10.00pm-7.00pm)	Residential	35

The CNVS states that these criteria are only applicable when ground-borne noise levels are higher than the airborne noise levels. All of the proposed works will take place at or above ground level. There are no tunnelling or deep excavation works proposed and therefore ground-borne noise is unlikely to be present at levels above the airborne noise levels.

It is noted that the Condition L4.5 of the EPL states that the licensee must identify all receivers likely to experience internal noise levels greater than $L_{Aeq(15\ minute)}$ 60 dB(A) inclusive of a 5dB penalty, if rock breaking or any other annoying activity likely to result in regenerated (ground-borne) noise or a perceptible level of vibration is planned, between 7am to 8pm. This condition is not expected to be triggered. This condition is included within the EPL to meet the requirements of the Sydney Metro City and Southwest Chatswood to Sydenham Planning Approval and does not relate to SMEW.

5 ASPECTS & POTENTIAL IMPACTS

Table 5-1 includes the aspects and potential impacts for construction noise and vibration.

Noise and vibration risks are assessed within Appendix C of the Construction Environmental management Plan (CEMP).

Table 5-1 Noise & vibration aspects and potential impacts

Aspects	Potential impacts / opportunities
Noisy works	Annoyance to residents
Out of hours works	Sleep disturbance Annoyance to residents
Vibratory works near residential properties	Annoyance to residents Structural damage
Vibratory works near industrial/commercial properties	Annoyance to workers Disruption to industrial or commercial processes that are sensitive to vibration Interference with vibration sensitive equipment Structural damage
Vibratory works near heritage items	Damage to heritage items Potential fines

6 PREDICTED NOISE & VIBRATION LEVELS

A project specific CNVIS has been prepared for these works, as required in CoA E27. The CNVIS has predicted noise and vibration levels for a range of scenarios and compared them against the criteria and guidelines detailed in Section 4 of this management plan. Measures to manage the predicted impacts are derived from Section 7 of this management plan. Where impacts are predicted, mitigation measures as identified in Section 7 are recommended. Additionally, predictions and outcomes of the CNVIS have been used to revise the management methodology and mitigation measures in Section 7.

Predicted noise and vibration levels from the CNVIS are available in Appendix D.

A detailed land use survey has been undertaken to confirm sensitive receivers (including critical working areas such as operating theatres and precision laboratories) potentially exposed to construction noise and vibration and construction ground-borne noise. It is noted that there is no operational noise associated with the design components.

Most of the works occurring along the rail corridor are in close proximity to receivers, a large proportion of which are residential. Works for Scenario 1 (CSR/drainage/HV) are predicted to have impacts in all NCAs apart from NCA7, works for Scenario 2 (fencing) are expected to have impacts in all NCAs apart from NCA7, NCA8, NCA9, NCA10 & NCA11. While noise impacts from Scenario 3, Scenario 4 (both retaining walls) and Scenario 5 are confined to NCA 04 and NCA 05. The Highly Affected Noise Management Level is not predicted to be exceeded for any of the works. The use of the emergency generators (Scenario 6) is expected to have a minor impact only in most NCA's, including NCA 07. It is not expected however that the generators will be used throughout the duration of construction works. Works for Scenario 7, 8 and 9 (site compound works) will only take place during standard construction hours and are predicted to mainly impact NCA 04. Scenario 7 is also predicted to exceed criteria in NCA 03, while the highly affected noise level is predicted to be exceeded in NCA 04 during Scenario 8.

The CNVIS has assessed expected vibration levels for the proposed construction works. It has been determined that the works will not generate vibration that would be perceptible within nearby receivers, with the exception of the use of the vibratory roller for the retaining wall earthworks. Vibration from this activity will potentially exceed relevant criteria for human comfort. The vibratory roller also has the potential to exceed the building damage screening criteria for the Heritage listed Cooks River Bridge. As outlined in Section 7 and Section 8 below, monitoring will be undertaken to more accurately assess the vibration impacts.

Where trucks travel past residences, some traffic noise impact may occur. It has been deemed unfeasible for JHLOR to place noise barriers or other noise attenuation measures at receivers for these intermittent noise impacts. The most effective mitigation measure for haulage vehicles therefore involves controlling the path of the vehicles. Trucks should be restricted to using routes and access gates that are not on local roads whenever possible. Trucks will still be required to use local roads to access some areas of the site, that are otherwise inaccessible via main roads and therefore some impacts will occur. Reasonable mitigation measures for reducing noise impacts from construction haulage include;

- Construction haulage to occur within standard hours, where possible. This includes scheduling the delivery of components to be used for OOHW to occur earlier, during standard hours.
- Construction haulage will occur via main roads, rather than local roads where possible.

- Planning and selection of laydown areas to favour areas accessible by main roads, rather than those only accessible by local roads, where possible
- Gate keepers or personnel available to open gates to mitigate noise from construction haulage idling on local roads

7 NOISE & VIBRATION MANAGEMENT & MITIGATION

In accordance with CoA C1 this section of the plan will detail the noise and vibration management and mitigation to be implemented during the proposed works.

7.1 Site Noise Mitigation Measures

The following general noise and vibration mitigation measures should be implemented where practicable:

- The layout of construction sites will aim to minimise airborne noise impacts to surrounding receivers.
- Residential grade mufflers would be fitted to all mobile plant.
- Selection of low noise / vibration generating equipment for use on site, when a range of equipment types is available.
- Scheduling respite – three hours 'on' and one hour 'off' for activities identified as high noise / vibration intensive activities (as per the Project EPL, CNVIS or specific noise and vibration impact statements developed for out of hour works).
- Where there is flexibility as to where equipment can be located or operated, ensure that the equipment is located as far as practicable from nearby residential receivers.
- Avoid loading and unloading of trucks at locations on the site which are close to residential receivers.
- Construction equipment and trucks on site are to be fitted with non-tonal reversing alarms (also known as "quackers"). This approach will extend to hire equipment including EWP that will be fitted with non-tonal booms.
- The mitigation measures outlined within Section 7 of the CNVS are to be applied. These include;
    - Construction hours would be in accordance with the *ICNG*, project approvals and the EPL, except where otherwise specified in an approved noise management plan.
    - When working adjacent to schools, medical facilities and childcare centres, particularly noisy activities would be scheduled outside normal working hours, where feasible and reasonable.
    - When working adjacent to churches and places of worship particularly noisy activities would be scheduled outside services, where feasible and reasonable.
    - Avoiding the coincidence of noisy plant working simultaneously close together and adjacent to sensitive receivers will result in reduced noise emissions.
    - Where feasible and reasonable, the offset distance between noisy plant items and nearby noise sensitive receivers would be as great as possible.

- Regular compliance checks on the noise emissions of all plant and machinery used for the project would indicate whether noise emissions from plant items were higher than predicted. This also identifies defective silencing equipment on the items of plant.
- Ongoing noise monitoring during construction at sensitive receivers during critical periods (i.e. times when noise emissions are expected to be at their highest – e.g. piling and hammering) to identify and assist in managing high risk noise events.
- Where feasible and reasonable heavy vehicle movements would be limited to daytime hours.
- The implementation of procedures to maximise the night time onsite spoil storage capacity where spoil is produced between the hours of 10.00pm and 7.00am.

The additional mitigation will be identified within the CNVIS and any specific OOH Noise and Vibration Impact Statements in accordance with the CNVS's additional mitigation measures outlined in Section 7.2.

Reasonable and feasible mitigation measures would be implemented where power supply works would result in elevated noise levels at receivers. This could include; carrying out works during the daytime period when in the vicinity of residential receivers, where out of hours works are required, scheduling the noisiest activities to occur in the evening period (up to 10pm) use of portable noise barriers around particularly noisy equipment.

CoA E32 states that any operational noise mitigation measures not physically affected by construction must commence implementation within six months of construction commencing. As these works are early works only there is no associated permanent operational noise mitigation, and the requirements of CoA E32 and CoA E33 are not relevant to the current scope of works. If the scope of works changes, CoA E32 and CoA E33 will be reassessed for relevance and, if required, this Plan will be updated. Any updates to this plan will be assessed by the ER in accordance with CoA A26.

It is the responsibility of the Environmental Manager (or delegate) and the Construction Manager to plan and provide for all mitigation measures to be implemented. The Superintendent is responsible for installation of all physical mitigation measures, including measures relating to plant, on the project site.

7.2 Source Noise Control Strategies

The following source noise control strategies will be utilised, as per Section 7 of the CNVS;

- Engines and exhausts are typically the dominant noise sources on mobile plant such as cranes, graders, excavators, heavy vehicles, etc. In order to minimise noise emissions, residential grade mufflers would be fitted on all mobile plant utilised on Sydney Metro construction projects.
- Regular maintenance of all plant and machinery used for the project will assist in minimising noise emissions, including the reporting of the results.
- Acoustic enclosure of plant items, if required, as identified during compliance monitoring.
- Air brake silencers would be correctly installed and fully operational for any heavy vehicle that approaches and uses any Sydney Metro construction site.

- Non-tonal reversing alarms would be used for all permanent mobile plant operating on Sydney Metro construction projects. Whilst the use of non-tonal reversing alarms is suggested to ensure noise impacts are minimised, it is noted that OH&S requirements must also be fully satisfied.

It is the responsibility of the Environmental Manager (or delegate) and the Construction Manager to plan and provide for all mitigation measures to be implemented. The Superintendent is responsible for installation of all physical mitigation measures, including measures relating to plant, on the project site.

7.3 Noise Barrier Control Strategies

Section 7 of the CNVS states "Temporary noise barriers are recommended between the noise sources and nearby potentially affected noise sensitive receivers, wherever feasible. Typically, 5dB to 15dB attenuation can be achieved with a well-constructed barrier."

The majority of the works will largely be short-term. The works will also cover large areas and be constantly moving throughout the site. The nature of these works therefore makes it difficult or not possible to position the barriers close to the works where maximum noise mitigation will occur.

Embankment stabilisation and retaining wall works will occur in three sections as described in Section 1.1. Residents and the recreational facility adjacent to the retaining wall works would gain minor benefits from temporary noise barriers as the majority of the works will occur on the embankment, above the height of the noise barriers. In particular residents adjacent to RW1 reside within high rise apartment and would receive no attenuation from noise barriers. It is noted that based on the CNVIS, noise levels associated with retaining wall works (Scenario 3 and 4) exceed the NML but do not exceed the highly noise affected level of 75dBA. The majority of these works will occur during standard construction hours. Therefore, due to the nature of the works as described above, noise barriers placed on the boundary of the work site are unlikely to effectively mitigate noise. It is therefore not reasonable or feasible to utilise noise barriers for this project. However, the practicality and feasibility of using noise barriers as a mitigation measure should continually be reviewed throughout the project.

For Canterbury Compound set-up activities (Scenarios 7, 8 and 9), the worst affected receivers directly to the east of these works will not achieve significant benefit from noise barriers as they are at an elevated position. Appropriate respite and consultation is favoured in this instance.

Buildings located to the west of the compound are commercial. Noise management levels for commercial premises are expected to be exceeded for a short duration during demolition of the Canterbury Bowls Club building. The noisiest part of this activity, hammering, is expected to occur intermittently over a number of days. Installation of hoarding in this instance is not feasible – consultation will be favoured.

Properties to the north of the proposed Canterbury compound area are located on the other side of the rail corridor, on top of a cutting. Installing hoarding on the northern boundary will not provide any benefit.

Parkland is located on the southern side of the proposed Canterbury compound. Due to access and space restrictions it is not possible to install hoarding along the southern boundary of the Canterbury compound during compound set up and building demolition. Due to the short duration

of the works impacts will be negligible. Consultation for park users through signage will be favoured. Residents on the southern side of the Cooks River will be notified of works in accordance with the Sydney Metro CNVS.

The positioning of the double storey site office at the eastern end of the compound area is expected to provide a significant reduction of noise impacts due to the ongoing use of the laydown area within the site compound.

It is the responsibility of the Environmental Manager (or delegate) and the Construction Manager to plan and provide for all mitigation measures to be implemented. The Superintendent is responsible for installation of all physical mitigation measures, including measures relating to plant, on the project site.

7.4 Demolition Strategies

Demolition of the existing structure within the Close Street compound is proposed as part of these works. These demolition works are not expected to be significantly more noise intensive than other construction activities associated with these works. Noise and vibration management and mitigation practices for these works should be consistent with the practices outlined in Section 7.1 above.

7.5 Vibration Control Strategies

Section 7 of the CNVS states that "Attended vibration measurements are required at the commencement of vibration generating activities to confirm that vibration levels satisfy the criteria for that vibration generating activity. Where there is potential for exceedances of the criteria further vibration site law investigations would be undertaken to determine the site-specific safe working distances for that vibration generating activity. Continuous vibration monitoring with audible and visible alarms would be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the calculated safe-working distances."

It is noted that a site assessment would be necessary to determine whether visible or audible alarms are appropriate for the subject area, depending on any businesses, residents, staff or commuters that may be disturbed by these alarms.

Safe working distances for vibration intensive plant are found in the Sydney Metro Construction Noise and Vibration Strategy. An extract of these distances is included within the CNVIS, found in Appendix D.

The distances identified represent the worst-case safe working distances. Plant and construction methods that minimise vibration in vibration sensitive areas, including near residences and heritage structures should be selected. An example of changing construction methodology would be to use a smaller vibratory roller near sensitive structures, to trial the vibratory roller at different frequencies or to determine whether static rolling could be used for any portion of the works near sensitive structures.

Where a building or other structure is located within the safe working distance of an area where vibratory plant is to be used and the screening levels are expected to be exceeded, an assessment of the building to determine whether the works are likely to cause damage to the building is to be undertaken. This assessment will also develop more accurate vibration criteria levels for each specific building. This will be done in consultation with a heritage expert if the structure is a heritage item, as outlined in Section 4.6.

Vibration monitoring will be conducted before and during works where buildings or structures exist within the safe work distances of vibratory plant. If vibration criteria are exceeded, then works will stop and construction methodology will be further reviewed.

As per REMM NVC10 any high vibration generating activity may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block of these works.

It is the responsibility of the Environmental Manager (or delegate) and the Construction Manager to plan and provide for all mitigation measures to be implemented. The Superintendent is responsible for installation of all physical mitigation measures, including measures relating to plant, on the project site.

7.6 Community Consultation & Additional Mitigation Measures

Consultation with and the provision of information to the surrounding community is regarded as a major factor in controlling the negative reaction to the inevitable noise emanating from the construction site. Consultation with the community will be managed by the Communication and Stakeholder Relations Manager in accordance with the Community Communications Strategy (CCS)

Notifications will be provided to residents and businesses surrounding the construction site on a monthly basis and as required in accordance with the CNVS mitigation measures and Condition L4.12 of the EPL. Notifications will include work hours, activities and plant and contact details for complaints and enquiries. Other sources of information will include a project website, the project information and construction response telephone line and email distribution lists. Notifications will be made at least 7 days prior to works. Particularly noisy construction activities taking place in the vicinity of potentially affected community, medical, religious, or educational institutions or child care centres will not be timetabled within sensitive periods, such as normal working hours or scheduled services. Consultation will occur on an on-going basis, but no later than 7 days for specific construction works. Other reasonable arrangements with the affected institutions are to be made at no cost to the affected institution or as otherwise approved by the Planning Secretary if works are to occur during these sensitive periods. Consultation with these receivers will take as soon as the works are confirmed, but no later than 7 days prior to the work.

In addition to the above community consultation, the Construction Manager will liaise with other construction works in the area, most notably the Sydenham Station and Junction (SSJ) project, Line Wide works, South West Metro Main Works and maintenance works on the Port Botany Freight Line (ARTC). Reasonable steps will be taken to coordinate works to minimise cumulative impacts of noise and vibration and maximise respite for affected sensitive receivers.

REMM NVC7 states "*When working adjacent to schools, medical facilities and child care centres, particularly noisy activities would be scheduled outside normal working hours, where reasonable and feasible*."

REMM NCV8 states "*When working adjacent to churches and places of worship, particularly noisy activities would be scheduled outside services, where reasonable and feasible*."

To comply with REMMs NVC7 and NVC8 JHLOR will undertake a sensitive receiver's survey to determine sensitive periods for these facilities and to determine how construction works can be scheduled to mitigate impacts.

In accordance with the CNVS, additional mitigation measures will be applied to eligible property owners as per Table 7-1, Table 7-2 and Table 7-3.

Table 7-1 Additional mitigation measures

Measure	Abbreviation
Alternative Accommodation	AA
Monitoring	M
Individual Briefings	IB
Letter Box Drops	LB
Project-specific Respite Offer	RO
Phone Calls	PC
Specific Notifications	SN

Table 7-2 Additional mitigation measures matrix (AMMM) – (airborne construction noise)

Time Period		Mitigation Measures			
		$L_{eq,15min}$ noise level above background (RBL) in dBA			
		0 to 10	11 to 20	21 to 30	>30
		Noticeable	Clearly audible	Moderately intrusive	Highly intrusive
Standard	Mon-Fri (7am-6pm) Sat (8am-1pm) Sun/Pub Hol (Nil)	-	-	M, LB	M, LB
OOHW Period 1	Mon-Fri (6pm-10pm) Sat (7am-8am & 1pm-10pm) Sun/Pub Hol (8am-6pm)	-	LB	M, LB	M, IB, LB, PC, RO, SN
OOHW Period 2	Mon-Fri (10pm-7am) Sat (10pm-8am) Sun/Pub Hol (6pm-7am)	LB	M, LB	M, IB, LB, PC, SN	AA, M, IB, LB, PC, RO, SN

Table 7-3 Additional mitigation measures matrix (AMMM) – (ground-borne vibration)

Time period		Mitigation measures
		Predicted vibration levels exceed maximum levels
Standard	Mon-Fri (7am-6pm) Sat (8am-1pm) Sun/Pub Hol (Nil)	M, LB, RO
OOHW Period 1	Mon-Fri (6pm-10pm) Sat (7am-8am & 1pm-10pm) Sun/Pub Hol (8am-6pm)	M, IB, LB, PC, RO, SN
OOHW Period 2	Mon-Fri (10pm-7am) Sat (10pm-8am) Sun/Pub Hol (6pm-7am)	AA, M, IB, LB, PC, RO, SN

If out of hours works are being undertaken in accordance with the community agreement provisions as per condition L4.10 of the EPL, the requirements of conditions E1.1 to E1.8 will apply

7.7 Hours of Operation & Out of Hours Work

Where works are necessary outside of the standard construction hours as identified in Section 4.1 and aren't subject to the EPL, an Out of Hours Work Protocol (OOHW Protocol) has been be prepared as required by CoA E25 (refer to Appendix C). This condition requires the OOHW Protocol to:

a) provide a process for the consideration of Out of Hours Work against the relevant noise and vibration criteria, including the determination of low and high-risk activities;

b) provide a process for the identification of mitigation measures for residual impacts, including respite periods in consultation with the community at each affected location, consistent with the requirements of Condition E23;

c) identify procedures to facilitate the coordination of Out of Hours Work approved by an EPL to ensure appropriate respite is provided;

d) identify an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where:

   i. low risk activities and high-risk activities that cease by 9pm can be approved by the ER, and

   ii. all other high-risk activities must be approved by the Planning Secretary; and

e) identify Planning Secretary, EPA and community notification arrangements for approved Out of Hours Work, which may be detailed in the Community Communication Strategy.

In accordance with CoA-E23, in order to undertake Out of Hours Work, the Proponent must identify appropriate respite periods for the Out of Hours Work in consultation with the community at each affected location on a regular basis. This consultation must include (but not be limited to) providing the community with a schedule of likely Out of Hours Work for a period no less than two (2) months;

a) the potential work, location and duration;

b) the noise characteristics and likely noise levels of the Work; and

c) likely mitigation and management measures.

The outcomes of the community consultation, the identified respite periods and the scheduling of the likely Out of Hours Work must be provided to the EPA and the Planning Secretary (for high risk activities after 9pm) upon request.

To comply with CoA-E23 JHLOR will undertake consultation on an ongoing basis, door-knocking or calling sensitive receivers to determine appropriate respite periods. During consultation the receiver will be provided with information on upcoming works, including those details required under CoA-E23. Consultation outcomes will be recorded under Consultation Manager and will be reported to the Environmental Manager and Construction team.

On becoming aware of the need for emergency work in accordance with Condition E20(b), JHLOR will notify the ER and the EPA (via Sydney Trains as per the Sydney Metro/Sydney Trains interface agreement) of the need for that Work. JHLOR will use best endeavours to notify all noise and/or vibration affected sensitive receivers of the likely impact and duration of those Work.

It is the responsibility of the Construction Manager and Superintendent to notify the

Environmental Manager of any planned out of hours work and to provide all relevant information for undertaking any out of hours work assessment. It is the responsibility of the Environmental Manager (or delegate) to undertake an assessment of the out of hours works and to process any out of hours works documentation.

As per REMM NVC6, noise intensive plant for construction activities, including ballast tampers will not be used during the night time period (10.00pm to 7.00am) unless:

- during a weekend rail possession or shut down;
- a requirement of a road authority, emergency services or Sydney Coordination Office requires works to be undertaken during this period.

7.7.1 Exemptions to Standard Construction Hours within the Laing O'Rourke EPL

In accordance with EPL condition L4.2 low noise work may occur outside the standard construction hours where the requirements of the condition is met.

In addition to this, EPL condition L4.3 allows for works to occur outside of standard construction hours during exceptional circumstances, including emergencies, delivery of oversized plant outside of standard hours and directed by authorised authorities. On becoming aware of the need to undertake emergency works under conditions of EPL 21147, contractors must notify the EPA as per L4.3b) and submit a report no later than 2pm the next business day.

Condition 4.6 of the EPL permits work to occur outside of standard hours during Local Possessions.

Conditions 4.7, 4.8 and 4.9 of the EPL allow for Local Area and Utility Works to be undertaken where the works meet the requirements of these conditions. ;

In accordance with Condition 4.10 and 4.11, JHLOR may also undertake works in agreement with the community and as approved by the NSW EPA.

7.8 Site Environment Induction & Training

All personnel, including contractors' and sub-contractors' employees, to work on site should be given an environmental induction prior to the commencement of work. This induction should include the following:

- Explanation of the nearby noise and vibration sensitive receivers and the expected level of sensitivity;
- Site-specific noise and vibration mitigation measures adopted;
- All relevant project specific and standard noise and vibration mitigation measures;
- Relevant licence and approval conditions;
- Permissible hours of work;
- Any limitations on high noise generating activities;
- Location of nearest sensitive receivers;

- Construction employee parking areas;
- Designated loading/unloading areas and procedures;
- Site opening/closing times (including deliveries);
- Environmental incident reporting and management procedures; and
- Complaints procedures.

Additional training will be provided to the workforce during toolbox talks which will explain the aspects of noise and vibration management in further detail.

It is the responsibility of the Safety Manager (or delegate) to ensure all project personnel are inducted to site. It is the responsibility of the Environmental Manager and Construction Manager to identify the need for (and where appropriate deliver) additional training.

Refer to the CEMP for further information on environmental training.

7.9 Neighbour Friendly Behaviour

Some basic rules are required at the site to ensure that unnecessary noise is not created in a way that may affect nearby residential receivers:

- No swearing on site;
- No unnecessary shouting or loud radios;
- No allowing gates to clanging when opening and shutting;
- No dropping of materials during work, loading or unloading, such as formwork; and
- No unnecessary use of equipment on site which could be turned off or left on low idle when not used.

It is the responsibility of all project personnel to comply with Neighbour-friendly Behaviour. It is the responsibility of the Environmental Manager, Construction Manager and Superintendent to communicate the expected behaviour to project personnel

7.10 Restriction on Deliveries & Site Access

Deliveries to site and removal of material from site is to be restricted to standard construction hours, unless otherwise approved.

Access to the site will be the access points specified in the Construction Traffic Management Plan. These will consist of existing Sydney Trains access gates and any new gates that need to be constructed to access the corridor. All trucks should comply with sign-posted speed limits.

It is the responsibility of the Construction Manager and Superintendent to ensure that deliveries occur in accordance with this section

7.11 Noise & Vibration Complaints

A Noise & Vibration Complaint Protocol has been developed for the Project. The contact details (phone number, email address and postal address) has been widely distributed to the surrounding

residential areas. The contact details continue to be widely distributed via ongoing notifications.

In accordance with the Community Communication Strategy, all complaints or enquiries should be kept within the complaints management system, Consultation Manager. This includes any complaints relating to noise or vibration. The following details are to be recorded:

- Date and time of complaint or enquiry;
- Means by which the complaint or enquiry was made;
- Details of the complainant;
- The nature of the complaint or enquiry; and
- Any action taken to investigate the complaint or enquiry, and the date of follow up with the complainant.

All complaints of noise and vibration shall be investigated in accordance with condition M6.5 of the EPL and action to be taken to remove the cause of the complaint (where possible) shall be determined and registered. In all cases, a response shall be provided to the complainant after investigation. The Sydney Metro complaints management system, Consultation Manager, will be used manage the register of complaints.

Records of community enquiries and complaints, and the Contractor's response will be maintained by the Consultation Manager.

The EPA will be notified of any noise complaints in accordance with condition R4.1 of the EPL.

7.12 Cumulative Impacts

Consultation with other construction projects within the vicinity to mitigate cumulative impacts from multiple work fronts will be undertaken. This will include coordinating works to provide respite for receivers, coordinating work locations to mitigate cumulative impacts and coordinating communications to receivers

The most notable other works in the vicinity of these works are the Sydenham Station and Junction (SSJ) project, the Line Wide works and the South West Metro Main Works. Other potential works include Sydney Trains maintenance works and Inner West Council works.

Other works in the vicinity of this project with the potential to have a cumulative noise or vibration impact should be added to the above list as identified.

JHLOR will ensure all works (including utility works associated with the CSSI where undertaken by third parties) are coordinated to provide the required respite periods identified in accordance with the terms of this approval.

It is the responsibility of the Construction Manager and Environmental Manager (or delegate) to ensure any cumulative impacts are accounted for during the works.

7.13 Utility Coordination and Respite

Utility work associated with the Sydney Metro City & Southwest Sydenham to Bankstown Project, including work undertaken by third parties, will be coordinated to ensure appropriate respite periods are provided.

JHLOR will coordinate any utilities work, in consultation with the Utility Coordination Manager as identified in the SMEW Utilities Management Strategy, to minimise noise impacts associated with Project utility works.

JHLOR, in consultation with the Utilities Coordination Manager, will schedule or reschedule work to provide respite to impacted noise sensitive receivers so that the respite is achieved in accordance with CoA-E23.

JHLOR will consider the provision of alternative respite or mitigation to impacted noise sensitive receivers.

JHLOR will also provide documentary evidence to the ER in support of any decision made by JHLOR and the Utility Coordination Manager in relation to respite or mitigation.

8 CONSTRUCTION NOISE & VIBRATION MONITORING PROGRAM

In accordance with CoA C8 – C15, a Construction Noise and Vibration Monitoring Program will be implemented for the project. The proposed monitoring program detailed within this section will be further refined with monitoring data collated within the first 12-month period from construction commencement. Any changes made would be subject to ER review and approval in line with CoA – C13.

8.1 Baseline Data

Unattended noise monitoring undertaken as part of the EIS will be used as baseline data for the Southwest Metro Early Works. The monitoring was undertaken by SLR Consulting Australia Pty Ltd over 23 locations between Sydenham and Bankstown from 21 June to 4 July 2016. As explained in Section 3.1 due to discrepancies in the reporting of the EIS background monitoring, results from different monitoring locations have been assigned to NCA 01 and NCA 02. These results are still believed to accurately represent the existing noise environment for these catchment areas and no further baseline data is required or will be obtained. The results of the baseline monitoring are shown in Table 8-1.

Table 8-1 Location & results of baseline monitoring

ID	NCA	Location	Daytime RBL (7am-6pm)	Evening RBL (6pm-10pm)	Night RBL (10pm-7am)
B.02	NCA01	10 Leofrene Avenue, Marrickville 2204	38	38	33
B.03	NCA02	18 Randall Street, Marrickville 2204	38	38	33
B.06	NCA03	3 Commons Street, Hurlstone Park 2193	38	38	34
B.07	NCA04	9 Canberra Street, Hurlstone Park 2193	40	40	35
B.09	NCA05	5 South Parade, Canterbury 2193	36	36	32
B.10	NCA06	34 North Parade, Campsie 2194	45	42	35
B.13	NCA07	10 Acacia Street, Belmore 2192	41	41	35
B.14	NCA08	17 The Boulevarde, Lakemba 2195	47	47	41
B.16	NCA09	66 Railway Parade, Lakemba 2195	44	44	36
B.19	NCA10	42 Urunga Parade, Punchbowl 2196	47	47	41
B.20	NCA11	90 South Terrace,	47	47	39

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The CNVIS identifies safe working distances for vibratory activities planned to be undertaken as part of SMEW. These safe working distances are considered the baseline criteria for construction monitoring of vibratory works (i.e. they identify where the screening criteria identified in Section 4.6 will be exceeded). A copy of the safe working distances as stated within the CNVIS are included within Appendix D.

8.2 Monitoring

There are seven NCAs potentially affected by construction noise. Three of the catchments with a number of residential receivers, NCA4, NCA5 and NCA6, will be impacted most regularly.

Monitoring will be carried out as follows:

- Ongoing attended noise monitoring will be undertaken at nearby residential receivers as required by Section 8.2 of the CNVS (summarised in Table 7-2 of this CNVMP) and REMM NVC11. JHLOR would utilise noise monitoring locations that represent the potentially worst affected receivers for the current activity. The potentially worst affected receivers should be identified on a case by case basis for each construction activity. A minimum of 2-3 receivers should be identified for each activity. The monitoring will take place when noise emissions are expected to be at their highest for the activity. The $LA_{eq15min}$ and L_{Amax} levels would be recorded during attended noise monitoring as a minimum, and the results used to assist in managing high risk noise events. Additionally, attempts will be made to quantify the ambient noise levels by recording L_{Amax}, L_{A1}, L_{A10} and L_{A90} where possible, as outlined in the CNVS.
- Attended noise monitoring would be undertaken in the event of a noise complaint determined to be from JHLOR activities. Monitoring will be undertaken at the complainant's property, nearest to any work.
- Noise monitoring will be undertaken in accordance with Section 9.2 of the CNVS to assess predicted noise levels for each scenario within the CNVIS against the NMLs for each NCA.
- Default noise monitoring locations are included within Table 8-2. These are based on noise monitoring locations used to capture baseline data. These locations should be used where the noise impacts are expected to be equal throughout the Noise Catchment Area. Monitoring should also be undertaken at the nearest receiver to the works in addition to these default locations.

Table 8-2 Default Noise Monitoring Locations

NCA	Monitoring ID	Location
NCA1	SMEW1	10 Leofrene Avenue, Marrickville 2204
NCA2	SMEW2	18 Randall Street, Marrickville 2204
NCA3	SMEW3	3 Commons Street, Hurlstone Park 2193
NCA4	SMEW4	9 Canberra Street, Hurlstone Park 2193
NCA5	SMEW5	5 South Parade, Canterbury 2193
NCA6	SMEW6	34 North Parade, Campsie 2194
NCA7	SMEW7	10 Acacia Street, Belmore 2192
NCA8	SMEW8	55 Railway Parade, Lakemba 2195
NCA9	SMEW9	57 Railway Parade, Lakemba 2195
NCA10	SMEW10	42 Urunga Parade, Punchbowl 2196
NCA11	SMEW11	74 South Terrace, Bankstown 2200

8.2.1 Plant Noise Auditing

Plant noise will be assessed in accordance with the maximum allowable sound power levels for construction equipment as per Table 11 within the CNVS. Measurement will occur in accordance with the guidance provided under Section 9.1 of the CNVS. The Sound Power Level (L_W) will be measured at a distance of 7m.

8.2.2 Vibration Monitoring

In accordance with the CNVIS, vibration impacts on surrounding residents and commercial proprieties are expected to be minimal. Vibration associated with the works is likely to impact on the Cooks River Bridge and should be monitored as outlined below. In general, vibration associated with the use of a vibratory roller is predicted to have a minor impact to human comfort only on structures outside the corridor. Vibration associated with Canterbury compound earthworks will likely exceed human comfort criteria – monitoring will take place during the works.

In accordance with REMM NV3, any construction activity that is predicted to produce vibration levels at a receiver in excess of the vibration screening level a detailed assessment of the structure would be undertaken. This assessment would be used to determine more appropriate vibration limits for that structure.

Safe working distances for vibratory plant to be used on the project is included within Appendix D. Construction planning indicates that structures exist within the safe work distances of plant to be used across the site. Any structure within the safe working distances is considered to be potentially impacted by vibration and as such vibration monitoring will be undertaken in accordance with this section. Monitoring will be carried out as follows:

- JHLOR will conduct vibration testing before and during vibration generating activities that have the potential to cause impact to identify minimum working distances to prevent cosmetic damage. In the event that the vibration testing and monitoring shows that the preferred values for vibration are likely to be exceeded, JHLOR will review the construction methodology and, if necessary, implement additional mitigation measures.
- Advice from the Project engaged Heritage Consultant will be sought in accordance with **CoA – E30** on methods and locations for installing equipment used for vibration and movement of, and noise monitoring at, heritage listed structures where required.
- Vibration monitoring parameters will include;
    - Peak Particle Velocity (PPV) for continuous vibration sources, relating to structural damage, cosmetic damage and human comfort criteria.
    - Vibration Dose Value (VDV) for transient and intermittent works, relating to human comfort criteria.
- Vibration limits will be set in accordance with the criteria established in Section 4.7 and Section 4.8. Where levels exceed the applicable alert level, the offending operation if related to SMEW must cease and be modified, or alternative methods adopted, to remain under this alert level. Vibration alert levels will be refined during the works to ensure these remain appropriate taking into account management of any heritage buildings found to be structurally unsound.
- Attended vibration monitoring will be undertaken at nearby residential receivers as required

by Section 8.2 of the CNVS (summarised in Table 7-3 of this CNVMP). JHLOR would undertake monitoring at the closest receiver to the works.

- Attended vibration monitoring would be undertaken in the event of a vibration complaint. Monitoring will be undertaken at the complainant's property, nearest to any work.

Vibration monitoring will be undertaken in accordance with Section 9.3 of the CNVS. This includes where it is anticipated that vibration levels will cause an exceedance to cosmetic damage criteria (monitored at nearest affected receiver). Monitoring is to also occur where an exceedance to the human response/ ground borne noise criteria will be exceeded and concerns have been raised regarding vibration (monitored at the receiver(s) under question).

8.2.3 General Monitoring Requirements

Attended noise/vibration monitoring will also be undertaken as required in accordance with the EPL and/or CNVS, at representative stages of out of hour works. Vibration monitoring will be conducted in accordance with the guidelines set out in Section 4 of the DEC document *Assessing Vibration: A Technical Guideline.*

Records of all noise and vibration monitoring results against applicable noise and vibration criteria; will be maintained and reported as outlined in Section 8.3 and requirements of the EPL. This includes records of noise and vibration monitoring results against the NMLs and the vibration criteria within Section 4.6.

In addition to the monitoring as listed above, JHLOR will undertake weekly site inspections for all activities. As part of the inspections plant will be assessed for unnecessary noise (i.e. rattling, idling), presence of noise mitigation measures or unexpected vibrational impacts.

It is noted that the Noise and Vibration Monitoring Program, as approved by the Secretary including any minor amendments approved by the ER, will be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Secretary, whichever is the greater.

8.2.4 Frequency of Monitoring

JHLOR will undertake noise monitoring when the following occurs:

- Where the CNVIS predicts noise levels associated with a particular scenario will meet the CNVS requirements for monitoring, as per Table 7-2 of this CNVMP.
- In response to noise complaints.
- To validate noise levels associated with each scenario within the CNVIS.

JHLOR will undertake vibration monitoring when the following occurs:

- Where the CNVIS predicts vibration levels will meet the CNVS requirements for monitoring, as per Table 7-3 of this CNVMP (where the "maximum levels" are defined as the vibration limits for building damage and human comfort as set out in Section 4.6 and 4.7 of this CNVMP).
- In response to vibration complaints.
- To validate vibration levels associated with each scenario within the CNVIS, where

vibratory plant will be used.

In accordance with the EPL, the licensee must undertake noise and vibration monitoring as directed by an authorised officer of the EPA.

8.3 Reporting

JHLOR will produce Construction Monitoring Reports on a six-monthly basis. The reports will include a summary of monitoring undertaken, an overview of the results, analysis of the results and raw data from monitoring. These reports will be provided to the DPI&E, City of Bankstown Canterbury and Inner West Council and EPA.

As per Section 9.2 and Section 9.3 of the CNVS, all noise monitoring results would be assessed against the nominated noise goals and compiled into a report. Where JHLOR engages a consultant to undertake monitoring, all reporting will be submitted to JHLOR within one week of being undertaken or at weekly intervals for continuous monitoring. All noise monitoring reports will also be made available to the public through a publicly accessible website.

Upon request of an authorised officer of the EPA, a Preliminary Investigation Report to the EPA will be submitted in respect of any noise or vibration monitoring undertaken in accordance with the requirements of Condition M6.5.

In the event of any exceedance of the best achievable noise performance objectives identified in Construction Noise and Vibration Impact Statements prepared for the works a follow up investigation report will be to the EPA within 5 working days of any noise or vibration monitoring having been undertaken in accordance with condition R4.3

Noise and vibration validation reports will be prepared in accordance with R4.4 for out of hours works, and submitted to the EPA no later than 2 business days from the end of each fortnight. Monitoring for works completed under the community agreement provisions will be carried out as per conditions E1.6 to E1.8 of the EPL.

8.4 Review of Monitoring

JHLOR will implement all reasonable and feasible proactive measures where exceedances are predicted. However, due to the nature of construction works, exceedances may still occur. These exceedances require further investigation.

Monitoring results will be reviewed by the Environmental Manager (or delegate) as soon as practicable and where an exceedance or opportunity for improvement is identified mitigation measures will be reviewed. These reviews will occur on an ongoing basis, within a week of any monitoring. These reviews will be documented where an exceedance is recorded, or a complaint is made.

The Environmental Manager (or delegate) will consult with the construction team to determine whether any further mitigation measures should be put in place. This may occur informally by way of discussion with the relevant Construction Manager, or formally through a meeting. The form of the consultation will be at the discretion of the Environmental Manager (or delegate) and will relate to the severity of the exceedance and/or impact on sensitive receiver. This is to occur as soon as practical after the Environmental Manager (or delegate) review of the monitoring

results and identify an exceedance.

Further mitigation measures may include:

- Further noise attenuation (e.g. additional hoarding, noise barriers or changes to construction plant where feasible and reasonable);
- Changes to construction methodology (e.g. using different plant);
- Additional or modified respite (e.g. longer continuous breaks for high impact noise);
- Any other feasible and reasonable measure.

Where an exceedance to predicted noise and vibration levels has occurred and the exceedance is attributable to SMEW, JHLOR will investigate the cause of the exceedance. JHLOR will inform the Environmental Representative of any exceedance and if the exceedance, or impact from the exceedance, constitutes an "incident" report to the Secretary, via Sydney Metro, in accordance with **CoA – A36**. Subsequent notification must be given, within seven days of becoming aware of the incident and a detailed report of the incident submitted within 30 days after it has occurred, as required by CoA A37. It is noted that the Planning Approval defines an incident as "*An occurrence or set of circumstances that causes, or threatens to cause, material harm to the environment, community or any member of the community, being actual or potential harm to the health or safety of human beings or to threatened species, endangered ecological communities or ecosystems that is not trivial*."

Where an exceedance to predicted noise and vibration levels has occurred and the exceedance is attributable to SMEW, JHLOR will undertake an investigation. Where the investigation indicates that the works were not undertaken in accordance with the mitigation measures described within this plan or in accordance with the modelled plant and work periods, JHLOR will record the exceedance as a Non-Conformance under the CEMP. This also has the potential to be a non-compliance against the planning approval. Where all mitigation was implemented and the investigation shows that the noise or vibration levels predicted were not correct (i.e. the modelled values were too low) JHLOR will extend the investigation to the noise model, in conjunction with JHLOR's noise and vibration consultant. The noise model will be subsequently updated as required and validation monitoring will occur.

8.5 Monitoring Program Consultation

In accordance with **CoA – C8(a)** the development of the Noise and Vibration Monitoring Program has occurred in consultation with the City of Canterbury-Bankstown and Inner West Council.

In accordance with **CoA – C14** the results from the Noise and Vibration Monitoring Program will be provided to the DPI&E, City of Canterbury-Bankstown and Inner West Council on a 6-monthly basis as part of the Construction Monitoring Report. This will also provide opportunity for comment on the effectiveness of the monitoring program.

In addition to the provision of the Construction Monitoring Report, JHLOR will facilitate ongoing consultation relating to the Noise and Vibration Monitoring Program, as required by CoA C9 and where requested by relevant regulatory agencies. This may include meetings, briefing sessions or other means to discuss items such as issues relating to noise and vibration monitoring or the results within the Construction Monitoring Report. This consultation will be conducted in accordance with the Community Consultation Strategy (CCS).

9 CNVMP ADMINISTRATION

9.1 Hold Points

A number of pre-construction and construction hold points are included within Table 9-1.

Table 9-1 Hold points

Item	Process held	Acceptance criteria	Approval authority
Construction Environmental Management Plan and subplans	Site activities (prior to construction commencement)	Site-specific Construction Environmental Management Plan and subplans (this CNVMP and the Noise and Vibration Construction Monitoring Program) have been developed, reviewed and approved	ER endorsement Department of Planning, Industry and Environment approval
CNVIS	Site activities (prior to construction commencement)	CNVIS to be prepared by Specialist Consultant	JHLOR Environmental Manager
Out of Hours Work (OOHW)	Works to be performed outside of approved construction hours (pre-construction and during construction)	Laing O'Rourke EPL 21147 OOHW Protocol and Application Form and Community Notification	Project Environmental Manager for works under EPL ER (Endorsement) & Sydney Metro (Approval) for works under OOHW Protocol EPA (Information to be provided on request)
Noise and vibration construction monitoring program	Construction works	Noise and Vibration Monitoring Program established and approved	ER approval (minor amendments as per CoA-C13) Department of Planning, Industry and Environment approval

9.2 Approval & Review of CNVMP

This sub-plan will be reviewed and endorsed by the Independent Environmental Representative in accordance with **CoA – A26**. Sydney Metro will also review the plan in accordance with condition 3.3e) of the CEMF.

CoA – C3 requires certain sub-plans to be developed in consultation with government agencies.

This plan is to be reviewed by relevant councils (i.e. City of Canterbury Bankstown and Inner West Council).

In accordance with **CoA – C6** the sub-plan must be submitted to the Secretary one month prior to the commencement of construction. Construction must not commence until the Secretary has approved the sub-plan in accordance with **CoA – C7**.

In accordance with **CoA – C9**, consultation with the City of Canterbury Bankstown and Inner West Council has occurred on the Noise and Vibration Construction Monitoring Program.

The CNVMP will be reviewed internally on an annual basis and earlier if required in response to the relevant findings of any audit, incident report complaint, monitoring event or inspection.

9.3 Records

Records associated with this management plan and monitoring programme will be maintained in accordance with Section 14 of the CEMP.

JHLOR will maintain the following compliance records on the project drive:

- Current and historical versions of this plan;
- Current and historical versions of the CNVIS;
- Records of noise and vibration monitoring results against appropriate NMLs and vibration criteria; and
- Records of community enquiries and complaints will be maintained by the Sydney Metro complaints management system, Consultation Manager.

APPENDIX A

PROJECT NOISE CATCHMENT AREA MAPS


NCA02
NCA01
NCAs
Residential
Commercial
Industrial
Education
Place of Worship
Childcare Centre
Medical
Southwest Metro Corridor
Land Use Survey
NCA 01
WILKINSON MURRAY


NCA02
NCA01
NCAs
Residential
Commercial
Industrial
Education
Place of Worship
Childcare Centre
Medical
Southwest Metro Corridor
Land Use Survey
NCA 02
WILKINSON MURRAY

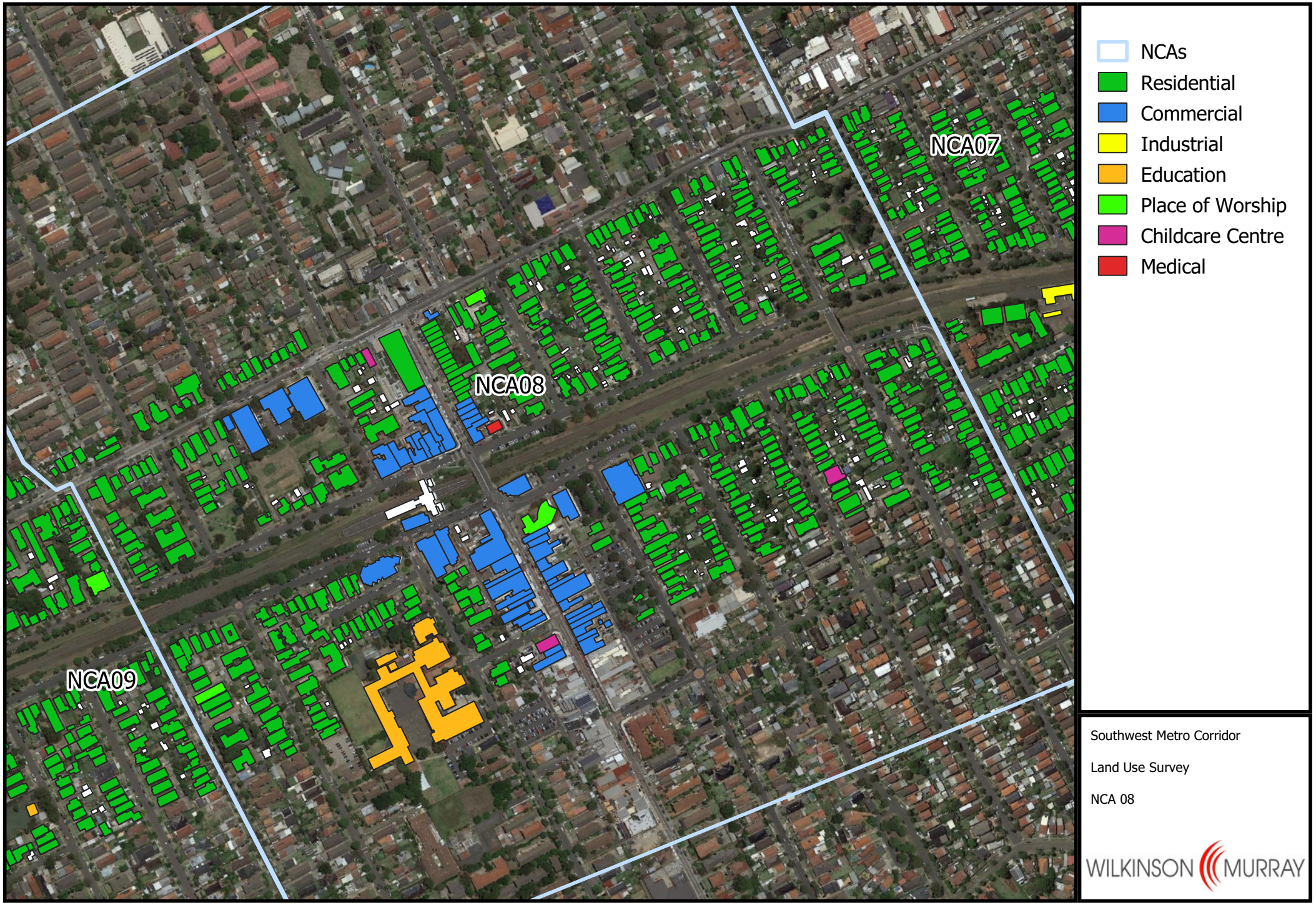

NCA02
NCA03
NCA04
NCAs
Residential
Commercial
Industrial
Education
Place of Worship
Childcare Centre
Medical
Southwest Metro Corridor
Land Use Survey
NCA 03
WILKINSON MURRAY


NCA05
NCA04
NCA03
NCAs
Residential
Commercial
Industrial
Education
Place of Worship
Childcare Centre
Medical
Southwest Metro Corridor
Land Use Survey
NCA 04
WILKINSON MURRAY


NCA05
NCA06
NCA04
NCAs
Residential
Commercial
Industrial
Education
Place of Worship
Childcare Centre
Medical
Southwest Metro Corridor
Land Use Survey
NCA 05
WILKINSON MURRAY


NCA05
NCA06
NCA07
NCAs
Residential
Commercial
Industrial
Education
Place of Worship
Childcare Centre
Medical
Southwest Metro Corridor
Land Use Survey
NCA 06
WILKINSON MURRAY


NCA07
NCA08
NCAs
Residential
Commercial
Industrial
Education
Place of Worship
Childcare Centre
Medical
Southwest Metro Corridor
Land Use Survey
NCA 07
WILKINSON MURRAY


NCA07
NCA08
NCA09
NCAs
Residential
Commercial
Industrial
Education
Place of Worship
Childcare Centre
Medical
Southwest Metro Corridor
Land Use Survey
NCA 08
WILKINSON MURRAY


NCA08
NCA09
NCA10
NCAs
Residential
Commercial
Industrial
Education
Place of Worship
Childcare Centre
Medical
Southwest Metro Corridor
Land Use Survey
NCA 09
WILKINSON MURRAY


NCA11
NCA10
NCA09
NCAs
Residential
Commercial
Industrial
Education
Place of Worship
Childcare Centre
Medical
Southwest Metro Corridor
Land Use Survey
NCA 10
WILKINSON MURRAY


NCA12
NCA11
NCA10
NCAs
Residential
Commercial
Industrial
Education
Place of Worship
Childcare Centre
Medical
Southwest Metro Corridor
Land Use Survey
NCA 11
WILKINSON MURRAY


NCA13
NCA12
NCA11
NCAs
Residential
Commercial
Industrial
Education
Place of Worship
Childcare Centre
Medical
Southwest Metro Corridor
Land Use Survey
NCA 12
WILKINSON MURRAY


NCA13
NCA12
NCAs
Residential
Commercial
Industrial
Education
Place of Worship
Childcare Centre
Medical
Southwest Metro Corridor
Land Use Survey
NCA 13
WILKINSON MURRAY

APPENDIX B

COMPLIANCE MATRIX

No.	Measure	Timing	Requirement	Responsibility	Reference
	Project Approval – Specific Management Plan Requirements				
1.	For the duration of the Work until the commencement of Operation, or as agreed with the Planning Secretary, the approved ER must: a) receive and respond to communication from the Planning Secretary in relation to the environmental performance of the CSSI; b) consider and inform the Planning Secretary on matters specified in the terms of this approval; c) consider and recommend to the Proponent any improvements that may be made to work practices to avoid or minimise adverse impact to the environment and to the community; d) review documents identified in Conditions C1, C3 and C8 and any other documents that are identified by the Planning Secretary, to ensure they are consistent with requirements in or under this approval and if so: i. make a written statement to this effect before submission of such documents to the Planning Secretary (if those documents are required to be approved by the Planning Secretary); or ii. make a written statement to this effect before the implementation of such documents (if those documents are required to be submitted to the Planning Secretary for information or are not required to be submitted to the Secretary); e) regularly monitor the implementation of the documents listed in Conditions C1, C3 and C8 to ensure implementation is being carried out in accordance with the document and the terms of this approval; f) as may be requested by the Planning Secretary, help plan, attend or undertake audits of the development commissioned by the Department including scoping audits, programming audits, briefings and site visits, but not independent environmental audits required under Condition A34 of	Prior to Construction	S2B SSI 8256 COA-A26	Sydney Metro	Independent Environmental Representative engaged by Sydney Metro Section 2.3

No.	Measure	Timing	Requirement	Responsibility	Reference
	this approval; g) as may be requested by the Planning Secretary, assist the Department in the resolution of community complaints; h) assess the impacts of minor ancillary facilities as required by Condition A19 of this approval; and i) consider any minor amendments to be made to the documents listed in Conditions C1, C3 and C8 and any document that requires the approval of the Planning Secretary that comprise updating or are of an administrative or minor nature and are consistent with the terms of this approval and the documents listed in Conditions C1, C3 and C8 or other documents approved by the Planning Secretary and, if satisfied such amendment is necessary, approve the amendment. This does not include any modifications to the terms of this approval; j) prepare and submit to the Planning Secretary and other relevant regulatory agencies, for information, an Environmental Representative Monthly Report detailing the ER's actions and decisions on matters for which the ER was responsible in the preceding month. The Environmental Representative Monthly Report must be submitted within seven (7) days following the end of each month for the duration of the ER's engagement for the CSSI.				
2.	The Department must be notified in writing to compliance@planning.nsw.gov.au immediately after the Proponent becomes aware of an incident. The notification must identify the CSSI (including the application number and the name of the CSSI if it has one) and set out the location and nature of the incident	During construction	S2B SSI 8256 COA-A36	Environment Manager	Section 8.4
3.	Subsequent notification must be given, and reports submitted in accordance with the requirements set out in Appendix A	During construction	S2B SSI 8256 COA-A37	Environment Manager	Section 8.4
4.	The CEMP Sub-plans must be prepared in consultation with the relevant government agencies identified for each CEMP Sub-plan and be consistent with the CEMF and CEMP referred to in Condition C1: Consultation required for CEMP Sub-plans Relevant government agencies to be consulted for CEMP Sub-plans	Prior to construction	S2B SSI 8256 COA-C3	Environment Manager	Section 1.2 Appendix E

No.	Measure	Timing	Requirement	Responsibility	Reference
	(a) Noise and vibration: Relevant council(s)				
5.	The CEMP Sub-plans must be prepared in accordance with the CEMF.	Prior to construction	S2B SSI 8256 COA-C4	Environment Manager	Section 2.1
6.	Details of all information requested by an agency to be included in a CEMP Sub-plan as a result of consultation, including copies of all correspondence from those agencies, must be provided with the relevant CEMP Sub-Plan.	Prior to construction	S2B SSI 8256 COA-C5	Environment Manager	Section 1.2 Appendix E
7.	Any of the CEMP Sub-plans may be submitted along with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before Construction.	Prior to construction	S2B SSI 8256 COA-C6	Environment Manager	Table 9-1 Hold points
8.	Construction must not commence until the CEMP and all CEMP Sub-plans have been approved by the Planning Secretary. The CEMP and CEMP Sub-plans, as approved by the Planning Secretary, including any minor amendments approved by the ER must be implemented for the duration of Construction. Where Construction of the CSSI is staged, Construction of a stage must not commence until the CEMP and sub-plans for that stage have been approved by the Planning Secretary.	Prior to construction	S2B SSI 8256 COA-C7	Environment Manager	Table 9-1 Hold points
9.	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies identified for each to compare actual performance of Construction of the CSSI against the predicted performance. (a) Noise and Vibration Relevant council(s)	Prior to construction	S2B SSI 8256 COA-C8	Environment Manager	Section 1.2 Section 8 Table 9-1 Hold points Appendix E
10.	Each Construction Monitoring Program must provide: (a) details of baseline data available; (b) details of baseline data to be obtained and when;	Prior to construction	S2B SSI 8256 COA-C9	Environment Manager	Section 8

No.	Measure	Timing	Requirement	Responsibility	Reference
	(c) details of all monitoring of the project to be undertaken; (d) the parameters of the project to be monitored; (e) the frequency of monitoring to be undertaken; (f) the location of monitoring; (g) the reporting of monitoring results; (h) procedures to identify and implement additional mitigation measures where results of monitoring are unsatisfactory; and (i) any consultation to be undertaken in relation to the monitoring programs.				
11.	The Construction Monitoring Programs must be developed in consultation with relevant government agencies as identified in Condition C8 of this approval and must include reasonable information requested by an agency to be included in a Construction Monitoring Programs during such consultation. Details of all information requested by an agency including copies of all correspondence from those agencies, must be provided with the relevant Construction Monitoring Program.	Prior to construction	S2B SSI 8256 COA-C10	Environmental Manager	Section 1.2 Section 8 Section 9.2 Appendix E
12.	The Construction Monitoring Programs must be endorsed by the ER and then submitted to the Planning Secretary for approval at least one (1) month before the commencement of Construction.	Prior to and during construction	S2B SSI 8256 COA-C11	Environmental Manager	Table 9-1 Hold Points
13.	Construction must not commence until the Planning Secretary has approved all of the required Construction Monitoring Programs.	Prior to construction	S2B SSI 8256 COA-C12	Environmental Manager	Table 9-1 Hold Points
14.	The Construction Monitoring Programs, as approved by the Planning Secretary including any minor amendments approved by the ER must be implemented for the duration of Construction and for any longer period set out in the monitoring program or specified by the Planning Secretary, whichever is the greater.	Prior to and during construction	S2B SSI 8256 COA-C13	Environmental Manager	Section 8 Table 9-1 Hold points
15.	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, and	During	S2B SSI 8256	Environmental	Section 8

No.	Measure	Timing	Requirement	Responsibility	Reference
	relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.	construction	COA-C14	Manager	
16.	Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.	Prior to construction	S2B SSI 8256 COA-C15	Environmental Manager	Section 8 of this Plan
17.	A detailed land use survey must be undertaken to confirm sensitive receivers (including critical working areas such as operating theatres and precision laboratories) potentially exposed to Construction noise and vibration, Construction ground-borne noise and Operational noise. The survey may be undertaken on a progressive basis but must be undertaken in any one area before the commencement of Work which generate Construction or Operational noise, vibration or ground-borne noise in that area. The results of the survey must be included in the Construction Noise and Vibration Impact Statement(s).	Prior to construction	S2B SSI 8256 COA-E18	Environmental Manager Noise Consultant	Section 6 included within CNVIS
18.	Work must only be undertaken during the following Construction hours: (a) 7.00am to 6.00pm Mondays to Fridays, inclusive; (b) 8.00am to 6.00pm Saturdays; and (c) at no time on Sundays or public holidays,	During construction	S2B SSI 8256 COA-E19	Environmental Manager Construction Manager Site Supervisor	Section 4.1 Section 7.7
19.	Notwithstanding Conditions E19 and E24 Work may be undertaken outside the hours specified in the following circumstances: (a) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or (b) where it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm; or (c) where different Construction hours are permitted or required under an EPL in force in respect of the CSSI; or (d) Work approved under an Out of Hours Work Protocol for Work not subject to an EPL as required by	During construction	S2B SSI 8256 COA-E20	Environmental Manager Construction Manager Site Supervisor	Section 4.1 Section 7.7

No.	Measure	Timing	Requirement	Responsibility	Reference
	Condition E25; or (e) Construction that causes LAeq(15 minute) noise levels: (i) 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 (ii) no more than the 'Noise affected' noise management levels specified in Table 3 of the Interim Construction Noise Guideline (DECC, 2009) at other sensitive land uses, and (iii) continuous or impulsive vibration values, measured at the most affected residence are no more than the maximum values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), and (iv) intermittent vibration values measured at the most affected residence are no more than the maximum values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or (f) where a negotiated agreement has been reached with a substantial majority of sensitive receivers who are within the vicinity of and may be potentially affected by the particular Construction, and the noise management levels and/or limit for ground-borne noise and vibration (human comfort) cannot be achieved. All agreements must be in writing and a copy forwarded to the Planning Secretary at least one (1) week before the commencement of activities. Note: Section 5.24(1)(e) of the EP&A Act requires that an EPL be substantially consistent with this approval.				
20.	On becoming aware of the need for emergency Work in accordance with Condition E20(b), the Proponent must notify the ER and the EPA (if a EPL applies) of the need for that Work. The Proponent must use best endeavours to notify all noise and/or vibration affected sensitive receivers of the likely impact and duration of those Work.	During construction	S2B SSI 8256 COA-E21	Environmental Manager Construction Manager Site Supervisor	Section 7.7

No.	Measure	Timing	Requirement	Responsibility	Reference
21.	Out of Hours Work that are regulated by an EPL as per Condition E20(c) or through the Out of Hours Work Protocol as per Condition E25 include: (a) Work which could result in a high risk to construction personnel or public safety, based on a risk assessment carried out in accordance with AS/NZS ISO 31000:2009 "Risk Management – Principles and Guidelines"; or (b) where the relevant road authority has advised the Proponent in writing that carrying out the activities could result in a high risk to road network operational performance; or (c) where the relevant utility service operator has advised the Proponent in writing that carrying out the activities could result in a high risk to the operation and integrity of the utility network; or (d) where the Transport for NSW Transport Management Centre (or other road authority) has advised the Proponent in writing that a road occupancy licence is required and will not be issued for the activities during the hours specified in Condition E19 and Condition E20; or (e) where Sydney Trains (or other rail authority) has advised the Proponent in writing that a Rail Possession is required. Note: Other Out of Hours Work can be undertaken with the approval of an EPL, or through the project's Out of Hours Work Protocol for Work not subject to a EPL.	During construction	S2B SSI 8256 COA-E22	Environmental Manager Construction Manager Site Supervisor	Section 4
22.	In order to undertake Out of Hours Work, the Proponent must identify appropriate respite periods for the Out of Hours Work in consultation with the community at each affected location on a regular basis. This consultation must include (but not be limited to) providing the community with: (a) a schedule of likely Out of Hours Work for a period no less than two (2) months; (b) the potential work, location and duration; (c) the noise characteristics and likely noise levels of the Work; and (d) likely mitigation and management measures. The outcomes of the community consultation, the identified respite periods and the scheduling of the likely	During construction	S2B SSI 8256 COA-E23	Environmental Manager Construction Manager Site Supervisor	Section 7.7

No.	Measure	Timing	Requirement	Responsibility	Reference
	Out of Hours Work must be provided to the EPA (if an EPL applies) and the Planning Secretary (for high risk activities after 9pm) upon request.				
23.	Except as permitted by an EPL, highly noise intensive Work that result in an exceedance of the applicable Noise Management Level at the same receiver must only be undertaken: (a) between the hours of 8:00 am to 6:00 pm Monday to Friday; (b) between the hours of 8:00 am to 1:00 pm Saturday; and (c) in continuous blocks not exceeding three (3) hours each with a minimum respite from those activities and Works of not less than one (1) hour between each block. For the purposes of this condition, 'continuous' includes any period during which there is less than a one (1) hour respite between ceasing and recommencing any of the work that are the subject of this condition.	During construction	S2B SSI 8256 COA-E24	Environmental Manager Construction Manager Site Supervisor	Section 4.3
24.	An Out of Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of Work which are outside the hours defined in Conditions E19, and that are not subject to an EPL. The Protocol must be approved by the Planning Secretary before commencement of the Work. The Protocol must: (a) provide a process for the consideration of Out of Hours Work against the relevant noise and vibration criteria, including the determination of low and high-risk activities; (b) provide a process for the identification of mitigation measures for residual impacts, including respite periods in consultation with the community at each affected location, consistent with the requirements of Condition E23; (c) identify procedures to facilitate the coordination of Out of Hours Work approved by an EPL to ensure appropriate respite is provided; (d) identify an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where: (i) low risk activities and high risk activities that cease by 9pm can be approved by the ER, and	Prior to construction	S2B SSI 8256 COA-E25	Sydney Metro are responsible for preparing the OOHW Protocol JHLOR will implement the protocol	Section 7.7 Appendix C

No.	Measure	Timing	Requirement	Responsibility	Reference
	(ii) all other high risk activities must be approved by the Planning Secretary; and (e) identify Planning Secretary, EPA and community notification arrangements for approved Out of Hours Work, which maybe detailed in the Community Communication Strategy.				
25.	Work undertaken for the delivery of the CSSI, including those undertaken by third parties (such as utility relocations), must be coordinated to ensure respite periods are provided. The Proponent must: (a) reschedule Work to provide respite to impacted noise sensitive receivers so that the respite is achieved in accordance with Condition E23; or (b) consider the provision of alternative respite or mitigation to impacted noise sensitive receivers; and (c) provide documentary evidence to the ER in support of any decision made by the Proponent in relation to respite or mitigation.	During Construction	S2B SSI 8256 COA-E26	Environmental Manager Construction Manager Site Supervisor	Section 7 Section 8
26.	Construction Noise and Vibration Impact Statements must be prepared for Construction sites before Construction noise and vibration impacts commence and include specific mitigation measures identified through consultation with affected sensitive receivers. The Statements must augment the Construction Noise and Vibration Management Sub-plan and must be implemented for the duration of Work. The Statements must be informed by a suite of potential management/mitigation options provided in the Construction Noise and Vibration Sub-plan.	Prior to construction	S2B SSI 8256 COA-E27	Noise Consultant	Section 6 Appendix D
27.	Noise generating Work in the vicinity of potentially-affected community, religious, or educational institutions resulting in noise levels above the noise management levels must not be timetabled within sensitive periods, unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution or as otherwise approved by the Planning Secretary.	During construction	S2B SSI 8256 COA-E28	Community and Stakeholder Manager Environmental Manager	Section 7.6
28.	Mitigation measures must be implemented with the aim of achieving the following Construction noise management levels and vibration criteria:	During construction	S2B SSI 8256 COA-E29	Environmental Manager	Section 4

No.	Measure	Timing	Requirement	Responsibility	Reference
	(a) Construction 'Noise affected' noise management levels established using the Interim Construction Noise Guideline (DECC, 2009); (b) vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure); (c) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and (d) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures (for structural damage). Note: The Interim Construction Noise Guideline identifies 'particularly annoying' activities that require the addition of 5 dB(A) to the predicted level before comparing to the Construction Noise Management Level.				Section 7
29.	The Proponent must seek the advice of a heritage specialist on methods and locations for installing equipment used for vibration, movement and noise monitoring at heritage-listed structures.	Prior to and during construction	S2B SSI 8256 COA-E30	Environmental Manager	Section 4.6
30.	Operational noise mitigation measures as identified in Condition E31 that will not be physically affected by Construction, must commence implementation within six (6) months of the commencement of Construction in the vicinity of the impacted receiver(s) to minimise Construction noise impacts, and detailed in an updated Noise and Vibration CEMP Sub-plan for the CSSI.	During construction	S2B SSI 8256 COA-E32	Construction Manager	Section 7.1
31.	Where implementation of Operational noise mitigation measures will be physically affected by Construction such that they cannot commence implementation within six (6) months of the commencement of Construction in accordance with Condition E32, the Proponent must submit to the Secretary a report providing justification as to why, along with details of temporary measures that would be implemented to address construction noise impacts until such time that the Operational noise mitigation measures identified in Condition E31 are implemented. The report must be submitted to the ER for review. When the ER is satisfied that the justification and alternative measures are appropriate to address construction noise impacts, and	During construction	S2B SSI 8256 COA-E33	Construction Manager	Section 7.1

No.	Measure	Timing	Requirement	Responsibility	Reference
	within six (6) months of the commencement of Construction which would affect the identified sensitive receivers, the report must be submitted to the Planning Secretary for information.				
	Revised Environmental Management Measures				
32.	In accordance with the Construction Noise and Vibration Strategy, construction noise impact statements would be prepared prior to the commencement of construction components, to consider the scale and duration of construction noise impacts, and identify measures to minimise impacts to sensitive receivers. This would include noise modelling to confirm the results of modelling undertaken as part of the Environmental Impact Statement and Submissions and Preferred Infrastructure Report. Where exceedances of the noise management levels are identified, feasible and reasonable mitigation measures would be identified.	Prior to construction	S2B SSI 8256 REMM NVC1	Noise consultant	Appendix D
33.	In accordance with the Construction Noise and Vibration Strategy, all employees, contractors and subcontractors would receive an environmental induction. The induction must at least include: • relevant project specific and standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • designated loading/unloading areas and procedures • site opening/closing times (including deliveries).	Prior to and during construction	S2B SSI 8256 REMM NVC2	Environmental Manager	Section 7.8
34.	Where vibration levels are predicted to exceed the vibration screening level, a more detailed assessment of the structure would be carried out to determine the appropriate vibration limits for that structure.	Prior to and during construction	S2B SSI 8256 REMM NVC3	Environmental Manager Noise Consultant	Section 4.6 Section 7.5

No.	Measure	Timing	Requirement	Responsibility	Reference
35.	For heritage items where vibration screening levels are predicted to be exceeded, the more detailed assessment would include condition assessment and specifically consider the heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed.	Prior to and during construction	S2B SSI 8256 REMM NVC4	Environmental Manager Noise Consultant Heritage Specialist	Section 4.6 Section 7.5
36.	The Construction Noise and Vibration Strategy would be implemented with the aim of achieving the noise management levels where feasible and reasonable. This may include the following example mitigation measures alone or in combination, where feasible and reasonable: • The provision of noise barriers around each construction site. • The coincidence of noisy plant working simultaneously close together would be avoided. • Residential grade mufflers would be fitted to all mobile plant. • Non-tonal reversing alarms would be fitted to all permanent mobile plant. • High noise generating activities would be scheduled for less sensitive periods considering the nearby receivers, where reasonable and feasible. • The layout of construction sites would consider opportunities to shield receivers from noise. • Stationary noise sources would be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained. • Loading and unloading of materials/deliveries is to occur as far as possible from noise sensitive receivers. • Select site access points and roads as far as possible away from noise sensitive receivers. • Dedicated loading/unloading areas to be shielded if close to noise sensitive receivers wherever feasible and reasonable. • Use quieter and less vibration emitting construction methods where feasible and reasonable.		S2B SSI 8256 REMM NVC5		Section 7

No.	Measure	Timing	Requirement	Responsibility	Reference
	• The noise levels of plant and equipment must have operating Sound Power Levels compliant with the criteria in the Construction Noise and Vibration Strategy. • Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site. • Where feasible and reasonable, the offset distance between noisy plant items and nearby noise sensitive receivers would be as great as possible. • Where reasonable and feasible heavy vehicle movements would be limited to daytime and evening hours, with night time movements avoided where possible. • Active community consultation and the maintenance of positive, cooperative relationships with schools, local residents and building owners and occupiers, through: – periodic notification or work activities and progress (e.g. regular letterbox drops, e-consult) – specific notification (letter-box drop) prior to especially noisy activities – comprehensive website information – project information and construction response telephone line – email distribution lists. • Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site. • Where feasible and reasonable, the offset distance between noisy plant items and nearby noise sensitive receivers would be as great as possible. • Where reasonable and feasible heavy vehicle movements would be limited to daytime and evening hours, with night time movements avoided where possible. • Active community consultation and the maintenance of positive, cooperative relationships with schools, local residents and building owners and occupiers, through: – periodic notification or work activities and progress (e.g. regular letterbox drops, e-consult) – specific notification (letter-box drop) prior to especially noisy activities – comprehensive website information				

No.	Measure	Timing	Requirement	Responsibility	Reference
	– project information and construction response telephone line – email distribution lists. • Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site. • Where feasible and reasonable, the offset distance between noisy plant items and nearby noise sensitive receivers would be as great as possible. • Where reasonable and feasible heavy vehicle movements would be limited to daytime and evening hours, with night time movements avoided where possible. • Active community consultation and the maintenance of positive, cooperative relationships with schools, local residents and building owners and occupiers, through: – periodic notification or work activities and progress (e.g. regular letterbox drops, e-consult) – specific notification (letter-box drop) prior to especially noisy activities – comprehensive website information – project information and construction response telephone line – email distribution lists. • Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site. • Where feasible and reasonable, the offset distance between noisy plant items and nearby noise sensitive receivers would be as great as possible. • Where reasonable and feasible heavy vehicle movements would be limited to daytime and evening hours, with night time movements avoided where possible. • Active community consultation and the maintenance of positive, cooperative relationships with schools, local residents and building owners and occupiers, through: – periodic notification or work activities and progress (e.g. regular letterbox drops, e-consult) – specific notification (letter-box drop) prior to especially noisy activities – comprehensive website information				

No.	Measure	Timing	Requirement	Responsibility	Reference
	– project information and construction response telephone line – email distribution lists.				
37.	Noise intensive plant for construction activities, including ballast tampers would not be used during the night time period (10pm to 7am) unless: • during a weekend rail possession or shut down • a requirement of a road authority, emergency services or Sydney Coordination Office requires works to be undertaken during this period.	During construction	S2B SSI 8256 REMM NVC6	Environmental Manager Construction Manager Site Supervisor	Section 4.3 Section 7.7
38.	When working adjacent to schools, medical facilities and child care centres, particularly noisy activities would be scheduled outside normal working hours, where reasonable and feasible.	During construction	S2B SSI 8256 REMM NVC7	Environmental Manager Community and Stakeholder Manager	Section 7.6
39.	When working adjacent to churches and places of worship, particularly noisy activities would be scheduled outside services, where reasonable and feasible.	During construction	S2B SSI 8256 REMM NVC8	Environmental Manager Community and Stakeholder Manager	Section 7.6
40.	Alternative accommodation may be offered to residents living in close proximity to construction works where detailed construction planning identifies unreasonably high noise impacts over a prolonged period. Alternative accommodation arrangements would be offered and discussed with residents on a case-by-case basis.	During construction	S2B SSI 8256 REMM NVC9	Environmental Manager Community and Stakeholder Manager	Section 7.6
41.	High noise and vibration generating activities including ballast tamping may only be carried out in continuous	During	S2B SSI 8256	Environmental	Section 4.3

No.	Measure	Timing	Requirement	Responsibility	Reference
	blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block and these works.	construction	REMM NVC10	Manager	Section 7.5
42.	Ongoing noise monitoring would be undertaken during construction at sensitive receivers during critical periods (i.e. times when noise emissions are expected to be at their highest to identify and assist in managing high risk noise events.	During construction	S2B SSI 8256 REMM NVC11	Environmental Manager	Section 8
43.	Where vibration levels are predicted to exceed the vibration screening level, attended vibration monitoring would be carried out to ensure vibration levels remain below appropriate limits for that structure.	Prior to construction	S2B SSI 8256 REMM NVC12	Environmental Manager	Section 8
44.	Reasonable and feasible measures would be implemented in accordance with the Construction Noise and Vibration Strategy to minimise groundbourne noise where exceedances are predicted.	During construction	S2B SSI 8256 REMM NVC13	Environmental Manager	Section 6 Section 7
45.	Reasonable and feasible mitigation measures would be implemented where power supply works would result in elevated noise levels at receivers. This could include: • carrying out works during the daytime period when in the vicinity of residential receivers • where out of hours works are required, scheduling the noisiest activities to occur in the evening period (up to 10pm) • use of portable noise barriers around particularly noisy equipment.	During construction	S2B SSI 8256 REMM NVC14	Environmental Manager	Section 7.1
46.	The routes for construction haulage vehicles and bus services associated with the Temporary Transport Strategy would be selected on the basis of compliance with the relevant road traffic noise criteria, where reasonable and feasible. Where compliance with the noise criteria is not possible, reasonable and feasible noise mitigation would be implemented.	During construction	S2B SSI 8256 REMM NVC15	Environmental Manager Construction Manager Site Supervisor	Section 4.5 Section 6 Appendix D Construction Traffic

No.	Measure	Timing	Requirement	Responsibility	Reference
					Management Plan
	EIS Environmental Performance Outcomes				
47.	The preferred project minimises impacts to the local community by: • controlling noise and vibration at the source • controlling noise and vibration on the source to receiver transmission path • controlling noise and vibration at the receiver • implementing practical and reasonable measures to minimise the noise and vibration impacts of construction activities on local sensitive receivers.	During construction	S2B EIS EPO – Noise and Vibration – amenity	Environmental Manager Construction Manager Site Supervisor	Section 7
48.	The preferred project minimises impacts to structures by: • controlling vibration at the source • controlling vibration on the source to receiver transmission path • implementing practical and reasonable measures to minimise vibration impacts of construction activities on structures.	During construction	S2B EIS EPO – Noise and Vibration – structural	Environmental Manager Construction Manager Site Supervisor	Section 7
	Construction Environmental Management Framework				
49.	**Construction Noise and Vibration Management Objectives** The following noise and vibration management objectives will apply to construction: (i) Minimise unreasonable noise and vibration impacts on residents and businesses; (ii) Avoid structural damage to buildings or heritage items as a result of construction vibration; (iii) Undertake active community consultation; and (iv) Maintain positive, cooperative relationships with schools, childcare centres, local residents and building owners.	During Construction	CEMF Section 9.1(a)	Environmental Manager Project Engineer Site Superintendent	These objectives are included within Section 1.3 The objectives are addressed in the following sections;

No.	Measure	Timing	Requirement	Responsibility	Reference
					i) Section 7 ii) Section 4.6, Section 7, iii) Section 7.6 iv) Section 7.6
50.	Principal Contractors will develop and implement a Construction Noise and Vibration Management Plan for their scope of works consistent with the Interim Construction Noise Guidelines (Department of Environment and Climate Change, 2009). The Construction Noise and Vibration Management Plan will include as a minimum: (i) Identification of work areas, site compounds and access points; (ii) Identification of sensitive receptors and relevant construction noise and vibration goals; (iii) Be consistent with, and include the requirements of the noise and vibration mitigation measures as detailed in, the environmental approval documentation and the Sydney Metro Construction Noise and Vibration Strategy (CNVS); (iv) Details of construction activities and an indicative schedule for construction works, including the identification of key noise and/or vibration generating construction activities (based on representative construction scenarios) that have the potential to generate noise or vibration impacts on surrounding sensitive receptors, in particular residential areas; (v) Identification of feasible and reasonable procedures and mitigation measures to ensure relevant vibrations and blasting criteria are achieved, including a suitable blast program; (vi) Community consultation requirements and Community notification provisions specifically in relation to blasting; (vii) The requirements of any applicable EPL conditions; (viii) Additional requirements in relation to activities undertaken 24 hours of the day, 7 days per week; (ix) Pre-construction compliance requirements and hold points; (x) The responsibilities of key project personnel with respect to the implementation of the plan; (xi) Noise monitoring requirements; (xii) Compliance record generation and management; and	Prior to construction	CEMF Section 9.2(a)	Environmental Manager	This Plan i) Section 1.1, Section 3 ii) Section 3, Appendix A iii) Section 4, Section 7, Section 9 iv) Section 3.2 Appendix D v) Section 3.2 Section 7. Note JHLOR's scope does not currently include blasting vi) Community

No.	Measure	Timing	Requirement	Responsibility	Reference
	(xiii) An Out of Hours Works Protocol applicable to all construction methods and sites.				consultation requirements are included in Section 7.6, Note JHLOR's scope does not currently include blasting vii) Section 2.2, Section 4 viii) N/A ix) Section 9.1 x) Section 2.3 xi) Section 8.2 xii) Section 8.3, Section 8.4, Section 9.3 xiii) Appendix C
51.	Detailed Construction Noise and Vibration Impact Statements will be prepared for noise intensive construction sites and or activities, to ensure the adequacy of the noise and vibration mitigation measures. Specifically, Construction Noise and Vibration Impact Statements will be prepared for EPL variation applications and works proposed to be undertake4n outside of standard construction hours.	Prior to construction	CEMF Section 9.2(b)	Environmental Manager	Appendix D
52.	Noise and vibration monitoring would be undertaken for construction as specified in the CNVS and the EPL.	During Construction	CEMF Section 9.2(c)	Environmental Manager	Section 8.2

No.	Measure	Timing	Requirement	Responsibility	Reference
53.	The following compliance records would be kept by Principal Contractors: (i) Records of noise and vibration monitoring results against appropriate NMLs and vibration criteria; and (ii) Records of community enquiries and complaints, and the Contractor's response.	During Construction	CEMF Section 9.2(d)	Environmental Manager Community Consultation Manager	Section 8.2.3 Section 9.3 Consultation Manager
54.	All feasible and reasonable mitigation measures would be implemented in accordance with the CNVS. Examples of noise and vibration mitigation measures include: (i) Construction hours will be in accordance with the working hours specified in Section 5.1; (ii) Hoarding and enclosures will be implemented where required to minimise airborne noise impacts; and (iii) The layout of construction sites will aim to minimise airborne noise impacts to surrounding receptors.	During Construction	CEMF Section 9.3(a)	Environmental Manager	Mitigation measures are included within Section 7 i) Section 4.1 ii) Section 7.3 iii) Section 7.1
Laing O'Rourke EPL 21147					
57	The licensee must implement all feasible and reasonable noise and vibration mitigation measures at the premises to minimise noise and vibration impacts on noise sensitive receivers to seek to achieve the Noise Management Levels in the Interim Construction Noise Guidelines (DECC, 2006).	During Construction	L3.1	Project Engineer Environmental Manager	Section 7
58	Unless permitted by another condition of this licence, construction works and activities must: (a) only be undertaken between the hours of 0700 and 1800 Monday to Friday; and (b) only be undertaken between the hours of 0800 and 1300 Saturday; and (c) not be undertaken on Sundays or Public Holidays.	During Construction	L4.1	Project Engineer Environmental Manager	Section 4.1

No.	Measure	Timing	Requirement	Responsibility	Reference
59	Exemptions to standard construction hours for low noise impact works The following works and activities may be carried out outside of the hours specified in Condition L4.1 if the works and activities do not cause, when measured at the boundary of the most affected noise sensitive receiver: (a) LAeq(15 minute) noise levels greater than 5dB above the day, evening and night rating background level (RBL) as applicable; and (b) LA1(1 minute) or LAmax noise levels greater than 15dB above the night RBL for night works; and (c) continuous or impulsive vibration values greater than those for human exposure to vibration, set out for residences in Table 2.2 in "Environmental noise management - Assessing Vibration: a technical guideline" (Department of Environment and Conservation, February 2006); and (d) intermittent vibration values greater than those for human exposure to vibration, set out for residences in Table 2.4 in "Environmental noise management - Assessing Vibration: a technical guideline" (Department of Environment and Conservation, February 2006). For the purpose of this condition, the RBLs are those contained in an environmental assessment for the scheduled activity subject to this licence prepared under the Environmental Planning and Assessment Act 1979. Alternatively, the licensee may use another RBL determined in accordance with the NSW Industrial Noise Policy (EPA, 2000) and provided to the EPA prior to carrying out any works or activities under this condition.	During Construction	L4.2	Project Engineer Environmental Manager	Section 7.7.1
60	Exemptions to standard construction hours in exceptional circumstances (a) The licensee may undertake works outside of standard construction hours if any of the following applies: (i) emergency works is required to avoid the loss of lives or property, or to prevent material	During Construction	L4.3	Project Engineer Environmental Manager	Section 7.7.1

No.	Measure	Timing	Requirement	Responsibility	Reference
	harm to the environment; (ii) the delivery of oversized plant or structures has been determined by the police or other authorised authorities to require special arrangements to transport along public roads. (b) The licensee must, on becoming aware of the need to undertake emergency construction work under this condition notify the EPA's Environment Line as soon as practicable and submit a report to the EPA by 2pm on the next business day after the emergency works commenced that describes: 1. the cause, time and duration of the emergency; and 2. action taken by or on behalf of the licensee in relation to the emergency; and 3. details of any measures taken or proposed to be taken by the licensee to prevent or mitigate against a recurrence of the emergency. For the purpose of this condition, "material harm to the environment" has the same meaning as in section 147 of the POEO Act.				
61	High Noise Impact Works Unless otherwise specified by another condition of this licence, the following applies in relation to high noise impact works: (a) High noise impact works and activities must only be undertaken: 1. between the hours of 8:00am to 6:00pm Monday to Friday; 2. between the hours of 8:00am to 1:00pm Saturday; and 3. in continuous blocks not exceeding 3 hours each with a minimum respite from those activities and works of not less than 1 hour between each block. For the purposes of this condition 'continuous' includes any period during which there is less than a 1hour respite between ceasing and recommencing any of the work that is the subject of this	During Construction	L4.4	Supervisor Environmental Manager	Section 4.3

No.	Measure	Timing	Requirement	Responsibility	Reference
	condition				
62	Respite for receivers The licensee must: (a) identify all receivers likely to experience internal noise levels greater than Leq(15 minute) 60 dB(A) inclusive of a 5dB penalty, if rock breaking or any other annoying activity likely to result in regenerated (ground-borne) noise or a perceptible level of vibration is planned, between 7am to 8pm; and, (b) consult with all receivers identified in Condition L4.5(a) with the objective of determining appropriate hours of respite so that construction noise (including ground-borne noise), does not exceed internal noise levels of: (i) Leq(15 minute) 60dB(A) inclusive of a 5dB penalty if rock breaking or any other annoying activity likely to result in ground-borne noise or a perceptible level of vibration is planned between 7am to 8pm for more than 50% of the time; and, (ii) Leq(15 minute) 55dB(A) inclusive of a 5dB penalty if rock breaking or any other annoying activity likely to result in ground-borne noise or a perceptible level of vibration is planned between 7am to 8pm for more than 25% of the time. (c) prior to the commencement of works associated with this licence, submit to EPA a map or register of receiver locations identified in accordance with condition L4.5(a), the results of consultation with receivers in accordance with condition L4.5(b) and the proposed work practices and scheduling to provide receivers with the respite required under condition L4.6(b)(i)&(ii).	During Construction	L4.5	Supervisor Environmental Manager	Section 4.8
63	Works Approved Outside of Standard Construction Hours - Local Possessions a) Works and activities may be undertaken during any local possession, but only if: (i) carrying on those works and activities during standard construction hours (specified in	During Construction	L4.6	Project Engineer Environmental Manager	Section 7.7.1

No.	Measure	Timing	Requirement	Responsibility	Reference
	Condition L4.1) would cause unacceptable risks to: (1) construction personnel safety; (2) rail passenger and railways personnel safety; or (3) railway network operational reliability as may be notified to the licensee from time to time by RailCorp; and (ii) noise and vibration mitigation measures are implemented as detailed in the Interim Construction Noise Guideline (DECC 2009); and (iv) the licensee complies with Condition L4.8(b),(c),(d),(e),(f)&(g). b) High noise impact works and activities (excluding rail adjustment, tamping and regulating) may be undertaken during any local possession permissible by Condition L4.6(a) as follows: (i) where feasible and reasonable between the hours of 6:00am to 10:00pm on any day subject to the works and activities being undertaken in continuous blocks not exceeding 3 hours each with a minimum respite from those works and activities of not less than one hour between each block. For the purposes of this condition "continuous" includes any period during which there is less than a 1 hour respite between ceasing and recommencing any of the works or activities that are the subject of this condition. c) Rail adjustment, tamping and regulating may be undertaken at any time during a local possession permissible by Condition L4.6(a).				
64	Works Approved Outside of Standard Construction Hours – Local Area and Utility Works (a) Local area and utilities works may be undertaken outside of standard construction hours specified in L4.1 at the premises but only if one or more of the following applies: (i) carrying on those works and activities during the hours specified in Condition L4.1 would	During Construction	L4.7	Project Engineer Environmental Manager	Section 7.7.1

No.	Measure	Timing	Requirement	Responsibility	Reference
	result in a high risk to construction personnel or public safety, based on a risk assessment carried our in accordance with AS/NZS ISO 31000:2009 "Risk Management"; or (ii) the relevant road network operator has advised the licensee in writing that carrying out the works and activities during the hours specified in Condition L4.1 would result in a high risk to road network operational performance; or (iii) the relevant utility service operator has advised the licensee in writing that carrying out the works and activities during the hours specified in Condition L4.1 would result in a high risk to the operation and integrity of the utility network; or (iv) the TfNSW Transport Management Centre (or other road authority) have advised the licensee in writing that a road occupancy licence is required and will not be issued for the works or activities during the hours specified in Condition L4.1; or				
65	In undertaking any works or activities under Condition L4.7 the licensee must: (a) Only undertake activities between the hours of: 1. 6:00 pm and 7:00 am the following day on Mondays, Tuesdays, Wednesdays, and Thursdays; and 2. 6:00 pm and 8:00 am the following day on Fridays. (b) Ensure that combined works and activities undertaken under L4.6 and L4.7 do not impact the same noise sensitive receivers on more than: (i) 3 evenings or nights per week; and (ii) 10 evenings or nights per month. (c) Implement reasonable and feasible noise and vibration mitigation measures as detailed in the Interim Construction Noise Guidelines (DECC 2009). (d) Undertake noise monitoring at the boundary of the most noise affected receiver or other	During Construction	L4.8	Project Engineer Environmental Manager	Section 7.7.1

No.	Measure	Timing	Requirement	Responsibility	Reference
	sensitive land uses(s) that is most representative of noise generating activities being carried out at the site; and (e) Comply with the requirements of Condition R4.1; and (f) Comply with the requirements of Condition R4.4; and (g) Ensure that an indicative schedule of works undertaken in accordance with L4.6 and L4.7 is made publicly accessible on the licensee's project website; and, (h) Ensure that high noise impact activities and works are concluded before midnight unless directly related to essential road reinstatement works. NOTE: For the purposes of L4.8(b) "impact" is defined as noise levels that exceed the noise levels in L4.2.				
66	If works are undertaken by a utilities provider during a scheduled respite period identified by Condition L4.8, and those works are related to the scheduled activity permitted by this licence, the licensee must: (a) where feasible, reschedule any works permissible by Condition L4.7 to provide respite to impacted noise sensitive receivers so that the minimum number of respite periods in any week can be achieved; or (b) consider the provision of alternative respite or mitigation to impacted noise sensitive receivers; and (c) provide documentary evidence to the EPA in support of any decision made by the licensee in relation to the provision or refusal of any respite or mitigation within the validation report required by Condition R4.4.	During Construction	L4.9	Project Engineer Environmental Manager	Section 7.7.1
67	Community Agreement The licensee may undertake works outside of standard construction hours if agreement between the licensee and a substantial majority of noise sensitive receivers has been reached.	During Construction	L4.10	Communication and Stakeholder Relations Manager	Section 7.7.1

No.	Measure	Timing	Requirement	Responsibility	Reference
	Note: This condition applies to out-of-hours works that have not been approved by another condition of this licence.			Project Engineer Environmental Manager	
68	Any agreement(s) between the licensee and noise sensitive receivers referred to in Condition L4.10 must be: (a) submitted to the EPA for approval prior to any works that are the subject of the agreement being undertaken; and (b) prepared in writing and a copy of the agreement(s) kept on the premises by the licensee for the duration of this licence; and (c) kept on the licensee's project website for the duration of the agreement (personal details of residents must be omitted); and (d) prepared and implemented in accordance with Condition E1	During Construction	L4.11	Communication and Stakeholder Relations Manager Project Engineer Environmental Manager	Section 7.7.1
69	Notification of works approved outside of standard construction hours (a) The licensee must notify affected noise sensitive receivers of works approved outside of standard construction hours not less than 5 days and not more than 14 days before those works are to be undertaken. (b) The notification must be: • by letterbox drop or email; and • be detailed on the project website. (c) The notification required by paragraphs (a) and (b) of this condition must: • clearly outline the reason that the work is required to be undertaken outside the hours specified in Condition L4.1;	During Construction	L4.12	Communication and Stakeholder Relations Manager Project Engineer Environmental Manager	Section 7.6

No.	Measure	Timing	Requirement	Responsibility	Reference
	• include a diagram that clearly identifies the location of the proposed works in relation to nearby cross streets and local landmarks; • include details of relevant time restrictions that apply to the proposed works; • clearly outline, in plain English, the location, nature, scope and duration of the proposed works; • detail the expected noise impact of the works on noise sensitive receivers; • clearly state how complaints may be made and additional information obtained; and • include the number of the telephone complaints line required by Condition M4.1, an after hours contact phone number specific to the works undertaken outside the hours specified in Condition L4.1, and the project website address. This condition does not apply to works undertaken in accordance with Condition L4.3.				
70	Noise and Vibration Complaints (a) The licensee must investigate noise and vibration complaints: (i) within two hours of the complaint being made; or (ii)in accordance with any documented complaint management agreement between the licensee and the complainant. (b) The licensee must ensure that any investigation referred to in this condition that identifies works or activities being undertaken on the licenses premises as the likely source of the complaint, includes an offer to the complainant to undertake attended noise or vibration monitoring at their premises unless representative real-time monitoring data was being collected at the time of the complaint. (c) If the occupant of the dwelling or management personnel of a noise sensitive receiver other than a dwelling accepts the offer of attended noise or vibration monitoring the licensee must undertake that attended monitoring:	During Construction	M6.5	Communication and Stakeholder Relations Manager Project Engineer Environmental Manager	Section 7.11

No.	Measure	Timing	Requirement	Responsibility	Reference
	(i) As soon as practicable; or (ii) At a time agreed with the complainant.				
71	Noise monitoring Any noise monitoring must be undertaken in accordance with Australian Standard AS 2659.1 – 1998: Guide to the use of sound measuring equipment – portable sound level meters, or any revisions of that standard which may be made by Standards Australia, and the compliance monitoring guidance provided in the NSW Industrial Noise Policy.	During Construction	M7.1	Environmental Manager	Section 8.2.1
72	Any vibration monitoring must be undertaken in accordance with the technical guidance provided in the Environmental Noise Management Assessing Vibration: A Technical Guideline (DECC, 2006). All vibration monitoring results may be assessed and reported against the acceptable values of human exposure to vibration set out in Tables 2.2 and 2.4 of the guideline.	During Construction	M7.2	Environmental Manager	Section 8.2.3
73	The licensee must undertake noise and vibration monitoring as directed by an authorised officer of the EPA.	During Construction	M7.3	Environmental Manager	Section 8.2.4
74	Noise and Vibration Reports (a) Upon request of an authorised officer, the licensee must submit a Preliminary Investigation Report to the EPA in respect of any noise or vibration monitoring undertaken in accordance with the requirements of Condition M6.5 (b) The Preliminary Investigation Report must be submitted to the EPA by 4:30pm on the afternoon of the next working day following any noise or vibration monitoring. (c) The Preliminary Investigation Report must: 1. Include numerical and/or graphical representation of the noise and vibration monitoring results; and 2. Highlight any detected exceedance of noise limits or noise management levels specified in this licence, relevant noise modelling and any relevant noise guidelines	During Construction	R4.2	Environmental Manager	Section 8.3

No.	Measure	Timing	Requirement	Responsibility	Reference
75	In the event of any exceedance of the best achievable noise performance objectives identified in Construction Noise and Vibration Impact Statements prepared for the works, the licensee must: (a) Modify activities and implement all reasonable and feasible measures to prevent a recurrence of the exceedance; and (b) Submit a Follow-Up Investigation Report to the EPA within 5 working days of any noise or vibration monitoring having been undertaken (unless otherwise approved by the EPA). (c) The Follow-Up Investigation Report must include: 1. Confirmation of whether noise monitoring has been undertaken in accordance with AS2659 and the compliance monitoring guidance provided in the INP; and 2. Confirmation of whether vibration monitoring has been undertaken in accordance with the guidance provided in Assessing Vibration: a technical guideline (DEC 2006). 3. Details of the prevailing meteorological conditions during the period when the monitoring was undertaken; and 4. A map of each noise and vibration monitoring location in relation to the noise source, including relevant distances; and 5. Numerical and graphical representation of the noise and vibration monitoring results; and 6. An analysis of the noise and vibration monitoring results; and 7. Details of any remedial action taken in relation to the matter; and 8. In cases not the subject of remedial action, detailed justification of the decision not to undertake remedial action.	During Construction	R4.3	Environmental Manager	Section 8.3
76	Out of Standard Hours Works - Validation Report (a) For activities permitted under Condition L4.6 & L4.7, a validation report must be submitted to	During Construction	R4.4	Environmental Manager	Section 8.3

No.	Measure	Timing	Requirement	Responsibility	Reference
	the EPA that includes the following detail: 1. Confirmation that the equipment used to undertake the works was as specified in the relevant Construction Noise and Vibration Impact Assessment for the worksite; and 2. A copy of the community notification required under Condition L4.12 3. Noise monitoring as required by L4.8(d) 4. Details of any exceedances of predicted noise levels; and 5. Details of the noise and vibration mitigation measures that were implemented as specified in the relevant Construction Noise and Vibration Impact Assessment for the worksite; and, 6. The justification required under L4.6 &L4.7 for the carrying out of works outside of standard construction hours in L4.1. (b) The validation report must be submitted to the EPA fortnightly from the commencement of the works permitted by L4.6 & L4.7 by no later than 2 business days from the end of each fortnight.				
77	Requirements for community agreements Any community agreement to permit works to be undertaken outside of standard construction hours (OOHW) under Condition L4.10 must: (a) be prepared and implemented in accordance with the relevant sections of the Interim Construction Noise Guidelines (DEC 2009), the Industrial Noise Policy (EPA 1999) and AS2346-2010 Guide to noise and vibration control on construction, demolition and maintenance sites; (b) detail the following: 1. the actual works proposed; 2. any expected impacts in clear, simple English based on noise modelling; 3. the expected duration of the works;	During Construction	E1.1	Communication and Stakeholder Relations Manager Environmental Manager	Section 7.6

No.	Measure	Timing	Requirement	Responsibility	Reference
	4. any expected benefits for receivers; 5. any other concurrent OOHW that will be occurring; and 6. any other OOHW that will be occurring on the nights preceding and following the proposed works or, if the proposed work precedes or follows a weekend period, any other OOHW that will be occurring on the weekend. (c) demonstrate that the noise sensitive receivers party to the agreement understand the nature of the works and any predicted impacts; and (d) be kept for the duration of the agreement and made available to an EPA authorised officer on request.				
78	Consultation and Engagement In relation to consulting and engaging with noise sensitive receivers for a community agreement, the following applies: (a) all noise sensitive receivers predicted by modelling to be impacted by noise greater than 5 dB(A) above RBL must be consulted on any proposed community agreement. This includes noise sensitive receivers that have declined to participate in previous agreements; (b) all proposed agreements must include details for interpreting services for languages other than English where required; and (c) If a licensee is unable to contact a noise sensitive receiver after three attempts, including leaving "sorry I missed you" cards explaining the reason for the visit and requesting a return phone call, then the licensee will note that the receiver could not be contacted and the receiver will not be considered to have either agreed or disagreed; and (d) records of the attempts to contact the receiver will be kept by the licensee.	During Construction	E1.2	Communication and Stakeholder Relations Manager Environmental Manager	Section 7.6

No.	Measure	Timing	Requirement	Responsibility	Reference
79	Agreement thresholds (a) The EPA will consider agreements reached between the licensee and a substantial majority of both: 1. noise sensitive receivers predicted to by the licensee to be impacted by noise levels exceeding those specified in Condition L4.2(a) and L4.2(b); and 2. noise sensitive receivers predicted to by the licensee to be impacted by noise levels above a highly noise affected level of 75dB(A).	During Construction	E1.3	Communication and Stakeholder Relations Environmental Manager	Section 7.6
80	Community agreements attained by phone Where a community agreement has been reached with noise sensitive receivers over the phone, the following applies: (a) the phone script used to describe the proposed agreement (including information required under Condition E1.1(b)) is to be provided to the EPA with the community agreement for approval; and (b) the script must include a clear question requesting receiver agreement to the proposal; and (c) detailed records are to be maintained by the licensee of all community agreement phone conversations and must be maintained for the duration of the community agreement; and (d) any noise sensitive receiver who requests a copy of the phone agreement must be supplied with one.	During Construction	E1.4	Communication and Stakeholder Relations Manager	Section 7.6
81	Notification All noise sensitive receivers must be advised of any community agreement that has been attained in writing within seven days of the agreement being finalised and must: (a) include a website link to the project website, specifically to a summary of the approved project agreement; and	During Construction	E1.5	Communication and Stakeholder Relations Manager	Section 7.6

No.	Measure	Timing	Requirement	Responsibility	Reference
	(b) include details of the licensees complaints line as requires by condition M6; and (c) include details of the EPAs Environment Line. The notification requirements in Condition L4.13 apply to community agreements.				
82	Monitoring Validation monitoring must be undertaken for any works that are the subject of a community agreement and must: (a) be performed by a suitably qualified and experienced person; and (b) be performed on at least the first 2 nights where OOHW will be undertaken.	During Construction	E1.6	Environmental Manager	Section 8.2
83	If validation monitoring undertaken under Condition E1.6 shows that noise levels are higher than those predicted by any noise modelling undertaken as part of the community agreement, work practices must be modified so that measured noise levels do not exceed predicted levels.	During Construction	E1.7	Project Engineer Environmental Manager	Section 8.2
84	A validation monitoring plan must be submitted to the EPA for approval as part of the community agreement documentation prior to any OOHW occurring.	During Construction	E1.8	Project Engineer Environmental Manager	Section 8.2

APPENDIX C

CNVIS RESULTS SUMMARY

CNVIS Scenarios

	Description	Location	Work Period	Main Equipment Used	Typical L_W	
					$L_{Aeq,15min}$	L_{Amax}
Sc_01	CSR and High Voltage Diversions and Signalling	Length of work site, excluding station areas	Standard and OOH	Vacuum truck	107	114
				6t excavator	103	
				2t tipper	101	
				hand tools	73	
				grinders	107	
				multi-crane	105	
				wacker packer	110	
				EWP	100	
Sc_02	Fencing	Various locations along length of work site	Standard and OOH	2t tipper	101	112
				multi-crane	105	
				Concrete Truck	102	
				Concrete pump	102	
				hand tools	73	
				Grinders	107	
				Telehandler	105	
Sc_03	Retaining Wall Earthworks	Around Cooks River Bridge	Standard and OOH	24t Excavator	106	115
				13t Excavator	106	
				6t vibratory roller	**105**	
				Truck and dog	107	
				Bogie	101	
Sc_04	Retaining Wall Lifting/Piling	Around Cooks River Bridge	Standard and OOH	13t Excavator	106	111
				Bored Piling Rig	108	
				Concrete truck	102	
				Concrete pump	102	
				Vacuum Truck	107	
				multi-crane	105	
				130t Crane	101	
Sc_05	Concrete Injected Columns	West of Cooks River Bridge	Standard and OOH	Excavator with vibration attachment	116	120
				Concrete truck	102	
				Concrete pump	102	
Sc_06	Emergency Generators	Installed at 5 separate stations	Standard and OOH	Small generator	84	87
				Large generator	92	95
Sc_07	Site Compound Demolition	Close Street, Canterbury	Standard	30t Excavator (with hammer attachment)	122	-
				Bogies	101	
				Watercart	102	

	Description	Location	Work Period	Main Equipment Used	Typical L_W	
					$L_{Aeq,15min}$	L_{Amax}
				Generators	99	
				Hand tools	107	
				Concrete Saw	113	
Sc_08	Site Compound Earthworks	Close Street, Canterbury	Standard	**14t vibratory roller**	110	-
				Dump truck	107	
				Bogies	101	
				13t excavator	104	
				Front End Loader	112	
				Water Cart	102	
				Smooth drum roller	109	
				Vacuum Truck	107	
				Chainsaws	114	
Sc_09	Site Compound Building Install	Close Street, Canterbury	Standard	100t crane	106	-
				Delivery Trucks	99	
				Handtools	107	
				Generators	99	

Note: **BOLD** indicates that the activity is considered to be particularly annoying to nearby residents due to noise character and therefore a 5dB penalty is to be applied at the receivers as specified in the ICNG.

Predicted Worse Case noise levels for Scenario 1 Residential Receivers

Receiver	OOH Night NML	Predicted Worst-Case $L_{Aeq,15min}$	Sleep Disturbance Screening Criteria	Predicted L_{Amax}
NCA 01	**38**	62	48	85
NCA 02	**38**	73	48	96
NCA 03	**39**	52	49	75
NCA 04	**40**	62	50	85
NCA 05	**37**	64	47	87
NCA 06	**40**	49	50	72
NCA 08	**46**	70	56	93
NCA 09	**41**	79	51	101
NCA 10	**56**	71	56	93
NCA 11	**54**	68	54	89

Noise levels shaded light blue indicate exceedances above the applicable NML. Noise levels shaded green exceed the sleep disturbance screening criteria.

Predicted Worse Case noise levels for Scenario 2 Residential Receivers

Receiver	OOH Night NML	Predicted Worst-Case $L_{Aeq,15min}$	Sleep Disturbance Screening Criteria	Predicted L_{Amax}
NCA 01	**38**	58	48	58
NCA 02	**38**	66	48	66
NCA 03	**39**	56	49	56
NCA 04	**40**	61	50	61
NCA 05	**37**	65	47	65
NCA 06	**40**	47	50	47

Noise levels shaded light blue indicate exceedances above the applicable NML. Noise levels shaded green exceed the sleep disturbance screening criteria.

Predicted Worse Case noise levels for Scenario 3 Residential Receivers

Receiver	OOH Night NML	Predicted Worst-Case $L_{Aeq,15min}$	Sleep Disturbance Screening Criteria	Predicted L_{Amax}
NCA 01	**38**	19*	48	41
NCA 02	**38**	20*	48	42
NCA 03	**39**	28*	49	49
NCA 04	**40**	63*	50	86
NCA 05	**37**	65*	47	87
NCA 06	**40**	35*	50	57

* A 5dBA penalty has been applied to these predicted levels due to the annoying character of the noise, as described in Section 3, and consistent with the ICNG.

Predicted Worse Case noise levels for Scenario 4 Residential Receivers

Receiver	OOH Night NML	Predicted Worst-Case $L_{Aeq,15min}$	Sleep Disturbance Screening Criteria	Predicted L_{Amax}
NCA 01	**38**	16	48	36
NCA 02	**38**	17	48	38
NCA 03	**39**	24	49	45
NCA 04	**40**	61	50	80
NCA 05	**37**	63	47	83
NCA 06	**40**	32	50	53

Noise levels shaded light blue indicate exceedances above the applicable NML. Noise levels shaded green exceed the sleep disturbance screening criteria.

Predicted Worse Case noise levels for Scenario 5 Residential Receivers

Receiver	NML	Predicted Worst-Case $L_{Aeq,15min}$	Sleep Disturbance Screening Criteria	Predicted L_{Amax}
NCA 01	**38**	18	48	22
NCA 02	**38**	22	48	26
NCA 03	**39**	33	49	37
NCA 04	**40**	65	50	69
NCA 05	**37**	51	47	55
NCA 06	**40**	37	50	41

Noise levels shaded light blue indicate exceedances above the applicable NML. Noise levels shaded green exceed the sleep disturbance screening criteria.

Predicted Worse Case noise levels for Scenario 6 Residential Receivers

Receiver	NML	Predicted Worst-Case $L_{Aeq,15min}$	Sleep Disturbance Screening Criteria	Predicted L_{Amax}
NCA 01	**38**	50	48	53
NCA 02	**38**	49	48	52
NCA 03	**39**	49	49	52
NCA 04	**40**	10	50	13
NCA 05	**37**	15	47	18
NCA06	**40**	44	50	47
NCA 07	**40**	43	50	46

Noise levels shaded light blue indicate exceedances above the applicable NML. Noise levels shaded green exceed the sleep disturbance screening criteria.

Predicted Worse Case noise levels for Scenario 7 Residential Receivers

Receiver	NML	Predicted Worst-Case $L_{Aeq,15min}$
NCA 01	**48**	28
NCA 02	**48**	35
NCA 03	**48**	54
NCA 04	**50**	72
NCA 05	**46**	39
NCA 06	**55**	28

Predicted Worse Case noise levels for Scenario 8 Residential Receivers

Receiver	NML	Predicted Worst-Case $L_{Aeq,15min}$
NCA 01	**48**	25
NCA 02	**48**	31
NCA 03	**48**	47
NCA 04	**50**	76
NCA 05	**46**	38
NCA 06	**55**	32

Predicted Worse Case noise levels for Scenario 9 Residential Receivers

Receiver	NML	Predicted Worst-Case $L_{Aeq,15min}$
NCA 01	**48**	15
NCA 02	**48**	23
NCA 03	**48**	37
NCA 04	**50**	72
NCA 05	**46**	31
NCA 06	**55**	27

Predicted Worse Case noise levels for Commercial Receivers

	Predicted Worst-Case $L_{Aeq,15min}$										
	NCA 01	**NCA 02**	**NCA 03**	**NCA 04**	**NCA 06**	**NCA 06**	**NCA 07**	**NCA 08**	**NCA 09**	**NCA 10**	**NCA 11**
NML						**70**					
Scenario 01	63	46	45	67	67	50	-	66	61	68	38
Scenario 02	51	27	18	74	70	46	-	-	-	-	-
Scenario 03	15	8	12	65	64	22	-	-	-	-	-
Scenario 04	16	10	14	67	66	25	-	-	-	-	-
Scenario 05	7	11	22	45	81	34	-	-	-	-	-
Scenario 06	41	44	22	7	3	50	46	-	-	-	-
Scenario 07	25	30	36	75	34	36	-	-	-	-	-
Scenario 08	23	28	32	69	37	31	-	-	-	-	-
Scenario 09	14	19	24	56	31	25	-	-	-	-	-

Noise levels shaded light blue indicate exceedances above the applicable NML.

Predicted Worse Case noise levels for Industrial Receivers

	Predicted Worst-Case $L_{Aeq,15min}$	
	NCA 01	**NCA 07**
NML	75	
Scenario 01	59	-
Scenario 02	44	-
Scenario 03	14	-
Scenario 04	16	-
Scenario 05	13	-
Scenario 06	11	40
Scenario 07	20	-
Scenario 08	20	-
Scenario 09	10	-

Note: The only industrial receivers considered in this assessment are located in NCA 01 and NCA 07.

Predicted Worse Case noise levels for Other Sensitive Receivers

Receiver ID	Receiver Type	NML	Sc 1	Sc 2	Sc 3	Sc 4	Sc 5	Sc 6	SC 7	SC 8	SC 9
NCA 01_Caf_1012	Café/Bar/Restaurant	60	43	27	2	4	2	42	23	22	12
NCA 01_Caf_6062	Café/Bar/Restaurant	60	33	26	1	3	7	35	30	28	19
NCA 01_Com_1208	Café/Bar/Restaurant	60	41	27	1	3	2	36	23	22	13
NCA 01_Com_2470	Café/Bar/Restaurant	60	35	28	1	3	1	18	16	21	10
NCA 01_Com_3895	Café/Bar/Restaurant	60	36	27	0	2	0	18	14	21	9
NCA 01_Com_4836	Café/Bar/Restaurant	60	34	26	1	2	0	16	15	21	11
NCA 01_Com_4894	Café/Bar/Restaurant	60	39	24	3	5	4	21	23	22	13
NCA 01_Com_4915	Café/Bar/Restaurant	60	36	26	1	3	6	18	15	21	10
NCA 01_Com_4938	Café/Bar/Restaurant	60	37	30	2	4	0	20	16	21	10
NCA 01_Com_5096	Café/Bar/Restaurant	60	36	28	1	2	0	20	16	21	10
NCA 01_Res_1052	Café/Bar/Restaurant	60	48	38	6	7	3	36	22	21	12

NCA 01_Res_4855	Café/Bar/Restaurant	60	34	26	1	2	1	15	16	21	1
NCA 01_Res_4864	Café/Bar/Restaurant	60	42	26	2	4	3	41	23	22	2
NCA 02_Caf_1647	Café/Bar/Restaurant	60	40	22	5	7	11	21	30	28	9
NCA 02_Caf_4700	Café/Bar/Restaurant	60	41	22	6	7	21	27	31	28	9
NCA 02_Res_4421	Café/Bar/Restaurant	60	44	23	6	8	7	28	30	28	8
NCA 02_Res_4773	Café/Bar/Restaurant	60	40	21	6	8	4	27	30	28	9
NCA 03_Caf_6060	Café/Bar/Restaurant	60	42	18	11	13	10	22	35	31	3
NCA 03_Caf_6061	Café/Bar/Restaurant	60	39	18	11	13	10	5	34	29	1
NCA 03_Res_5091	Café/Bar/Restaurant	60	43	18	11	13	10	24	35	31	3
NCA 04_Caf_4315	Café/Bar/Restaurant	60	44	34	25	27	43	0	66	66	6
NCA 04_Caf_6059	Café/Bar/Restaurant	60	38	28	26	28	33	0	41	39	7
NCA 04_Com_1055	Café/Bar/Restaurant	60	40	29	26	28	29	0	44	45	3
NCA 04_Com_4703	Café/Bar/Restaurant	60	43	31	30	32	44	0	57	57	7
NCA 04_Com_4734	Café/Bar/Restaurant	60	37	29	25	27	36	0	45	42	5
NCA 04_Com_4734	Café/Bar/Restaurant	60	37	29	25	27	36	0	45	42	5
NCA 04_Res_4504	Café/Bar/Restaurant	60	48	32	31	34	45	1	41	47	9
NCA 04_Res_4541	Café/Bar/Restaurant	60	44	34	36	38	33	0	42	38	9
NCA 06_Caf_6050	Café/Bar/Restaurant	60	35	27	17	20	17	15	32	28	2
NCA 06_Caf_6051	Café/Bar/Restaurant	60	36	28	18	20	16	12	33	28	2
NCA 06_Caf_6052	Café/Bar/Restaurant	60	37	29	17	20	15	13	33	28	3
NCA 06_Caf_6053	Café/Bar/Restaurant	60	37	31	18	20	16	14	33	28	3

NCA 06_Caf_6054	Café/Bar/Restaurant	60	37	29	18	20	16	18	33	28	2 3
NCA 06_Caf_6055	Café/Bar/Restaurant	60	45	42	19	21	34	29	34	28	2 3
NCA 06_Caf_6056	Café/Bar/Restaurant	60	40	31	18	20	17	16	34	28	2 3
NCA 06_Caf_6057	Café/Bar/Restaurant	60	50	46	20	22	31	19	35	28	2 3
NCA 06_Caf_6058	Café/Bar/Restaurant	60	36	26	17	19	20	16	35	30	2 3
NCA 06_Com_1210	Café/Bar/Restaurant	60	40	34	19	21	17	9	36	29	2 4
NCA 06_Com_4401	Café/Bar/Restaurant	60	38	33	19	21	16	9	36	30	2 4
NCA 06_Com_4405	Café/Bar/Restaurant	60	42	29	17	19	21	39	34	28	2 2
NCA 06_Com_4532	Café/Bar/Restaurant	60	43	37	19	21	16	10	36	29	2 4
NCA 06_Com_4537	Café/Bar/Restaurant	60	34	27	18	20	17	8	35	31	2 5
NCA 06_Com_4537	Café/Bar/Restaurant	60	34	27	18	20	17	8	35	31	2 5
NCA 06_Com_4537	Café/Bar/Restaurant	60	34	27	18	20	17	8	35	31	2 5
NCA 06_Med_4414	Café/Bar/Restaurant	60	40	31	18	20	17	12	35	29	2 3
NCA 06_Res_4467	Café/Bar/Restaurant	60	39	28	17	19	19	37	34	28	2 2
NCA 01_CCC_2803	Child Care Centre	55	35	29	1	2	1	2	21	20	1 0
NCA 03_CCC_1589	Child Care Centre	55	33	16	10	12	16	10	35	30	2 2
NCA 03_CCC_2114	Child Care Centre	55	35	22	13	14	15	9	32	36	2 5
NCA 03_CCC_5024	Child Care Centre	55	54	16	9	11	17	13	34	29	2 2
NCA 06_CCC_1811	Child Care Centre	55	37	28	17	19	17	22	33	28	2 3
NCA 06_CCC_4644	Child Care Centre	55	40	17	12	15	13	10	31	27	2 0
NCA 01_CCC_6000	Child Care Centre	55	63	28	15	16	3	31	32	28	2 1

NCA 01_Edu_1117	Education	55	34	22	1	3	5	11	25	23	1 4
NCA 01_Edu_1133	Education	55	39	27	1	3	0	24	19	21	1 0
NCA 01_Edu_2827	Education	55	35	22	2	4	8	12	25	23	1 4
NCA 02_Edu_4373	Education	55	37	31	4	6	16	17	28	26	1 7
NCA 06_Edu_1073	Education	55	36	31	21	23	26	3	37	30	2 5
NCA 06_Edu_1956	Education	55	41	38	19	21	26	7	36	29	2 4
NCA 01_Med_1102	Medical	55	34	23	2	4	7	15	25	23	1 4
NCA 01_Med_2171	Medical	55	36	23	1	3	0	19	25	23	1 4
NCA 01_Med_2182	Medical	55	35	28	1	3	0	17	16	21	1 0
NCA 01_Med_3638	Medical	55	37	25	1	3	6	22	25	22	1 3
NCA 02_Med_1086	Medical	55	40	22	5	7	7	23	30	28	1 9
NCA 03_Med_4628	Medical	55	38	18	11	13	15	8	34	29	2 1
NCA 03_Med_4778	Medical	55	37	18	11	13	14	8	33	29	2 1
NCA 04_Med_4568	Medical	55	34	27	23	25	30	0	36	35	2 7
NCA 06_Med_1081	Medical	55	45	28	17	19	21	23	35	29	2 3
NCA 06_Med_1190	Medical	55	36	30	18	20	16	8	36	30	2 4
NCA 06_Med_1604	Medical	55	34	26	18	20	15	11	32	28	2 2
NCA 06_Med_2104	Medical	55	41	36	22	24	19	5	37	30	2 4
NCA 06_Med_3444	Medical	55	37	27	17	19	18	12	33	28	2 3
NCA 06_Med_4400	Medical	55	47	45	21	23	17	10	36	29	2 4
NCA 06_Med_4446	Medical	55	41	32	18	20	34	32	34	28	2 3

NCA 06_Med_4625	Medical	55	35	25	17	19	16	11	35	30	2 4
NCA 06_Med_4652	Medical	55	34	24	16	18	14	8	32	28	2 2
NCA 06_Med_4765	Medical	55	38	30	18	20	18	17	33	28	2 3
NCA 01_PoW_1106	Place of Worship	55	36	24	1	3	0	19	25	23	1 4
NCA 01_PoW_4317	Place of Worship	55	34	22	2	4	18	13	26	23	1 4
NCA 02_PoW_1130	Place of Worship	55	38	25	4	5	10	15	19	24	1 4
NCA 03_PoW_2022	Place of Worship	55	36	17	11	13	22	9	35	30	2 2
NCA 06_PoW_1087	Place of Worship	55	35	28	21	23	27	3	37	31	2 6
NCA 06_PoW_1144	Place of Worship	55	37	26	16	19	20	23	34	30	2 3
NCA 06_PoW_1411	Place of Worship	55	45	43	20	22	33	21	34	29	2 4
NCA 08_CCC_5156	Childcare Centre	60	45	0	0	0	0	0	0	0	0
NCA 08_EDU_6451	Education	60	47	0	0	0	0	0	0	0	0
NCA 08_MED_8142	Medical	60	51	0	0	0	0	0	0	0	0
NCA 08_POW_7427	Place of Worship	60	53	0	0	0	0	0	0	0	0
NCA 09_EDU_6080	Education	60	46	0	0	0	0	0	0	0	0
NCA 09_EDU_6081	Education	60	40	0	0	0	0	0	0	0	0
NCA 09_EDU_6153	Education	60	48	0	0	0	0	0	0	0	0
NCA 09_EDU_6154	Education	60	37	0	0	0	0	0	0	0	0

NCA 09_EDU_6155	Education	60	43	0	0	0	0	0	0	0	0
NCA 09_EDU_6156	Education	60	54	0	0	0	0	0	0	0	0
NCA 09_EDU_6157	Education	60	52	0	0	0	0	0	0	0	0
NCA 09_EDU_6288	Education	60	40	0	0	0	0	0	0	0	0
NCA 09_EDU_6289	Education	60	39	0	0	0	0	0	0	0	0
NCA 09_EDU_6327	Education	60	48	0	0	0	0	0	0	0	0
NCA 09_EDU_6328	Education	60	42	0	0	0	0	0	0	0	0
NCA 09_EDU_6329	Education	60	41	0	0	0	0	0	0	0	0
NCA 09_EDU_6330	Education	60	41	0	0	0	0	0	0	0	0
NCA 09_EDU_6331	Education	60	49	0	0	0	0	0	0	0	0
NCA 09_EDU_6332	Education	60	50	0	0	0	0	0	0	0	0
NCA 09_EDU_6492	Education	60	56	0	0	0	0	0	0	0	0
NCA 09_EDU_6493	Education	60	48	0	0	0	0	0	0	0	0
NCA 09_EDU_6494	Education	60	37	0	0	0	0	0	0	0	0
NCA	Education	60	47	0	0	0	0	0	0	0	0

09_EDU_6495											
NCA 09_EDU_6496	Education	60	51	0	0	0	0	0	0	0	0
NCA 09_EDU_6497	Education	60	36	0	0	0	0	0	0	0	0
NCA 09_EDU_6498	Education	60	37	0	0	0	0	0	0	0	0
NCA 09_EDU_6505	Education	60	54	0	0	0	0	0	0	0	0
NCA 09_EDU_6506	Education	60	34	0	0	0	0	0	0	0	0
NCA 09_EDU_6507	Education	60	54	0	0	0	0	0	0	0	0
NCA 09_EDU_6508	Education	60	43	0	0	0	0	0	0	0	0

Noise levels shaded light blue indicate exceedances above the applicable NML.

Recommended Additional Noise Mitigation Measures for worst case scenarios

Scenario	Period	NCA 01	NCA 02	NCA 03	NCA 04	NCA 05	NCA 06	NCA 07	NCA 08	NCA 09	NCA 10	NCA 11
Sc_01	**Standard**	LB, M	LB, M	-	LB, M	LB, M	-	-	LB, M	LB, M	LB, M	LB, M
	OOHW 1	LB, M	M, IB, LB, RO, PC, SN	LB	LB, M	LB, M	-	-	LB, M	M, IB, LB, RO, PC, SN	LB, M	LB, M
	OOHW 2	M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, SN	LB, M	M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, SN	LB, M	-	M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, SN	AA, M, IB, LB, PC, SN	M, IB, LB, PC, RO, SN
Sc_02	**Standard**	LB, M	LB, M	-	LB, M	LB, M	-	-	-	-	-	-
	OOHW 1	LB, M	LB, M	LB	LB, M	LB, M	-	-	-	-	-	-
	OOHW 2	M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, SN	M, IB, LB, PC, RO, SN	M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, SN	LB, M	-	-	-	-	-
Sc_03	**Standard**	-	-	-	-	LB, M	-	-	-	-	-	-
	OOHW 1	-	-	-	LB	LB, M	-	-	-	-	-	-
	OOHW 2	-	-	-	M, IB, LB, PC, RO, SN	M, IB, LB, PC, RO, SN	-	-	-	-	-	-
Sc_04	**Standard**	-	-	-	LB, M	LB, M	-	-	-	-	-	-
	OOHW 1	-	-	-	LB, M	LB, M	-	-	-	-	-	-
	OOHW 2	-	-	-	M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, SN	-	-	-	-	-	-
Sc_05	**Standard**	-	-	-	LB, M	-	-	-	-	-	-	-
	OOHW 1	-	-	-	LB, M	LB	-	-	-	-	-	-

	OOHW 2	-	-	-	M, IB, LB, PC, RO, SN	LB, M	-	-	-	-	-	-
	Standard	-	-	-	-	-	-	-	-	-	-	-
Sc_06	**OOHW 1**	LB	LB	LB	-	-	-	-	-	-	-	-
	OOHW 2	LB, M	LB, M	LB, M	-	-	-	LB, M	-	-	-	-
Sc_07	**Standard**	-	-	-	LB, M	-	-	-	-	-	-	-
Sc_08	**Standard**	-	-	-	LB, M	-	-	-	-	-	-	-
Sc_09	**Standard**	-	-	-	LB, M	-	-	-	-	-	-	-

Vibration – Safe Working Distances

Plant	**PPV Vibration Level (mm/s) at Distance [1]**					**Recommended Minimum Working Distance[2]**	
	5m	**10m**	**20m**	**30m**	**40m**	**Building Damage**	**Human Comfort**
Large Vibratory Roller	7	4.5	3	2.3	2	12m	40m
Heavy Hydraulic Hammer (1500kg hammer on 30t exc)	4.5	2.5	0.5	0.2	0.12	22m	73m
Vibratory Piling	-	5.2	2.5	1.1	0.1	2-20m	20m
Bored Piling	-	0.2	<0.1	-	-	2m (nominal)	N/A

Note 1: Vibration levels are typical based on measured data mostly in Sydney sandstone and should be used as a guide only. Short-term higher levels can be experienced at commencement of some operations.
Note 2: Minimum working distances from TfNSW Construction Noise and Vibration Strategy

APPENDIX D

CONSULTATION RECORDS

Condition of Approval SSI 8256	Agency Consultation	Consultation Workshop	Status	Comments	Responses
	City of Canterbury Bankstown	Invited 18/04/2019 Attended 29/04/2019	Submitted 20/04/2019 Follow up email sent – 7/05/2019 Call from Allan Shooter on 14/05/2019 to request extension to 17/05/2019 Response received 21/05/2019	Hi Daniel – Please be advised The EH unit has reviewed the Construction Noise and Vibration Management Plan (CNVMP) & Noise and Vibration Monitoring Program and have no further comments to add.	Noted
C3(a), C6	Inner West Council	Invited 18/04/2019 Attended 29/04/2019	Submitted 25/04/2019 Follow up email sent – 7/05/2019 Response received 14/05/2019	Hi Daniel – comments below on CNVMP for early works for SW Metro. • Given the different nature of early works, a subsequent Construction Noise & Vibration Plan should be submitted for the main construction phase of the project to allow consideration of the 6-monthly Construction Compliance Reports specified in Part 8.3. • Residents living along the proposed Metro line already experience noise impacts as a result of the 24-hour Port Botany freight line and the airport and these cumulative impacts of these noise sources need to be taken into account. Part 7.12 refers to Cumulative Impacts and it should identify cumulative impact of these sources with the intention of minimising clearly audible noise during OOHW. • Part 4.4 (Sleep Disturbance) cites the EIS and table 4-3 establishes Sleep disturbance screening criterion based on the EIS. The criterion in Table 4-3 are considered excessive and should be lowered. In addition, Table 4-4 Road traffic noise criteria outlines continuous traffic noise level on Local Roads at night time of 50dB and this is considered excessive.	i) Noted. To clarify, Section 8.3 has been updated to appropriately reference the Construction Monitoring Report, rather than the Construction Compliance Report ii) Rating Background Levels account for normal operating noise levels of the Port Botany Freight line and aircraft noise. However, where construction or maintenance works by other works are to occur on the Port Botany freight line (or other local assets) potential noise impacts should be considered and appropriate notification coordinated. This has been addressed in Section 7.6 and 7.12. iii) The EIS/SPIR has used the best practice standard for Sleep Disturbance as included within the Industrial Noise Policy 2000 Application Notes. This is the standard recognised by the NSW EPA and as such it is appropriate for SMEW. Local road noise criteria during nights is taken from the NSW Road Noise Policy (DECCW, 2011). This is the standard and recognised document for assessing construction vehicle noise criteria. The criteria included within the EIS/SPIR is appropriate. iv) JHLOR will endeavour to undertake works, particularly noisy works, during standard construction hours. However, some works within the danger zone of the railway must

	• Table 7-1, Table 7-2 and Table 7-3 outline additional mitigation measures for eligible property owners. Alternative accommodation should be made available for noise clearly audible and above during OOHW Period 2. Additionally, it's considered that when work during OOHW Period 2 attracts many and/or repeated complaints from multiple parties, mitigation measures should include rescheduling of the activity to within hours stated in the consent.	occur outside standard construction hours for construction worker safety. The Additional Mitigation Measures stated within Section 7.6 of this Plan are measures included within the Sydney Metro City & Southwest Construction Noise and Vibration Strategy (CNVS). The CNVS is included within the EIS, has gone through appropriate consultation and forms part of the approved Project. JHLOR, in conjunction with Sydney Metro, will actively consult with the community to prevent or mitigate the risk of impacts to the community and community complaints, including ongoing or multiple complaints. JHLOR will consult with groups or individuals to resolve any issues and will review construction methodology and timing of works to reduce impacts where possible. Any complaints that cannot be resolved by JHLOR and Sydney Metro will be referred to the Community Complaints Mediator.