Construction Noise and Vibration Management Plan

SMCSWSSJ-JHL-WSS-EM-PLN-000029

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Terms and definitions

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

Terms	Explanation
AA	Acoustic Advisor
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
DPE	Department of Planning and Environment
EIS	Environmental Impact Statement
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence
ER	Environmental Representative
HNAML	Highly Noise Affected Management Level
HSEMS	Health Safety Environmental Management System
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.
ISCA	Infrastructure Sustainability Council of Australia
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.
SM	Sydney Metro
SSI	State Significant Infrastructure
SMu	Sydenham Metro upgrade
TfNSW	Transport for New South Wales
the Project	Sydenham Station and Junction

1. Introduction

As part of the Sydney Metro City & Southwest project, it is proposed to carry out construction works relating to the Sydenham Metro upgrade project (Smu). This project was formerly referred to as the Sydenham Station Junction project (SSJ). The works are being undertaken by a 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 and Construction Environmental Management Framework. The Plan has been produced to demonstrate how JHLOR will mitigate risks associated with noise and vibration during the construction stage.

A Project specific Construction Noise and Vibration Impact Statement has been developed in August 2018 and incorporated into this management plan. The current document also relies on information provided in the EIS and Modification Report. This document also is based on the Sydney Metro City and Southwest Construction Noise and Vibration Strategy, Version 0.4, August 2016.

1.1 Background and Scope

The project site is located within the rail corridor at Sydenham Station and several hundred meters to the north and south of the station, 11 Sydenham Road, Marrickville, NSW, the Sydenham Pit and Drainage Pump Station and future precinct areas on Railway Parade and Burrows Avenue, Sydenham, NSW.

The works will be undertaken by a John Holland Group Pty Limited (John Holland) and Laing O'Rourke Construction Pty Limited (Laing O'Rourke) joint venture referred to as JHLOR. Laing O'Rourke has been nominated as Principal Contractor and as such, the works will occur under Laing O'Rourke's Management Systems. Work initially commenced under Sydney trains EPL (12208). As of January 2019, LOR has obtained a project EPL (21147).

This CNVMP has been developed for the Construction phase of the project, in compliance with Laing O'Rourke's Health Safety Environmental Management System (HSEMS) the Project's legal, planning and contractual requirements.

1.2 Overview of the Sydenham Station and Junction (Smu) Project

Sydney Metro City & Southwest is a new 30km metro line extending metro rail 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 Smu project forms part of the Sydney Metro City & Southwest project and includes upgrades to Sydenham Station, the surrounding network and other ancillary infrastructure to accommodate Sydney Metro trains.

The SMu works were not assessed under the planning approval for the Sydney City Metro Chatswood to Sydenham that was approved by the Minister on 9 January 2017 under Part 5.1 of the Environmental Assessment & Planning Act 1979. The Sydenham to Bankstown State Significant Infrastructure Application Report identified an opportunity to accelerate the phased opening of the Chatswood to Sydenham Metro Service, through to Sydenham Station if Sydenham Station and Junction works commence earlier under a separate planning approval. As such, the works have been assessed as a modification to the Sydney City Metro Chatswood to Sydenham Environmental Impact Statement to allow the phased opening of the Metro services from Chatswood to Sydenham Station.

1.3 Smu Scope of Works

1.3.1 Permanent Works

The works include all permanent new infrastructure and modifications to existing infrastructure, which must be constructed to enable the construction of Smu. The permanent new infrastructure and modifications to existing infrastructure to be constructed includes:

- Sydenham Station and precinct works – demolition and reconstruction of platforms 1 and 2 for metro rail operations and a new aerial concourse connecting to new station entries at Railway Parade and Burrows Avenue. Upgrades to transport interchange facilities and provision for active transport would be delivered as part of the station works
- Track and rail system facilities – reconfiguration of existing track and rail systems to segregate the T3 Bankstown Line and the Goods Line, installation of metro tracks and rail systems including crossover and turnback facilities
- Adjustments to the Sydenham Pit and Drainage Pumping Station – including a new aqueduct over the pit, new pumping station and new maintenance access ramp
- Ancillary infrastructure and works – including fencing, maintenance access, utilities works, drainage, noise barriers, road and transport network works, bridge works, and temporary facilities to support construction.

1.3.2 Temporary Works

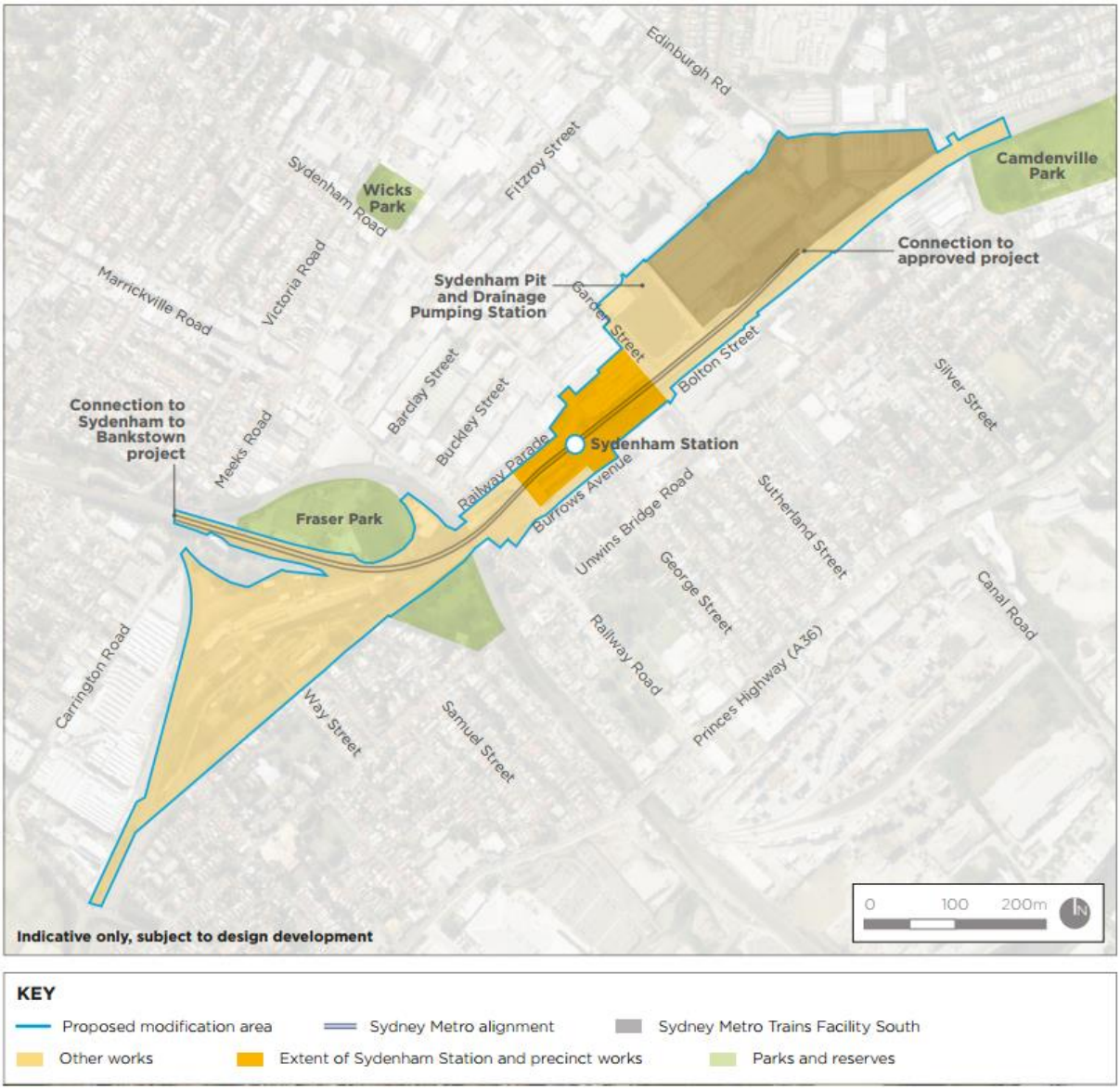
The Smu temporary works include:

- 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, noise walls, 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 works and measures required as a consequence of requirements arising from the stakeholder and community liaison process; and
- all other temporary works and measures required for the construction of the Works.

1.4 Works Location and Site Layout

The Smu work location and site layout is highlighted in Figure 1.

Figure 1 Sydenham Station and Junction Project Site



1.5 Objectives and Targets

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

Table 1 Objectives and 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; and Maintain positive, cooperative relationships with schools, childcare centres, local residents and building owners. Meet noise and vibration requirements for work conducted under conditions of project EPL (21147), 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 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. Fulfil all mitigation and reporting requirements as required by project EPL

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

1.6 Consultation

A summary of consultation undertaken as per CoAs – C3(a), C9(a) and C12 for the preparation of this CNVMP including the Construction Monitoring Program (CMP) for Noise and Vibration is provided in Table 2.The CNVMP (including the CMP) has been updated further following receipt of comments, as required. Records of consultation are contained in a separate document to this plan for the information for DPE. A Consultation Register is included within Appendix E.

Table 2 Summary of Consultation

CoA SSISSI-15_7400	Agency Consultation	Requirements and date submitted	Key issues raised	CNVMP Section Reference
C3(a) C9(a) C12	Environment Protection Authority	Submitted for Consultation on the 23/3/18 Follow up correspondence sent 3/5/18 Phone call 11/6/18 (no response) CNVMP and draft CNVIS sent to EPA as part of EPL application on 19/07/2018 – no response EPL 21147 Issued on 17/01/19	No response received	N/A
	Inner West Council	Submitted for Consultation on the 23/3/18 Follow up correspondence sent 3/5/18 Follow up correspondence sent 8/5/18 Follow up correspondence sent 9/5/18 Kick-off meeting 24th May Phone call 11/6/18 (no response) Phone call 12/6/18 (no response)	Response received on the 15/5/18 stating no comments have been received on the CNVMP No further comments or issues raised at kick-off meeting	N/A

2. Legal and other requirements

Table 3 details the legislation and planning instruments considered during development of this Plan.

Table 3 Legislation and 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 CNVMP addresses applicable requirements in the following documents:

- *Project Planning Approval – The Sydney Metro City and Southwest – Environmental Impact Statement – Sydenham Station and Sydney Metro Trains Facility South Modification Report*
- *The Sydney Metro City and Southwest – Environmental Impact Statement – Sydenham Station and Sydney Metro Trains Facility South Modification Submissions Report*
- *The Sydney Metro City and Southwest – Sydenham Station and Sydney Metro Trains Facility South Conditions of Approval*
- *Sydney Metro City and Southwest Construction Noise and Vibration Strategy V4.0, August 2016*
- *The Sydney Metro Construction Environmental Management Framework v3;*
- *The Sydenham Station and Junction Project Deed*
- *Infrastructure Sustainability Council of Australia – IS Technical Manual V1.2*
- *Environmental Protection License 21147: Sydenham Station Junction*

The Compliance Matrix in Appendix A provides a comprehensive list of compliance requirements, environmental documents and the contract documents.

In accordance with **CoA – C4(a)** JHLOR will comply with **EIS – EPO Noise** "*Noise levels would be minimised with the aim of achieving the noise management levels where feasible and reasonable*" by implementing the mitigation measures within Section 7 of this Plan and by undertaking monitoring as per Section 8 of this Plan.

JHLOR will comply with **EIS – EPO Vibration** "*The project would avoid any damage to buildings from vibration*" by implementing the mitigation measures within Section 7 of this Plan and by undertaking monitoring as per Section 8 of this Plan.

In accordance with **CoA – C4(b)** JHLOR will comply with the mitigation measures identified within the EIS as amended by the PIR as modified by the Conditions of Approval. This will be achieved by implementing the mitigation measures within Section 7 of this Plan and by undertaking monitoring as per Section 8 of this Plan. The EIS mitigation measures are included within Appendix A – Compliance Matrix and integrated throughout the Plan.

In accordance with **CoA – C4I** JHLOR will comply with the relevant terms of the approval as referenced throughout the Plan and as listed and cross referenced within Appendix–A - Compliance Matrix.

Issues requiring management during construction, as identified through ongoing environmental risk management analysis, will be managed in accordance with **CoA – C4(d)**.

2.1 Policy and Guidelines

The CNVMP has been prepared with due regard to and in accordance with the:

- NSW Department of Environment and Climate Change – *NSW Interim Construction Noise Guideline (ICNG),* July 2009; and
- NSW Government – *Sydney Metro City and Southwest Construction Noise and Vibration Strategy (CNVS)*, August 2017.

The ICNG is the key guideline relating to construction noise and vibration in NSW with the CNVS developed to address other noise and vibration issues associated with the broader project.

The CNVMP has also considered and applied the following additional policy, guidelines and standards as relevant:

- NSW Environment Protection Authority – NSW Environmental Noise Management – Industrial Noise Policy (INP), January 2000 and relevant application notes;
- NSW Department of Environment, Climate Change and Water – NSW Road Noise Policy (RNP), March 2011;
- NSW Government – Transport for NSW (TfNSW) Construction Noise Strategy (CNS), April 2013;
- NSW Department of Environment and Conservation – NSW Environmental Noise Management – Assessing Vibration: a Technical Guideline (the NSW Vibration Guideline), February 2006.
- German Institute for Standardisation – DIN 4150 (1999-02) Part 3 (DIN4150:3) – Structural Vibrati–n - Effects of Vibration on Structures;
- British Standard BS7385: Part 2-1993 (BS 738–) - Evaluation and Measurement for Vibration in Buildings — Part 2 – Guide to Damage Levels from Ground-borne Vibration, dated 1993;

2.2 Environmental Protection Licence

SMu pre-construction works were delivered in accordance with the Sydney Trains Environment Protection Licence (EPL) 12208. All information required by the EPL will be submitted to Sydney Trains or relevant authority within the stipulated timeframes and subject to requirements of an interface agreement that has been put in place for the Project. Note that no scheduled activity works outside of the Sydney Trains EPL boundary occurred as part of the pre-construction works.

LOR have obtained an EPL (21147) for the works which was issued on the 17/2/2019. Relevant conditions to noise and vibration are contained in Appendix A. The latest EPL can be accessed: https://apps.epa.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=252606&SYSUID=1&LICID=21147.

2.2.1 Construction Noise and Vibration Strategy

Sydney Metro has developed the Sydney Metro City and Southwest Construction Noise and Vibration Strategy (CNVS) and updated it in accordance with CoA-E32. The Strategy includes objectives, application of the strategy, Environmental Protection Licence guidance, noise and vibration guidelines, construction noise and vibration assessment methodology, standard noise and vibration mitigation measures, additional noise and vibration mitigation measures, monitoring, auditing and reporting, complaint handling and community consultation and liaison.

JHLOR will undertake the works in compliance with the CNVS.

2.3 Infrastructure Sustainability Council of Australia (ISCA)

The SMu Project will pursue a rating under the IS Rating Scheme V1.2. The IS Rating Scheme is a platform for measuring sustainable outcomes for project during design, construction and operation over a number of different initiatives (credits). Each credit is split into a number of levels, between 1 and 3 levels depending on the credit. To obtain each level a series of criteria must be met, with the criteria for level 1 being the easiest and level 3 being the hardest to achieve. Refer to the SMu Sustainability Management Plan for more information on the IS Rating Scheme. This plan relates to two of the IS Discharge (Dis) credits.

2.3.1 Dis-2 Noise

JHLOR will pursue Level 3 for this credit. To achieve Level 3 JHLOR will undertake the following;

Table 4 Dis-2 Achievement

IS Rating Scheme Criteria Dis-2	How will this be achieved
Level–1 - Measures to mitigate noise during construction and operation have been identified and implemented.	• Section 7
Level–1 - Monitoring of noise is undertaken at appropriate intervals and in response to complaints during construction	• Section 7 and Section 8
Level–2 - The requirements for Level 1 are achieved	• See above
Level–2 - For construction, modelling and monitoring demonstrates no recurring or major divergences from the noise management process in ISCA approved noise guidelines.	• Modelling within CNVIS and monitoring to comply with management process within ICNG
Level–2 - For operation, modelling demonstrates no recurring or major exceedances of noise goals	• This will be covered within the Operational Noise and Vibration Management Plan
Level–3 - The requirements for Level 2 are achieved.	• See above
Level–3 - For construction, modelling and monitoring demonstrates no divergence from the noise management process in ISCA approved noise guidelines.	• Modelling within CNVIS and monitoring to comply with management process within ICNG
Level–3 - For operation, modelling demonstrates no exceedances of noise goals.	• This will be covered within the Operational Noise and Vibration Management Plan

2.3.2 Dis-3 Vibration

JHLOR will pursue Level 3 for this credit. This Plan includes measures to minimise vibration impacts to sensitive receivers and structures. This Plan also set vibration targets for the project to meet during the construction phase.

Table 5 Dis-3 Achievement

IS Rating Scheme Criteria Dis-3	How will this be achieved
Level–1 - Measures to mitigate vibration during construction and operation have been identified and implemented.	• Section 7
Level–1 - Monitoring of vibration is undertaken at appropriate intervals and in response to complaints during construction.	• Section 7 and Section 8
Level–2 - The requirements for Level 1 are achieved	• See above
Level–2 - For construction, modelling and monitoring demonstrates no exceedances of vibration goals for structural damage to buildings and structures.	• CNVIS and Section 8
Level–2 - For operation, modelling demonstrates no recurring or major exceedances of vibration goals for human comfort criteria.	• This will be covered within the Operational Noise and Vibration Management Plan
Level–2 - No physical damage has been caused to any buildings or structures by vibration caused by construction	• Pre-construction and Post-construction Condition Surveys
Level–3 - The requirements for Level 2 are achieved.	• See above
Level–3 - For operation, modelling demonstrates no exceedances of vibration goals for human comfort criteria	• This will be covered within the Operational Noise and Vibration Management Plan

2.4 Roles and Responsibilities

Roles and responsibilities are included within Table 6.

Table 6 Roles and 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 • 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 on site. • Ensure works occur within standard construction hours unless the appropriate out of hours works approval is in place. • Manage deliveries to mitigate noise impacts.

Roles	Responsibilities
Environment Manager (or delegate)	• 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 • Assesses and approves work outside of standard construction hours in adherence to conditions of EPL 21147 • 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 • Ensure construction activity records / monitoring records/ incident reports are kept and maintained on-site • 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 SM'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 SM led Communications Management Control Group and reports on activities, strategies and issues • Attends the monthly Project Management Review Group meeting to discuss project status and issues • 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.

Roles	Responsibilities
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 sub plans • 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. • 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 (or conduct if authorised) in relevant training to implement the requirements of this CNVMP
Noise and Vibration Monitoring Personnel (LOR / 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 of monitoring equipment • Ensure all relevant monitoring quality control / assurance procedures are effectively implemented

Roles	Responsibilities
Independent Environment Representative	• Receive and respond to communications from the Secretary in relation to the environmental performance of the Critical State Significant Infrastructure (CSSI); • Consider and inform the Secretary on matters specified in the terms of the planning approval; • Consider and recommend any improvements that may be made to work practices to avoid or minimise adverse impact to the environment and to the community; • Review all documents required to be prepared under the terms of the planning approval, ensure they address any requirements in or under the planning approval and if so, endorse them before submission to the Secretary (if required to be submitted to the Secretary) or before implementation (if not required to be submitted to the Secretary); • Regularly monitor the implementation of all documents required by the terms of the planning approval for implementation in accordance with what is stated in the document and the terms of the planning approval; • Review the Proponent's notification of incidents in accordance with Condition A41 of this approval; • As may be requested by the Secretary, help plan, attend or undertake Department audits of the CSSI, briefings, and site visits; • If conflict arises between the Proponent and the community in relation to the environmental performance of the CSSI, follow the procedure in the Community Communication Strategy approved under Condition B3 of the planning approval to attempt to resolve the conflict, and if it cannot be resolved, notify the Secretary; • Review any draft consistency assessment that may be carried out by the Proponent, and provide advice on any additional mitigation measures required to minimise the impact of the work; • Consider any minor amendments to be made to the CEMP, CEMP sub-plans and monitoring programs that comprise updating or are of an administrative nature, and are consistent with the terms of the planning approval and the CEMP, CEMP sub-plans and monitoring programs approved by the Secretary and, if satisfied such amendment is necessary, approve the amendment. This does not include any modifications to the terms of the planning approval; • Assess the impacts of minor ancillary facilities as required by Condition A18 of the planning approval; and prepare and submit to the Secretary and other relevant regulatory agencies, for information, a monthly Environmental Representative Report detailing the ER's actions and decisions on matters for which the ER was responsible in the preceding month (or other timeframe agreed with the Secretary). The Environmental Representative Report must be submitted within seven (7) days following the end of each month for the duration of works and construction of the CSSI, or as otherwise agreed with the Secretary. • Perform the roles under CoA A24 • Must complete project induction covering LORs' environmental management system.

Roles	Responsibilities

Acoustics Advisor	• Review all noise and vibration documents required to be prepared under the project approval and, should they be consistent with the CoA, endorse them prior to submission to the Secretary (if required to be submitted to the Secretary) or before implementation (if not required to be submitted to the Secretary);
	• Consider and provide recommendations on improvements that may be made to works practices to avoid or minimise noise and vibration impacts;
	• Regularly monitor the implementation of all noise and vibration documents required to be prepared under the project approval to ensure implementation is in accordance with what is stated in the document and the project approval;
	• Notify the Secretary of noise and vibration incidents in accordance with CoA A41;
	• In conjunction with the ER:
	  • As may be requested by the Secretary or Complaints Commissioner, help plan, attend or undertake audits of noise and vibration management;
	  • Facilitate conflict resolution with the community in relation to noise and vibration management performance during construction as required;
	  • Consider relevant minor amendments made to the CEMP, relevant sub-plans and noise and vibration monitoring programs that require updating or are of an administrative nature, and are consistent with the terms of the project approval and the management plans and monitoring programs approved by the Secretary and, if satisfied such amendment is necessary, endorse the amendment;
	  • Assess the noise impacts of minor ancillary facilities as required by Condition A18 of the project approval; and
	  • Prepare and submit to the Secretary and other relevant regulatory agencies, for information, a monthly Noise and Vibration Report detailing the AAs actions and decisions on matters for which the AA was responsible in the preceding month.

Note: Sydney Metro have engaged a suitably qualified Acoustic Advisor (AA) and Environmental Representative (ER) as required by the Conditions of Approval.

COA – A26 states that "*Any activities generating noise and vibration in excess of the Noise Management Level derived from the Interim Construction Noise Guideline must not commence until an Acoustic Advisor, nominated under Condition A25 of this approval, has been approved by the Secretary*.

3. Existing Environment and proposed works

3.1 Existing Environment

The Project site is surrounded by properties of varying types, including industrial, commercial, residential and recreational.

A Noise and Vibration Assessment for the works was carried out as part of the Modification Report. This Noise and Vibration Assessment was further refined within the Submissions Report.

As part of the Noise and Vibration Assessment within the Modification Report and Submissions report, the area surrounding the Project site has been divided into 3 Noise Catchment Areas (NCAs). Noise monitoring was undertaken in 2015 and 2016 to determine the Rating Background Level for these catchments.

During the development of the Construction Noise and Vibration Impact Statement (CNVIS) further background noise monitoring was undertaken within the surrounding area between 18th & 27th June 2018. The additional monitoring has taken place at the following locations;

- NCA2 – 25 Bridge St, Tempe
- NCA3 – 4 Burrows Avenue, Sydenham
- NC–4 - 80 Unwins Bridge Road, St Peters

As such, the area surrounding the project has been split into 6 Noise Catchment Areas.

Rating Background Levels for all 6 NCAs are shown in Table 7.

Table 7 Rating Background Levels

NCA	Daytime RBL (7am-6pm)	Evening RBL (6pm-10pm)	Night RBL (10pm-7am)
NCA1*	47	45	40
NCA2	41	46	40
NCA3	51	49	42
NCA4	58	51	43
NCA5**	58	52	38
NCA6***	52	43	38

*Noise levels adopted from Sydenham to Bankstown EIS

**Noise levels adopted from Chatswood to Sydenham EIS

***Noise levels adopted from TSE Marrickville Dive Construction Site

NCA mapping is included within Appendix B. These maps indicate both residential and non-residential receptors and vibration sensitive areas.

There are three noise sensitive areas affected by the proposed construction and these are:

- Edgeware Road / Lord Street – Located within NCA5. Many residences potentially affected by the construction works in this area have been fitted with heavy double glazing as part of the Sydney Airport Noise Management Plan, but some residences still retain standard single glazed windows.

- Burrows Avenue / Railway Road Area – Located within NCA3. All potentially affected residences in this area have been fitted with heavy double glazing as part of the Sydney Airport Noise Management Plan; and
- Meeks Road Area – Located within NCA1. Many residences potentially affected by the construction works in this area have been fitted with heavy double glazing as part of the Sydney Airport Noise Management Plan, but some residences still retain standard single glazed windows.

As of the most recent review of this management plan, further impacts in evening and night are not anticipated due to stage of construction scope, which currently does not include further out-of-hours works with impacts above background RBLs.

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

Table 8 outlines key construction activities associated with the Project, indicative staging, proposed plant and equipment. Information within the table has been utilised to develop a Project specific Construction Noise and Vibration Impact Statement (CNVIS) as per CoA – E33. Strikethrough indicates where scope is complete at time of management review.

Table 8 Indicative Construction Works, Staging, Plant and Equipment

Activity	Details	Timeframe	Plant
CSR & Drainage Construction / Relocation	~~Construct and commissioning of the new CSR routes including signals / comms / HV commissioning City Side of the Station~~	~~Jan 2018- April 2022~~	~~Excavators, mobile cranes, light towers, EWPs, compaction equipment, hand tools, grinders, welding equipment, hi-rail plant, underboring drilling rigs, generators, tipper trucks, non-destructive digging trucks.~~
	~~Construct and commissioning of the new CSR routes including signals / comms / HV commissioning Country Side of the Station~~	-	~~Excavators, mobile cranes, piling rig, concrete pump, concrete vibrator, light towers, EWPs, compaction equipment, hand tools, grinders, welding equipment, hi-rail plant, underboring drilling rigs, generators, tipper trucks, non-destructive digging trucks.~~
	~~Construction of the Drainage Country Side of the Station~~	~~Jun to Nov 2019~~	~~Excavators, mobile cranes, concrete pump, concrete vibrator, light towers, EWPs, compaction equipment, hand tools, grinders, welding equipment, hi-rail plant, telehandlers, generators, concrete saws, tipper trucks, non-destructive digging trucks.~~
Utilities Diversions	~~Utilities Relocations including Quenos and Transgrid~~	~~Sep 2018 to Feb 2020~~	~~excavators (1T +), breakers, trucks, generators, pumps, road compaction equipment, light towers for night works, HDD rigs, demo saws, power tools~~
Demolition	~~11 Sydenham demolition~~	~~Nov 2018 to Mar 2019~~	~~1 x EWP, 3 x 20t excavators with breakers and munchers, Bobcat, Truck and Dog~~
	~~Platforms 1 & 2~~	-	~~2x Concrete Cutter, 12t excavator, Truck and Dog~~
	~~Sydney Water Culverts~~	~~Aug 2018 to Feb 2020~~	~~Excavators (0 - 25t +), Hydraulic Breakers, Wheel Loader, Truck and Dog, Tipper Truck, Water Tankers~~

Activity	Details	Timeframe	Plant
	~~Services Building (likely to be refurbished /fit out internally – to be confirmed)~~	~~Jan to May 2020~~	~~Hand tools~~
Sydney Water Works	~~Sydney water pit and Culvert works / or aqueduct~~	~~Aug 2018 to Feb 2021~~	~~Mobile Cranes and/or Tower Crane, Piling rigs, Soil Nail Drilling Rig, Excavators (25t +), Concrete Pumps, Water Pumps, Truck and Dog, Tipper Truck, Water Tanker, Hand Held Concrete Breakers, Graders, 10t Rollers, 3t Rollers, Ute, Hiab, Demo Saws, Power Tools, Concrete Vibrators, Telehandler, 'WP's, Hammer Drill, Concrete Saws~~
Civil / Structural Works Corridor	~~Formation preparation and bridge/culvert works Bankstown line~~	~~Jan 2020 to Jun 2021~~	~~Excavators (25t +), Graders, Truck and Dog, Tipper Trucks, 10t Rollers, 3t Rollers, Ute, Hiab,~~
	~~Civil, structural and Earthworks City Side of the station~~	~~Nov 2018 to Sept 2021~~	~~Piling rig, Excavators, Roller, Truck and Dog, Telehandler and/or forklift for precast elements~~
	~~Civil and structural works Country Side of the station~~	~~-~~	~~Piling rig, Excavators, Roller, Truck and Dog, Telehandler and/or forklift for precast elements~~
	~~OHW footings / structures~~	~~-~~	~~Super sucker, 12t Excavator, Hi Rail Hydrema~~
Station and Service Building Scope	~~Construction of station services building and pad mount~~	~~Nov 2018 to FebSept 2021~~	~~50t Mobile, Concrete boom pump, Piling Rig, Tele-handler, Dumper, 5t Excavator~~
	~~Fit out and commissioning of services building~~	~~Feb 2021 to September 2021~~	~~Tele-handler, 'WP's, Concrete/Brick saws, hammer drills~~
	~~Metro Concourse Foundation Construction (including Canopies)~~	~~May 2019 to Sept 2021~~	~~300t Mobile, Concrete boom pump, Mini Piling Rigs, Tele-handler, 5t Excavators~~
	~~Metro Concourse Superstructure~~	~~Sept 2019 to 2021~~	~~300t Mobile, Concrete boom pump, Tele-handler, 'WP's~~
	~~Metro Concourse Fit tout and Commissioning~~	~~Oct 2020 to Sept 2021~~	~~Tele-handler, 'WP's, Concrete/Brick/Tile saws, hammer drills~~
	~~Construction of Platforms 1&2~~	~~Feb 2020 to Sept 2021~~	~~30t Mobile crane, concrete boom pump, tele-handler, 'WP's, 5t Excavator~~

Activity	Details	Timeframe	Plant
	Fit out and commissioning of remaining station activities	Dec 2020 to Jan 2023	Tele-handler, 'WP's, Concrete/Brick saws, hammer drills
Rail Systems Construction	~~Diversion and Reconstruction of Track, OHW and Signalling City side of the station~~	~~Jun 2018 to Sept 2021 (multiple possessions~~	~~Multi Crane, PEM & LEMS, Engineering Trains, Hi rail dump trucks, 17T excavators, tampers & regulators, 5T Hi rail excavators, Drott, Scissor Truck, 50T Crane, Tele-handlers, FEL, Road trucks~~
	~~Diversion and Reconstruction of Track, OHW and Signalling Country side of the station~~	~~Jun 2018 to Sept 2021 (multiple possession & 16-day & 12-day shutdowns~~	~~Multi Crane, PEM & LEMS, Engineering Trains, Hi rail dump trucks, 17T excavators, tampers & regulators, 5T Hi rail excavators, Drott, Scissor Truck, 50T Crane, Tele-handlers, FEL, Road trucks~~
	~~CBI and track configuration changes completed as a single commissioning event during a 12-day possession~~	~~Dec 2019/Jan 2020~~	~~-~~
Station Precinct Construction	Completion of remaining station elements including forecourt and plaza and handover to Metro.	Feb 2022 to June 2023	Tele-handler, Jackhammer, Concrete/Brick saws, hammer drills, mini-excavator, Concrete trucks, ~~kerbing machines~~
Bedwin Road Bridge	~~Resurfacing of roadway and installation of throw screens~~	~~Jul 2018 to Sept 2021~~	~~Excavator, concrete truck, concrete boom pump, rock breaker, grinder~~

*Note that some Pre-Construction Minor Works activities have been undertaken, as approved by the ER and in accordance with the Sydney Trains EPL, CNVS and Out of Hours Work Protocol. These activities have included; survey, service searching, geotechnical testing, service relocation, minor clearing and other activities determined to have minor impacts as approved by the ER.

JHLOR will utilise unattended noise and vibration loggers to meet the requirements of CoA-C11 where the CNVIS identifies noise or vibration levels exceeding noise and vibration monitoring trigger levels as defined in the CNVS.

4. Construction noise & Vibration criteria

4.1 Construction Noise Management Levels

In accordance with the Sydney Metro Construction Noise and Vibration Strategy and the Sydney Metro Construction Environmental Management Framework, reference has been made to the *Interim Construction Noise Guideline* (ICNG), July 2009, published by the EPA, when establishing noise and vibration criteria. This document recommends noise management levels and vibration criteria for the assessment of construction activities.

4.1.1 Construction Noise Management Levels for Residential Receivers

Table 9 shows an extract from the ICNG giving the noise management levels.

Table 9 ICNG Noise Management Levels

Time of Day	Management Level LAeq,15min	How to Apply
Recommended Standard Hours: **Monday to Friday** **7am to 6pm** **Saturday** **8am to 6pm** **No work on Sundays or Public Holidays**	Noise affected RBL + 10dBA	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $LA_{eq15min}$ is greater than the noise affected level, the proponent should 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 75dBA	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 should 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 should 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 should 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 5dB(A) above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see section 7.2.2.

Based on the background noise levels reported in Table 7, the noise management levels to be adopted for Sydenham Station and Junction works have been determined and these are shown in Table 10.

Table 10 Noise Management Levels for Sydenham Station and Junction

Area	Construction Noise Management Level LAeq,15min – dBA			
	Day Noise Affected	Day Highly Noise Affected	Evening Noise Affected	Night Noise Affected
NCA1	57	75	50	45
NCA2	51	75	51	45
NCA3	61	75	54	47
NCA4	68	75	56	48
NCA5	68	75	57	43
NCA6	62	75	48	43

Where Highly Noise Affected levels are predicted, works will occur for up to 3 hours followed by 1 hour continuous respite.

4.1.2 Sleep Disturbance

In accordance with the Modification Report a sleep disturbance L_{AMax} NML of 55dBA (internal) has been adopted, which equates to an external L_{AMax} NML of 65 dBA (assuming open windows). This only applies during the night time period.

The CNVS sets the following guidance;

- Maximum internal noise levels below 50 dB to 55 dB LA_{Max} are unlikely to cause awakening reactions.
- One or two events per night, with maximum internal noise levels of 65 dB to 70 dB LA_{Max}, are not likely to affect health and wellbeing significantly.
- At locations where road traffic is continuous rather than intermittent, the LA_{eq}(9hour) target noise level should sufficiently account for sleep disturbance impacts.
- Where the emergence of LA_{Max} noise levels over the ambient LAeq noise level is greater than 15 dB, the LAeq criterion may not sufficiently account for sleep disturbance impacts.

4.1.3 Non-Residential Receptors

The ICNG defines fixed management levels for other sensitive receptors and non-residential sensitive land uses. These values are reproduced in Table 11.

Table 11 Noise Levels for non-residential sensitive land use

Land Use	Noise Management Level: LAeq, 15minute (applies when properties are being used)
Classrooms at schools and other educational Institutions	Internal Noise Level 45dB[1]
Hospital wards and operating theatres	Internal Noise Level 45dB[1]
Places of worship	Internal Noise Level 45dB[1]
Active recreation	External noise level 65dB
Passive recreation	External noise level 60dB
Community centre	Depends on intended use – see AS2107
Industrial premises	External Noise Level 75dB

Land Use	Noise Management Level: LAeq, 15minute (applies when properties are being used)
Offices, retail outlets	External Noise Level 70dB

Source: ICNG, CNVS

1 External goal of 55dBA applies. The ICNG recommends that construction noise levels do not exceed 45 dB (LAeq, 15minute) internally within school classrooms when in use. For the purpose of the CNVIS (and as adopted here to verify criteria for use in the CNVMP) the internal noise level has been translated to an external level of 55dB (LAeq, 15minute) based on the accepted level of attenuation (10dB) that is readily achieved through windows, partially opened for ventilation.

Non-residential receptors are identified within the project CNVIS, refer to Appendix B for mapping of the area.

It is noted that Tempe High School is located within NCA2.

CoA – E34 states "*Noise generating works in the vicinity of potentially-affected, religious, educational, community institutions and noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) must not be timetabled within sensitive periods, unless other reasonable arrangements to the affected institutions are made at no cost to the affected institution or as otherwise approved by the Secretary*."

Table 4 of the CNVS provides recommended maximum internal noise levels for a number of land uses including hotels, cafés, bar/restaurants, library, recording studio, theatre/auditorium. As identified within CNVIS, a number of these land uses are present within the local noise catchments (in particular cafés), as such the management levels in Table 4 of the CNVS apply to these facilities.

The CNVS also sets the following noise management levels for child care centres;

- LAeq (1hour) – 55 dBA for external play areas
- LAeq (1hour) – 40 dBA for internal play and sleeping areas

The CNVIS has identified a child care centre (Tillman Park Early Learning Centre) within NCA2 that these limits will apply to.

4.1.4 Additional Management Requirements

In accordance with **CoA – E35** JHLOR will investigate alternative methods to rock hammering during the project, and where feasible and reasonable, will adopt these methods to minimise impacts on sensitive receivers. Alternative methods will be reflected within the CNVIS and will be implemented unless otherwise agreed by the Acoustic Advisor. It is noted that impacts can relate to both noise and vibration impacts.

CoA- E37 and **CoA–E38** provide further internal noise management level requirements. These conditions are applicable to residential, residential in non-residential zones, and sensitive non-residential and state:

CoA-E37 "*The Proponent must identify all receivers at Crows Nest, Victoria Cross, Barangaroo, Martin Place, Pitt Street, Central ,Marrickville, Newtown, St Peters, Sydenham and Tempe likely to experience internal noise levels greater than LAeq(15 minute) 60 dB(A) inclusive of a 5 dB 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 (including works associated with utility adjustments), between 7am — 8pm.*"

CoA–E38 "*The Proponent must consult with all receivers identified in accordance with Condition E37 with the objective of determining appropriate hours of respite so that construction noise (including ground-borne noise), does not exceed internal noise levels of:*

> *(a) LAeq(15 minute) 60 dB(A) inclusive of a 5 dB 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 — 8pm for more than 50 percent of the time; and*
>
> *(b) LAeq(15 minute) 55 dB(A) inclusive of a 5 dB 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 — 8pm for more than 25 percent of the time, unless an agreement is reached with those receivers.*

Note This condition requires that noise levels be less than LAeq(15 minute) 60 dB(A) for at least 6.5 hours between 7am and 8pm, of which at least 3.25 hours must be below LAeq(15 minute) 55 dB(A). Noise equal to or above LAeq(15 minutes) 60 dB(A) is allowed for the remaining 6.5 hours between 7am and 8pm."

In the event of any conflict between the noise management levels determined by the ICNG and the CNVS, and those specified in **CoA- E37** and **CoA – E38**, the noise management levels specified in **CoA- E37** and **CoA – E38** will prevail as per **CoA - A3**.

4.1.5 Construction Traffic Noise Criteria

Construction-related traffic noise is assessed in accordance with Road Noise Policy (RNP) (noting that the RNP supersedes the Environmental Criteria for Road Traffic Noise (ECRTN, NSW EPA 1999) which is referred to on page 2 of ICNG). Table 12 shows the traffic noise criteria adopted from this policy for the likely site access roads.

Table 12 Construction Traffic Noise Criteria (RNP)

Road Category	Type of Project / Land Use	Assessment Criteria – dBA	
		Day (7am-10pm)	Night (10pm-7am)
Sub-arterial	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	LAeq,15hr 60 (external)	LAeq,15hr 55 (external)
Local Roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	LAeq,1hr 55 (external)	LAeq,1hr 50 (external)

Section 3.4 of the RNP states "*In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person."*

The CNVS states "*construction traffic NMLs set at 2 dB above the existing road traffic noise levels during the daytime and night-time periods are considered appropriate to identify the onset of potential noise impacts. Where the road traffic noise levels are predicted to increase by more than 2 dB as a result of construction traffic, consideration would be given to applying feasible and reasonable noise mitigation measures to reduce the potential noise impacts and preserve acoustic amenity*."

4.2 Construction Vibration Criteria

4.2.1 Building Damage

In accordance with **CoA – E28** and the requirements of the CNVS, vibration from construction activities must not exceed the vibration limits set out in the British Standard *BS 7385-2:1993 Evaluation and measurement for vibration in buildings: Guide to damage levels from groundborne vibration*. The criteria for this standard are presented in Table 13.

Table 13 Building Damage Vibration Management Levels (BS 7385)

Line	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
1	Reinforced or framed structures Industrial and heavy commercial buildings	50mm/s at 4 Hz and above	
2	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

Source: BS 7385, CNVS

The Modification Report states that "*based on the typical nature of buildings around the proposed modification, the cosmetic damage screening criteria of 7.5mm/s for unreinforced or light framed structures has been uniformly applied. This same screening criteria is also relevant for heritage items*".

Section 5.6 of the CNVS provides guidelines for vibration sensitive and special structures, including heritage structures and scientific & medical equipment.

The British Standard states that "*A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive."* Identified heritage items on the project have not been found to be structurally unsound after inspection, and therefore will retain a damage screening criteria of 7.5mm/s.

For any identified buildings that are deemed to be structurally unsound, JHLOR will consider a more conservative damage criteria in accordance with the CNVS and the German Standard *DIN 4150: Part 3 – 1999 Structural vibration in buildings: Effects on structures*. The criteria for this standard are shown in Table 14. The proposed initial approach to manage potential vibration impact shall be to:

- Identify if the 2.5 mm/s PPV objective may be exceeded during specific construction activities at Sydenham Station/Sydenham Pit;
- Structural engineering report to be undertaken on above identified heritage items, to confirm structural integrity and confirm if item is 'structurally sound';
- If item confirmed as 'structurally sound', the screening criteria in Table 13 shall be adopted, or
- If item confirmed as 'structurally unsound', the more conservative cosmetic damage objectives of 2.5 mm/s PPV (in accordance with the CNVS) may be adopted based on advice from specialist consultants (Project Noise/Vibration consultant /Heritage Specialist) to ensure sensitive heritage fabric is adequately monitored and managed (REMM–NV3).

Table 14 Building Damage Vibration Management Levels (DIN4150:3)

Line	Type of Structure	Guideline Values for Velocity (PPV in mm/s)		
		1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz[1]
3	Structures that, because of their particular sensitivity to vibration, cannot be classified under either of the other classifications and of great intrinsic value	3	3 to 8	8 to 10

Source: DIN4150:3

1. At frequencies above 100 Hz, the values given in this column may be used as minimum values; and
2. The 50 Hz values may be applied to assess vibration at the horizontal plane of the highest building floor at all frequencies.
3. As per the CNVS, Heritage criteria are provided. It is noted that line one and line two do not apply to this project. These criteria are only to be applied if a heritage building or structure is found to be structurally unsound.

Based on previous construction vibration monitoring undertaken by Wilkinson Murray[1], construction works associated with the SMu Project are likely to be above 10Hz. It is noted that no blasting will be undertaken as part of the SMu works.

[1] Wilkinson Murray has measured the frequency of construction vibration at other construction sites. The measured dominant frequencies are: Vibratory roller 25Hz, 20t Excavator 63Hz, 600mm auger 63Hz, 14t excavator with hammer 31Hz, 300mm bored piling rig 100Hz. A literature search suggests that ballast tamping uses frequencies of 28-35Hz and above.

4.2.2 Human Comfort

In accordance with Assessing vibration: A technical guide (DEC, 2006) and the British Standard BS 6472, 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 15 indicates the acceptable maximum Vibration Dose Value for intermittent vibration.

Table 15 Acceptable maximum vibration dose values for intermittent vibration (m/s1.75)

Location	Day (7am-10pm)	Night (10pm-7am)
Critical areas	0.2	0.2
Residences	0.4	0.26
Offices, schools, educational facilities and places of worship	0.8	0.8
Workshops	1.6	1.6

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 16.

Table 16 Criteria for exposure to continuous and impulsive vibration

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

1. Values given for the most critical frequency range >8Hz assuming sinusoidal motion.

Source: Table C1.1 – The NSW Vibration Guideline

4.2.3 Ground-borne (Regenerated) Noise

Ground-borne (regenerated) noise is noise generated by vibration transmitted through the ground into a structure. Ground-borne noise is unlikely to occur on the SMu project as it is typically generated by underground activities such as tunnelling.
The ICNG and CNVS nominate the following management levels for ground-borne noise;

Day (7.00 am to 6.00pm)

- Internal Residential: 45 dB LAeq(15minute)
- Internal Commercial: 50 dB LAeq(15minute)

Evening (6.00 pm to 10.00 pm)

- Internal Residential: 40 dB $L_{Aeq(15minute)}$

Night-time (10.00 pm to 7.00 am)

- Internal Residential: 35 dB $L_{Aeq(15minute)}$

Condition L5.5 of the EPL states that the licensee must 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. This condition is not expected to be triggered.

5. Aspects and Potential Impacts

Table 17 includes the aspects, potential impacts and a risk rating for construction noise and vibration, as related to the SMu works.

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

Table 17 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 • Structural damage
Vibratory works near heritage items	• Damage to heritage items • Potential fines

These impacts/opportunities are to be managed in accordance with the measures outlined in Section 7. As noted in the CEMP, the residual risk of these impacts is low due to the current stage of construction scope.

6. Predicted Noise & Vibration Levels

A Project specific CNVIS has been developed by JHLOR as per **CoA – E33**, which has been reviewed and approved by the Acoustic Advisor**.** A summary of the results are included within Appendix D.

In the Burrows Avenue / Railway Road Area all potentially affected residences are fitted with double glazing. Double glazed windows lead to lower internal noise levels, originating from outdoor sources, when compared with standard windows. Construction noise levels for some SMu work activities are expected to exceed the external noise management level at times, particularly during works outside of standard hours, resulting in noise impacts to outdoor spaces. Internal and external noise levels will be assessed as part of the OOHW protocol.

Most construction works in this area will not generate vibration which would be perceptible within the nearest residences, but some works, such as compaction by vibratory roller may generate vibration levels above the vibration criteria at the nearest residences in Railway Road.

At Meeks Road, construction noise levels may exceed the noise management levels at residences at times. However, given that most of the construction works are well removed from Meeks Road, noise impact would be expected to be limited. Equally, vibration levels above the criteria are unlikely to occur in Meeks Road.

Where trucks travel past residences, some traffic noise impact may occur without reasonable levels of control.

In accordance with **CoA – E32** JHLOR have reviewed the CNVS to consider scale and duration of impacts, the requirements of this approval and all measures to limit construction noise impacts to sensitive receivers including:

(a) at property or architectural treatment
(b) relocation; and
(c) other forms of mitigation where impacts are predicted to long term and significant

At property and architectural treatment has already been undertaken at a large number of receivers in the vicinity of the project as described above.

The CNVIS indicates that the following scenarios are most likely to cause noise impacts;

- Scenario 5 - Bridge Works
- Scenario 6 – Track Reconditioning Works
- Scenario 7 – Track grinding

These activities will occur over short time periods (generally occurring over a rail possession) and are likely to occur over a large portion of the site. As such, installing at property or architectural treatment is not feasible or reasonable. JHLOR will continue to review this requirement through-out the project.

Relocation will be implemented in accordance with Section 8 of the CNVS, and as described within Section 7.6 of this Plan. The CNVIS identifies the construction activities when additional mitigation (including relocation) should be implemented. Relocation will also be implemented where an out of hours works specific CNVIS is produced and predicted noise levels exceed the criteria identified within Section 8 of the CNVS.

Other forms of mitigation are included within Section 7 of this Plan. JHLOR will continue to review the effectiveness of these measures during a six monthly review of this Plan.

Safe working distances for plant used on SMu that is likely to cause vibration have been developed as part of the CNVIS. A table with safe working distances has been included within Appendix D.

7. NOISE & VIBRATION MANAGEMENT & MITIGATION

This section indicates the noise and vibration management and mitigation to be implemented during the proposed works.

In accordance with REMM NV4, JHLOR will implement all feasible and reasonable measures where exceedances are predicted.

7.1 Source Noise Control Strategies

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

- 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 (estimated benefit 10dB).
- The use of damped hammers is recommended such as the 'City' model Rammer hammers. These reduce the 'ringing' of the rockpick, cylinder and excavator arm that is commonly associated with rockbreaking works. Approximately 10 dB attenuation can be achieved compared to undamped hammers of the same size.
- Regular maintenance of all plant and machinery used for the project will assist in minimising noise emissions, including the reporting of the results (estimated benefit 0-10dB).
- Acoustic enclosure of plant items, if required, as identified during compliance monitoring (estimated benefit 5-15dB).
- Air brake silencers would be correctly installed and fully operational for any heavy vehicle that approaches and uses any Sydney Metro construction site (estimated benefit 10dB).
- 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 (estimated benefit 5-10dB).

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 Site Noise Mitigation Measures

Since the proposed works are well removed from the Meeks Road residences and the residences in the Burrows Avenue / Railway Road Area are all double glazed, construction noise barriers need not be used to control the effect of construction noise for general works. The most practical approach is to implement common sense noise management measures to minimise the noise impact.

In addition, where work is proposed outside of standard hours, separate out of hours work Noise and Vibration Impact Statements should be prepared and specific noise and vibration mitigation measures identified and implemented.

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 (estimated benefit 40dB+).
- Residential grade mufflers would be fitted to all mobile plant (estimated benefit 10dB).

- Selection of low noise/vibration generating equipment for use on site, when a range of equipment types is available (estimated benefit 0-20dB).
- 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) between the hours of 8:00am to 6:00pm Monday to Friday; and between the hours of 8:00am to 6:00pm Saturday
- 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 (estimated benefit 40dB+).
- Avoid loading and unloading of trucks at locations on the site which are close to residential receivers (estimated benefit 40dB+).
- Construction equipment and trucks on site are to be fitted with non-tonal reversing alarms (also known as "quackers") (estimated benefit 5-10dB).
- In accordance with REMM NV4 feasible and reasonable measures would be implemented to minimise ground borne noise where exceedances are predicted.
- In accordance with REMM NV12 ballast tamping and rock breakers would not be undertaken during the night-time period (10pm to 7am) except where circumstances arise that require the use of this plant to ensure the rail corridor is made safe for the operation of trains by the conclusion of a scheduled rail possession
- Where the CNVIS identifies residences where noise levels are likely to exceed the following internal noise levels, additional noise mitigation should be implemented to ensure the noise levels as per **CoA – E41 and CoA – E42** will be complied with:

Table 18 Internal Noise Levels

Zone in which Residence Located	Time Period	Internal Noise Level, LAeq,15min (dBA)
Non-Residential Zone	8pm to 9pm	60
	9pm to 7am	45
Residential Zone	8pm to 7am	45

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 (estimated benefit 0 – 40dB+).
- 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 (estimated benefit 0-10dB).

- 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 10.00 pm and 7.00 am.

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.

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.

In accordance with **CoA-E43** at no time can noise generated by construction exceed the National Standard for exposure to noise in the occupational environment of an eight-hour equivalent continuous A-weighted sound pressure level of LAeq,8h, of 85dB(A) for any employee working at a location near the CSSI. Refer to the Occupational Health Hygiene Welfare Management Plan.

It is the responsibility of the Safety Manager (or delegate) and Construction Manager to ensure that works are planned and undertaken in a manner that will comply with **CoA-E43**. The Superintendent is responsible for installation of all physical mitigation measures relating to achieving **CoA-E43** on 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, 5 dB to 15 dB attenuation can be achieved with a well-constructed barrier*."

Works on the SMu site a largely transient due to the majority of the works being based around rail possessions. The CNVIS indicates that the following scenarios are most likely to cause noise impacts;

- Scenario 5 - Bridge Works
- Scenario 6 – Track Reconditioning Works
- Scenario 7 – Track grinding

These activities will occur over short time periods (generally occurring over a rail possession) and are likely to occur over a large portion of the site. Further, the nature of these works prevents noise barriers from being placed in close proximity to the works. Noise barriers placed on the project boundary are unlikely to be effective in providing a noticeable level of noise attenuation. As such, it is not reasonable or feasible to install noise barriers on the project. JHLOR will continue to review the applicability of this mitigation measure throughout the course of the project.

Where localised works may cause noise impacts to staff or commuters (i.e. Sydenham Station Platform works) hoarding will be utilised to mitigate these impacts.

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

In accordance with REMM NV7 JHLOR will investigate alternative demolition strategies.

"*Alternative demolition techniques that minimise noise and vibration levels would be investigated and implemented where feasible and reasonable. This would include consideration of:*

- *The use of hydraulic concrete shears in lieu of hammers/rock breakers*
- *Sequencing works to shield noise sensitive receptors by retaining building wall elements*
- *Locating demolition load out areas away from the nearby noise sensitive receptors*
- *Providing respite periods for noise intensive works*
- *Methods to minimise structural-borne noise to adjacent buildings including separating the structural connection prior to demolition through saw-cutting and propping, using hand held splitters and pulverisers or hand demolition*
- *Installing sound barrier screening to scaffolding facing noise sensitive neighbours*

Modifying demolition works sequencing / hours to minimise impacts during peak pedestrian times and / or adjoining neighbour outdoor activity periods"

These techniques can lead to a benefit in noise levels of 0-20dB for hydraulic shears, 0-40+dB for relocating loading zones, 0-20dB for separating structures and 5-15dB for installing screening.

These activities will be implemented where found to be feasible and reasonable.

These alternative techniques will be reviewed when preparing demolition plans and SWMS.

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.

7.5 Vibration Control Strategies

JHLOR will comply with the requirements of Section 7 of the CNVS which states "*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 vibratory plant likely to be used on SMu are included within Appendix D. The distances identified represent the worst case safe working distances. Primarily JHLOR will select plant and construction methods that minimise vibration in vibration sensitive areas, including near residents and heritage structures. 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, JHLOR will undertake an assessment of the building to determine whether the works are likely to cause damage to the building.

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

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 and 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.

Community consultation will be managed by the Communication and Stakeholder Relations Manager in accordance with the SMu 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 Section L5.12 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.

In addition to above community consultation, the Project Interface Manager will also liaise with other construction works (TSE and Sydney Trains) that may occur in the vicinity of SMu Project works and will take reasonable steps to coordinate works to minimise cumulative impacts of noise and vibration and maximise respite for affected sensitive receivers, as per **CoA – E39** requirements.

In accordance with Section 8 of the CNVS, additional mitigation measures will be applied to eligible property occupiers as per Table 20 and Table 21.

Table 19 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

Measure	Abbreviation
Specific Notifications	SN
Source: CNVS	

Table 20 Additional Mitigation Measures Matrix (AMMM) – (Airborne Construction Noise)

Time Period		Mitigation Measures			
		Leq, 15minute 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)	-	-	M, LB	M, LB
	Sat (8am-1pm)				
	Sun/Pub Hol (Nil)				
OOHW Period 1	Mon-Fri (6pm-10pm)	-	LB	M, LB	M, IB, LB, PC, RO, SN
	Sat (7am-8am & 1pm-10pm)				
	Sun/Pub Hol (8am-6pm)				
OOHW Period 2	Mon-Fri (10pm-7am)	LB	M, LB	M, IB, LB, PC, SN	AA, M, IB, LB, PC, RO, SN
	Sat (10pm-8am)				
	Sun/Pub Hol (6pm-7am)				
Source: CNVS					

Table 21 Additional Mitigation Measures Matrix (AMMM) – (Ground-borne Vibration)

Time Period		Mitigation Measures
		Predicted Vibration Levels Exceed Maximum Levels (refer Table 4.5 for criteria)
Standard	Mon-Fri (7am-6pm)	M, LB, RO
	Sat (8am-1pm)	
	Sun/Pub Hol (Nil)	
OOHW Period 1	Mon-Fri (6pm-10pm)	M, IB, LB, PC, RO, SN
	Sat (7am-8am & 1pm-10pm)	
	Sun/Pub Hol (8am-6pm)	
OOHW Period 2	Mon-Fri (10pm-7am)	AA, M, IB, LB, PC, RO, SN
	Sat (10pm-8am)	
	Sun/Pub Hol (6pm-7am)	
Source: CNVS		

The response to any noise and vibration complaint received is an important issue as discussed in Section 7.12 below. A direct complaints line is required, and the telephone number should be shown on the access gates to the site. The surrounding residents should also be advised of an email address where complaints can also be lodged.

In accordance with CoA-E29, if there is a risk that the vibration levels from any works will exceed the damage levels at any properties, as indicated by the CNVIS, the owners of those properties will be directly notified of the risk prior to the commencement of vibration generating works in the vicinity. A dilapidation survey will also be undertaken on any properties within the zone of potential cosmetic damage prior to the works. The criteria for property damage associated with vibration is included in Table 13. The process will be managed by reviewing high vibration risk activities, as indicated by the CNVIS, in conjunction with the construction programme. It is expected that there will be a low vibration risk associated with all works.

As per **CoA – E34** any noise generating works in the vicinity of potentially-affected, religious, educational, community institutions and noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) must not be timetabled within sensitive periods, unless other reasonable arrangements to the affected institutions are made at no cost to the affected institution or as otherwise approved by the Secretary. Consultation with these institutions, including Tempe High School and Tillman Park Early Learning Centre will occur prior to works.

In accordance with the CNVIS, the works undertaken for SMu are not expected to result in ground-borne noise levels that exceed the criteria as stated within **CoA – E37.** Therefore, further consultation in accordance with **CoA – E38** is not required.

Any additional mitigation measures are identified within the CNVIS and any specific Out of Hours Noise and Vibration Impact Statements in accordance with the CNVS's additional mitigation measures outlined in table above.

If out of hours works are being undertaken in accordance with the community agreement provisions as per condition L5.10 of the EPL, the requirements of conditions E1.1 to E1.8 will apply

7.7 Hours of Operation

In accordance with **CoA – E36**, Section 5.1 of the CEMF and Section 5.2 of the CNVS the standard hours of construction are as follows:

- Weekdays 7.00am-6.00pm
- Saturday 8.00am-6.00pm
- At no time on Sundays or Public Holidays

On 9th of April 2020, NSW Government Gazette 75 was released in response to social distancing requirements under COVID 19 health plans, to apply until repealed. This alters the standard limits on working hours on Saturday, Sundays and public holidays to allow staged construction to limit the number of workers onsite at any given time. Any work conducted under this order would be undertaken in consultation with Metro prior to commencement of the work.

Where works are necessary outside of these hours, an Out of Hours Noise and Vibration Impact Statement should be prepared justifying the out of hours work using recognised noise modelling software Predictool, predicting the likely noise and vibration impacts and identifying specific mitigation measures to be adopted during the out of hours work. Where project EPL applies, an out-of-hours permit will be raised as per section 7.8. In other circumstances, approval and/or endorsement will be obtained in accordance with the Out of Hours Work Protocol and as outlined in Table 20.

Ballast tamping and rock breakers would not be undertaken during the night-time period (10pm to 7am) except where circumstances arise that require the use of this plant to ensure the rail corridor is made safe for the operation of trains by the conclusion of a scheduled rail possession.

JHLOR will undertake works in accordance with **CoA-E44** where an EPL is not applicable. "*Notwithstanding Condition E36 construction associated with the CSSI may be undertaken outside the hours specified under those conditions 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 construction; or

(d) 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 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 those 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 those for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or

(e) 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 limits for ground-borne noise and vibration (human comfort) cannot be achieved. All agreements must be in writing and a copy forwarded to the Secretary at least one (1) week before the works commencing; or

(f) construction approved through an Out of Hours Work Protocol referred to in Condition E47, provided the relevant council, local residents and other affected stakeholders and sensitive receivers are informed of the timing and duration at least five (5) days and no more than 14 days before the commencement of the works.

Note: This condition does not apply where an EPL is in force in respect of the construction"

Prior to obtaining the Project EPL, JHLOR will undertake all works in accordance with the Sydney Trains EPL 12208. EPL 12208 does not include conditions that reflect E44, EPL clause O5.7 permits emergency works as described in Section 7.8 of this plan. This Plan will be updated to reflect the JHLOR Project EPL once it is obtained.

JHLOR will undertake works in accordance with the **CoA-E48** which states – "*Notwithstanding Condition E36 of this approval and subject to Condition E47, the following activities may be undertaken 24 hours per day, seven (7) days per week:*

(a) tunnelling and associated support activities (excluding cut and cover tunnelling);

(b) excavation within an acoustic enclosure;

(c) excavation at Central (excluding Central Walk works at 20-28 Chalmers St Sydney) without an acoustic enclosure;

(d) station and tunnel fit out; and

(e) *haulage and delivery of spoil and materials." Noting that parts (a) and (c) are not applicable to the works.*

It is the responsibility of the Construction Manager and Superintendent to plan works so that they occur during the standard construction hours unless out of hours work approval has been obtained as per Section 7.8.

7.8 Out of Hours Work

In accordance with the **CoA – E47**, the Sydney Metro Protocol will not apply if the works are subject to an EPL. All OOHW will be undertaken in accordance with the EPL held by LOR (21147).

OOHW will be undertaken under the following conditions:

- L5.2 - Exemptions to standard construction hours for low noise impact works
- L5.3 - Exemptions to standard construction hours in exceptional circumstances
- L5.6 - Works Approved Outside of Standard Construction Hours - Local Possessions
- L5.7, L5.8 and L5.9 - Works Approved Outside of Standard Construction Hours – Local Area and Utility Works
- L5.10, L5.11 and L5.12 – Community Agreement
- ~~L4.14 , L4.16 and L4.17 – Approved Variations to allow specific additional work to occur out of hours not covered by other conditions.~~

A noise assessment will be undertaken for all out of hours works using PredicTool and a form will be raised in Field View.

Mitigation will be applied as per the requirements set out in this section.

On becoming aware of the need to undertake emergency works under conditions of EPL 21147, contractors must notify the EPA as per L5.3b) and submit a report no later than 2pm the next business day.

As a form of mitigation, community notification is to be undertaken within two hours of the commencement of emergency works. These notifications will generally be prepared by the contractor using a small hand-completed Sydney Metro card template for distribution to the immediate surrounding community."

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. Information on noise assessment and notification would be provided to Sydney Metro and the ER/AA on requested.

7.9 Site Environmental Induction and 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; and
- 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
- 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 Section 9 of the CEMP for further information on environmental training.

7.10 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 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.

7.11 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. There will also be access to the compound at 11 Sydenham Road on the north-western side of the rail corridor or via Marrickville Road and Fraser Park to avoid, as far as practicable, site trucks travelling past residences. 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.

7.12 Noise & Vibration Complaints

A Noise & Vibration Complaint Protocol shall be developed for the site to apply during the construction period. The contact details (phone number, email address and postal address) shall be widely distributed to the surrounding residential areas.

All complaints or enquiries should be kept in a register, including the following details:

- 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.

Records of community enquiries and complaints, and the Contractor's response will be maintained by SMu on Consultation Manager by the Communications and Stakeholder Relationships Manager.

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

7.13 Cumulative Impacts

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

Other works that may result in cumulative impacts include the Sydney Metro Tunnel and Excavation Works (TSE) Marrickville Dive site, WestConnex works, Sydney Trains maintenance works and Inner West Council works.

In accordance with **CoA – E40** 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.

8. Construction Noise and Vibration Monitoring Program

In accordance with CoA C9-C17, a Construction Noise and Vibration Program will be implemented for the project. The proposed monitoring program (including but not limited to operator alert levels, monitoring locations) 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 AA/ER review and approval by the AA in line with CoA – C15 (also refer Table 24).

8.1 Baseline Data

Unattended noise monitoring undertaken as part of the EIS and Modification Report will be used as baseline data for the SMu works. The monitoring was undertaken by SLR Consulting Australia Pty Ltd over four locations during June to July 2015 and August to September 2015 at B.01 – B.04 (C2S). Noise monitoring for NCA1 was undertaken during June and July 2016 as part of the Sydney Metro City & Southwest Sydenham to Bankstown EIS.

Additional baseline monitoring was undertaken by Wilkinson Murray between 18th – 27th June 2018. Baseline data from this period has been used for determining the Rating background Level of NCA2, NCA3 & NCA4.

JHLOR now has sufficient baseline data to appropriately manage impacts within the surrounding noise catchments, as such further baseline data is not required.

The results of the baseline monitoring are as follows;

Table 22 Location and results of Baseline Monitoring

ID	NCA	Location	Daytime RBL (7am-6pm)	Evening RBL (6pm-10pm)	Night RBL (10pm-7am)
B0.1 (S2B)	1	143 Meeks Road Marrickville	47	45	40
NCA2 (CNVIS)	2	25 Bridge Street, Tempe	41	46	40
NCA3 (CNVIS)	3	4 Burrows Avenue, Sydenham	51	49	42
NCA4 (CNVIS)	4	80 Unwins Bridge Road, St Peters	58	51	43
B.01 (C2S Mod4)	5	322 Edgeware Road, Newtown	58	52	38
B.02 (C2S Mod4) & TSE	6	1B Leister Street, Marrickville	52	43	38
B.03 (C2S Mod4)	Additional	104 Unwins Bridge Road, St Peters	59	53	41
B.04 (C2S Mod4)	Additional	16 Swain Street, Sydenham	47	47	39

The CNVIS identifies safe working distances for vibratory activities planned to be undertaken as part of SMu works. 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 4.2 will be exceeded). A copy of the safe working distances as stated within the CNVIS are included within Appendix D.

8.2 Monitoring

A semi-permanent noise and vibration monitoring system will be set up and operated during the nearby construction works based on the activities and risk of impacts to receivers over the period of the construction works. It is worth noting that a substantial amount of the works will be completed during weekend rail possessions (periods over which the certain rail lines are non-operational to allow for works on those lines to occur) which will occur periodically. There will be periods of time where no works will be completed and it is not reasonable to have the real time system in operation during these periods. JHLOR will utilise unattended noise and vibration loggers to meet the requirements of CoA-C11 where the CNVIS identifies potential noise impacts.

8.2.1 Noise Monitoring

There are six NCAs potentially affected by construction noise. Two of the catchments with a number of residential receivers, NCA1 and NCA3, will be impacted most regularly.

Monitoring will be carried out as follows;

- In accordance with **CoA – C11** continuous real-time noise monitoring will be undertaken on the project boundary adjacent to one of the closest residences in the Burrows Avenue / Railway Road Area, at one of the closest residences in the Meeks Road Area and at one of the closest residences in Lord Street/Edgeware Road to determine the $LA_{eq15min}$ and LA_{Max} levels during times of nearby work. This monitoring will occur during activities that are expected to generate maximum noise levels at impacted receivers, as identified within the CNVIS.
- Where the noise alert levels are exceeded by SMu Project related works, the construction method and equipment should be reviewed/modified. It should be noted that sensible noise alert levels need to be a balance between other ambient noise levels at the monitoring location and the NMLs to reduce false positives. Noise alert levels will be refined during the works to ensure these remain appropriate.
- Attended noise monitoring will be undertaken at nearby residential receivers as required by Section 8.2 of the CNVS (summarised in Table 20 of this CNVMP). JHLOR would utilise the following noise monitoring locations in Table 23, as generally identified within the NCAs of the CNVIS (refer Appendix B). Other locations may be used where deemed appropriate for localised out of hours works. The $LA_{eq15min}$ and LA_{Max} levels would be recorded during attended noise monitoring as a minimum.
- 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 included in Table 10.

Table 23 Attended Noise Monitoring Locations

NCA	Monitoring ID	Location
NCA1	SSJ1	143 Meeks Road Marrickville
NCA2	SSJ2	25 Bridge Street, Tempe
NCA3	SSJ3	4 Burrows Avenue, Sydenham
NCA4	SSJ4	80 Unwins Bridge Road, St Peters
NCA5	SSJ5	322 Edgeware Road, Newtown
NCA6	SSJ6	1B Leister Street, Marrickville

8.2.2 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.

8.2.3 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 are most likely to impact on structures within the corridor. In particular, the Sydenham Station buildings and platforms. 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;

- In accordance with **CoA – C11** continuous real-time vibration monitoring will be undertaken on the project boundary adjacent to one of the closest residences in the Burrows Avenue / Railway Road Area, at one of the closest residences in the Meeks Road Area and at one of the closest residences in Lord Street/Edgeware Road to determine the PPV levels and VDV during times of nearby work;
- In accordance with **CoA – E30** JHLOR will conduct vibration testing before and during vibration generating activities that have the potential to impact on heritage items 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. Given that there is potential for construction vibration to affect two NCAs and two heritage buildings, vibration monitoring at one of the closest residences likely to be impacted in the Burrows Avenue/Railway Road Area and at one of the closest residences likely to be impacted in the Meeks Road Area will be carried out to determine the highest PPV and VDV levels generated by the construction site when work occurs nearby. In addition, vibration monitoring will be carried out Sydenham Station and Sydenham pit and pump house, when works occur nearby.

- Advice from the Project engaged Heritage Consultant will be sought in accordance with **CoA - E31** on methods and locations for installing equipment used for vibration and movement of, and noise monitoring at, heritage listed structures where required.
- Vibration alert level of 7.5mm/s PPV will be set at heritage structures (unless the structure is determined to be have a low threshold for damage during a pre-construction dilapidation survey) and where levels exceed this damage alert level, the offending operation if related to SMu works 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 talking into account management of any heritage buildings found to be structurally unsound (refer Section 4.2.1 for further detail).
- Attended vibration monitoring will be undertaken at nearby residential receivers as required by Section 8.2 of the CNVS (summarised in Table 21 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).

8.2.4 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.

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 (as included within Table 10) and the vibration criteria within Section 4.2.

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.

8.2.5 Frequency of Monitoring

As previously stated the majority of works will occur during rail possessions. JHLOR will undertake monitoring during construction activities (including out of hours works) where the CNVIS determines that monitoring is required in accordance with Section 8 of the CNVS and for validation purposes.

Noise and vibration monitoring will be undertaken as directed by an authorised officer of the EPA.

8.3 Reporting

Real-time monitoring will be made available to the DPE, the NSW EPA, the construction team, SM, Environmental representative and the Acoustic Advisor as per CoA – C11 JHLOR will produce Construction Monitoring Reports on a six-monthly basis. As JHLORJV construction works are concluding in January 2023, Construction Monitoring Report 09 – September 2022 to February 2023 will be the final report for this project. Note: If circumstances change and delays occur, another report may be prepared and can be discussed at a closer date. The reports will include a summary of monitoring undertaken, an overview of the results, analysis of the results and raw data from monitoring, as per CoA –16. These reports will be provided to DPE and EPA. JHLOR will participate in further consultation with these agencies where any relevant issues are identified by the monitoring. Current construction monitoring reports are available at https://sydenhamstationupgrade.com/documents/. Current reports have not generated any comment or required revision to this plan.

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) 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 SMu works JHLOR will investigate the cause of the exceedance. JHLOR will inform the Acoustic Advisor of any exceedance. In accordance with **CoA – A27(f)** the Acoustic Advisor will determine whether the exceedance, or impact from the exceedance, constitutes an "incident" and if so will report to the Secretary in accordance with **CoA-A41**. 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 SMu works 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. 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 – C9(a)** the development of the Noise and Vibration Monitoring Program has occurred in consultation with the NSW EPA and Inner West Council. It is noted that no comments were received from either party in relation to the Noise and Vibration Monitoring Plan.

In accordance with **CoA- C16** the results from the Noise and Vibration Monitoring Program will be provided to the DPE, NSW EPA and Inner West Council on a 6 monthly basis as part of the Construction Compliance Reports. This will also provide opportunity for comment on the effectiveness of the monitoring program.

9. CNVMP Administration

9.1 Hold Points

A number of pre-construction and construction hold points are included within Table 24.

Table 24 Pre-Construction Hold Points

Item	Process Held	Acceptance Criteria	Approval Authority
Construction Environmental Management Plan and sub-plans	Site activities (prior to construction commencement)	Site specific Construction Environmental Management Plan and sub-plans (this CNVMP and the Noise and Vibration Construction Monitoring Program) have been developed, reviewed and approved. *Construction must not commence until the CNVMP has been endorsed by the AA & ER and approved by DPE	AA/ER endorsement Department of Planning and Environment approval.
CNVIS	Site activities (prior to construction commencement)	CNVIS to be prepared by Specialist Consultant	AA/ER endorsement

Item	Process Held	Acceptance Criteria	Approval Authority
Out of Hours Work (OOHW)	Works to be performed outside of approved construction hours (pre –construction and during construction)	OOHW Protocol and Application Form and Community Notification Sydney Trains EPL 12208 – Prior to construction JHLOR EPL 21147– During construction	Environmental Manager/Co-ordinator (Approval) EPA (Information to be provided on request and as per EPL) AA approval for OOHW not covered by an EPL
Noise and vibration construction monitoring program	Amendments to noise and vibration construction monitoring program (during construction-refer CoA C15)	Amendments have been reviewed and approved for implementation	AA endorsement/ (as per CoA – C15) Department of Planning and Environment approval.

9.2 Approval and Review of CNVMP

This sub-plan will be reviewed by the Independent Environmental Representative. This sub-plan will be reviewed, and any minor amendments will be endorsed by the AA in accordance with CoA A27. Endorsement by the project ER is no longer required under SCCI 7400 MOD6 administrative changes (21 Feb 2019). Sydney Metro and the ER will also review the plan in accordance with condition 3.3e) of the CEMF.

CoA-C5 requires certain sub-plans to be developed in consultation with government agencies. It is noted that in accordance with CoA-C3 the plan is to be reviewed by relevant councils (i.e. 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-C8.

In accordance with CoA-C9, consultation with the NSW EPA and Inner West Council has occurred on the Noise and Vibration Construction Monitoring Program. No comments were received from with the NSW EPA or Inner West Council.

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. To date, no audit findings, complaints, monitoring events or inspection actions have required the plan to be reviewed prior to annual review. This is considered to indicate that the current management of noise and vibration, as set out in this plan, is appropriate in meeting project requirements for noise and vibration during construction activities.

9.3 Records

Records associated with this management plan and monitoring programme will be maintained in accordance with Section 12 of the CEMP.

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

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

GLOSSARY OF ACOUSTIC AND VIBRATION 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 (LAmax) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

LA1 – The LA1 level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the LA1 level for 99% of the time.

LA10 – The LA10 level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the LA10 level for 90% of the time. The LA10 is a common noise descriptor for environmental noise and road traffic noise.

LA90 – The LA90 level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the LA90 level for 10% of the time. This measure is commonly referred to as the background noise level.

LAeq – The equivalent continuous sound level (LAeq) 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 (LA90) 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.

Displacement – Distance over which a object or particle moves, generally measured in mm or m for measurements relating to vibration

Velocity – Rate at which an object or particle moves expressed as distance/time, generally measured in mm/s or m/s for measurements relating to vibration

rms – The Root Mean Square is the square root of the average of the squared values of a waveform associated with a vibration event

PPV – The Peak Particle Velocity refers to the displacement of particles in the ground caused by vibration

VDV – Vibration Dose Value is a measurement of vibration magnitude over time and is usually used for assessing intermittent vibration over an 8-hour or 16-hour period.

Tonal – the same meaning as in section 4.2 of the INP

Impulsive – the same meaning as in section 4.2 of the INP

High Impact Work – jack hammering, rock breaking or hammering, pile driving, vibratory rolling, cutting of pavement, concrete or steel or other work occurring on the surface that generates noise with impulsive, intermittent, tonal or low frequency characteristics

APPENDIX A - Compliance Matrix

No.	Measure	Timing	Requirement	Responsibility	Reference
	Project Approval – Specific Management Plan Requirements				
1.	A suitably qualified and experienced Acoustics Advisor (AA), who is independent of the design and construction personnel, must be nominated by the Proponent and engaged for the duration of construction and for no less than six (6) months following operation of the CSSI. The details of the nominated AA must be submitted to the Secretary for approval no later than one (1) month before commencement of works, or within another timeframe as agreed with the Secretary. The Proponent may nominate additional suitably qualified and experienced persons to assist the lead Acoustics Advisor for the Secretary's approval. The Proponent must cooperate with the AA by: (a) providing access to noise and vibration monitoring activities as they take place; (b) providing for review of noise and vibration plans, assessments, monitoring reports, data and analyses undertaken; and (c) considering any recommendations to improve practices and demonstrating, to the satisfaction of the AA, why any recommendation is not adopted.	Prior to Construction	C2S SSI 15_7400 COA – A25	Sydney Metro	Independent Acoustic Advisor engaged by Sydney Metro
2	Any activities generating noise and vibration in excess of the Noise Management Level derived from the Interim Construction Noise Guideline must not commence until an AA, nominated under Condition A25 of this approval, has been approved by the Secretary.	Prior to Construction	C2S SSI 15_7400 COA – A26	Environment Manager Project Engineer	Section 2.4

3.	The approved AA must: (a) receive and respond to communication from the Secretary in relation to the performance of the CSSI in relation to noise and vibration; (b) consider and inform the Secretary on matters specified in the terms of this approval relating to noise and vibration; (c) consider and recommend, to the Proponent, improvements that may be made to work practices to avoid or minimise adverse noise and vibration impacts; (d) review all noise and vibration documents required to be prepared under the terms of this approval and, should they be consistent with the terms of this approval, endorse them before submission to the Secretary (if required to be submitted to the Secretary) or before implementation (if not required to be submitted to the Secretary); (e) regularly monitor the implementation of all noise and vibration documents required to be prepared under the terms of this approval to ensure implementation is in accordance with what is stated in the document and the terms of this approval; (f) review the Proponent's Notification of noise and vibration incidents in accordance with Condition A41 of this approval; (g) in conjunction with the ER (where required), the AA must: i. consider requests for out of hours construction activities and determine whether to endorse the proposed activities in accordance with Condition E47 ii. as may be requested by the Secretary or Complaints Mediator, help plan, attend or undertake audits of noise and vibration management of the CSSI including briefings, and site visits; iii. if conflict arises between the Proponent and the community in relation to the noise and vibration performance during construction of the CSSI, follow the procedure in the Community Communication Strategy approved under Condition B3 of this approval to attempt to resolve the conflict, and if it cannot be resolved, notify the Secretary; iv. consider relevant minor amendments made to any noise and vibration document approved by the Secretary that require updating or are of an administrative or minor nature, and are consistent with the terms of this approval and the document approved by the Secretary and, if satisfied such amendment is necessary, approve the amendment. This does not include any modifications to the terms of this approval; v. assess the noise impacts of minor ancillary facilities as required by Condition Al 8 of this approval; and vi. prepare and submit to the Secretary and other relevant regulatory agencies, for information, a monthly Noise and Vibration Report detailing the AAs actions and decisions on matters for which the AA was responsible in the preceding month (or other timeframe agreed with the Secretary). The Noise and Vibration Report must be submitted within seven (7) days following	During Construction	C2S SSI 15_7400 COA – A27	AA	Noted. Noise and vibration documents that AA is to review as per A27 d) within Table 24

No.	Measure	Timing	Requirement	Responsibility	Reference
	the end of each month for the duration of construction of the CSSI, or as otherwise agreed with the Secretary.				
4.	The CEMP must provide for training and induction for employees, including contractors and sub-contractors, in relation to environmental and compliance obligations under the terms of this approval	Prior to construction	C2S SSI 15_7400 COA – C2k	Environment Manager	Section 7.9
5.	The following 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. Required CEMP sub- plan Relevant government agencies to be consulted for each CEMP sub-plan (a) Noise and vibration Relevant Council(s)	Prior to construction	C2S SSI 15_7400 COA – C3	Environment Manager	Section 1.6
6.	The CEMP sub-plans must state how: (a) the environmental performance outcomes identified in the EIS as amended by the documents listed in A1 will be achieved; (b) the mitigation measures identified in the EIS as amended by documents listed in A1 will be implemented; (c) the relevant terms of this approval will be complied with; and (d) issues requiring management during construction, as identified through ongoing environmental risk analysis, will be managed	Prior to construction	C2S SSI 15_7400 COA – C4	Environment Manager	(a) Section2, Section 7, Appendix A (b) Section2, Section 7, Appendix A (c) This Plan, Section2, Section 7, Appendix A (d) Section2, Appendix A
7.	The CEMP sub-plans must be developed in consultation with relevant government agencies. Where an agency(ies) request(s) is not included, the Proponent must provide the Secretary justification as to why. Details of all information requested by an agency to be included in a CEMP sub-plan as a result of consultation and copies of all correspondence from those agencies, must be provided with the relevant CEMP sub-plan.	Prior to construction	C2S SSI 15_7400 COA – C5	Environment Manager	Section 1.6 Appendix E

No.	Measure	Timing	Requirement	Responsibility	Reference
8.	Any of the CEMP sub-plans may be submitted to the Secretary along with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before commencement of construction.	Prior to construction	C2S SSI 15_7400 COA – C6	Environment Manager	Table 24 includes a Hold Point
9.	The CEMP must be endorsed by the ER and then submitted to the Secretary for approval no later than one (1) month before the commencement of construction or within another timeframe agreed with the Secretary.	Prior to construction	C2S SSI 15_7400 COA – C7	Environment Manager	Table 24 includes a Hold Point
10.	Construction must not commence until the CEMP and all CEMP sub-plans have been approved by the Secretary. The CEMP and CEMP sub-plans, as approved by the Secretary, including any minor amendments approved by the ER (or AA in regards to the Noise and Vibration sub-plan), must be implemented for the duration of construction. Where the CSSI is being staged, construction of that stage is not to commence until the relevant CEMP and sub-plans have been approved by the Secretary.	Prior to construction	C2S SSI 15_7400 COA – C8	Environment Manager	Table 24 includes a Hold Point
11.	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies identified for each Construction Monitoring Program to compare actual performance of construction of the CSSI against predicted performance. Required Construction Monitoring Programs Relevant government agencies to be consulted for each Construction Monitoring Program (a) Noise and Vibration EPA and Relevant Council(s)	Prior to construction	C2S SSI 15_7400 COA – C9	Environmental Manager	Section 1.6 Section 8 Section 9.2

No.	Measure	Timing	Requirement	Responsibility	Reference
12.	Each Construction Monitoring Program must provide: (a) details of baseline data available; (b) details of baseline data to be obtained and when; (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.	Prior to and during construction	C2S SSI 15_7400 COA – C10	Environmental Manager	(a) Section 8.1 (b) Section 8.2 (c) Section 8.1 (d) Section 8.2 (e) Section 4, Section 8.4 (f) Section 8.1, Section 8.2, Appendix B (g) Section 8.3 (h) Section 8.4 (i) Section 8.5
13.	The Noise and Vibration Construction Monitoring Program and Blast Construction Monitoring Program must include provision of real time noise and vibration monitoring data. The real time data must be available to the construction team, Proponent, ER and AA in real time. The Department and EPA must be provided with access to the real time monitoring data in real time.	Prior to construction	C2S SSI 15_7400 COA – C11	Environmental Manager	Section 8.2

No.	Measure	Timing	Requirement	Responsibility	Reference
14.	The Construction Monitoring Programs must be developed in consultation with relevant government agencies as identified in Condition C9 of this approval and must include, to the written satisfaction of the Secretary, 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	C2S SSI 15_7400 COA – C12	Environmental Manager	Section 1.6 Section 8 Section 9.2
15.	The Construction Monitoring Programs must be endorsed by the ER (or AA in regards to the Noise and Vibration Construction Monitoring Program) and then submitted to the Secretary for approval at least one (1) month before commencement of construction or within another timeframe agreed with the Secretary.	Prior to construction	C2S SSI 15_7400 COA – C13	Environmental Manager	Table 24 includes a Hold Point
16.	Construction must not commence until the Secretary has approved all of the required Construction Monitoring Programs, and all relevant baseline data for the specific construction activity has been collected.	Prior to construction	C2S SSI 15_7400 COA – C14	Environmental Manager	Section 8.1, Section 8.2 Table 24 includes a Hold Point
17.	The Construction Monitoring Programs, as approved by the Secretary including any minor amendments approved by the ER (or AA in regards to the Noise and Vibration Construction Moniotring Program), must 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.	During construction	C2S SSI 15_7400 COA – C15	Environmental Manager	Section 8 Table 24 includes a Hold Point
18.	The results of the Construction Monitoring Programs must be submitted to the Secretary for information, and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.	During construction	C2S SSI 15_7400 COA – C16	Environmental Manager	Section 8.3
19.	Where a relevant CEMP sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP sub-plan.	Prior to construction	C2S SSI 15_7400 COA – C17	Environmental Manager	Incorporated in this Plan – Section 8
20.	**Vibration** The Proponent must ensure that vibration from construction activities does not exceed the vibration limits set out in the British Standard BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration	During Construction	C2S SSI 15_7400 COA – E28	Environmental Manager	Section 4.2

No.	Measure	Timing	Requirement	Responsibility	Reference
21.	Owners of properties at risk of exceeding the screening criteria for cosmetic damage must be notified before construction that generates vibration commences in the vicinity of those properties. The management of construction works in the vicinity of properties at risk of exceeding the screening criteria for cosmetic damage must be considered in the Noise and Vibration management sub plan required by Condition C3.	During Construction	C2S SSI 15_7400 COA – E29	Environmental Manager Community Manager	Section 7.6
22.	The Proponent must conduct vibration testing before and during vibration generating activities that have the potential to impact on heritage items 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, the Proponent must review the construction methodology and, if necessary, implement additional mitigation measures.	During Construction	C2S SSI 15_7400 COA – E30	Environmental Manager	Section 8.2
23.	The Proponent must seek the advice of a heritage specialist on methods and locations for installing equipment used for vibration, movement and noise monitoring of heritage-listed structures.	During Construction	C2S SSI 15_7400 COA – E31	Environmental Manager	Section 8.2
24.	Construction Noise and Vibration Strategy The Proponent must review the Sydney Metro City and Southwest Construction Noise and Vibration Strategy in the PIR during detailed construction planning to consider scale and duration of impacts, the requirements of this approval and all measures to limit construction noise impacts to sensitive receivers including: (a) at property or architectural treatment; (b) relocation; and (c) other forms of mitigation where impacts are predicted to be long term and significant. The revised Sydney Metro City and Southwest Construction Noise and Vibration Strategy must be submitted to the Secretary for approval at least one (1) month before construction commences.	Prior to Construction	C2S SSI 15_7400 COA – E32	Sydney Metro Environmental Manager (compliance to CNVS only)	(a) Section 6 (b) Section 6, Section 7.6 (c) Section 6, Section 7 Noted - compliance to CNVS is required by JHLOR
25.	Construction Noise and Vibration Impact Statements must be prepared for each construction site before construction noise and vibration impacts commence and include specific mitigation measures identified through consultation with affected sensitive receptors.	Prior to construction	C2S SSI 15_7400 COA – E33	Environmental Manager	Section 3.2 A CNVIS has been developed and approved by the AA

No.	Measure	Timing	Requirement	Responsibility	Reference
26.	Noise generating works in the vicinity of potentially-affected, religious, educational, community institutions and noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) must not be timetabled within sensitive periods, unless other reasonable arrangements to the affected institutions are made at no cost to the affected institution or as otherwise approved by the Secretary.	During Construction	C2S SSI 15_7400 COA – E34	Environmental Manager Project Engineer Site Superintendent	Section 4.1.3 Section 7.6 Appendix B CNVIS
27.	The Proponent must review alternative methods to rock hammering and blasting for excavation as part of the detailed construction planning with a view to adopting methods that minimise impacts on sensitive receivers. Construction Noise and Vibration Impact Statements must be updated for each location or activity to adopt the least impact alternative in any given location unless it can be demonstrated, to the satisfaction of the AA, why it should not be adopted.	During Construction	C2S SSI 15_7400 COA – E35	Environmental Manager Project Engineer Site Superintendent	Section 4.1.4 A CNVIS has been developed and approved by AA
28.	**Standard Construction Hours** Construction, except as allowed by project EPL 21147 or Condition E48 (excluding cut and cover tunnelling), must only be undertaken during the following standard 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	C2S SSI 15_7400 COA – E36	Environmental Manager Project Engineer Site Superintendent	Section 7.7 EPL 21147
29.	**Respite for Receivers** The Proponent must identify all receivers likely to experience internal noise levels greater than LAeq(15 minute) 60 dB(A) inclusive of a 5 dB 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 (including works associated with utility adjustments), between 7am — 8pm at: (a) Crows Nest, Victoria Cross, Blues Point, Barangaroo, Martin Place, Pitt Street, and Central; and; (b) Marrickville, Newtown, St peters, Sydenham and Tempe for works specified in SSI 7400_MOD4 referenced in condition A1 (c)	During Construction	C2S SSI 15_7400 COA – E37	Environmental Manager Project Engineer Community Manager	Section 4.1.4 Section 7.6 A CNVIS has been developed and approved by AA

No.	Measure	Timing	Requirement	Responsibility	Reference
30.	The Proponent must consult with all receivers identified in accordance with Condition E37 with the objective of determining appropriate hours of respite so that construction noise (including ground-borne noise), does not exceed internal noise levels of: (a) LAeq(15 minute) 60 dB(A) inclusive of a 5 dB 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 — 8pm for more than 50 percent of the time; and (b) LAeq(15 minute) 55 dB(A) inclusive of a 5 dB 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 — 8pm for more than 25 percent of the time, unless an agreement is reached with those receivers. This condition does not apply to noise associated with the cutting surface of a TBM as it passes under receivers. Note This condition requires that noise levels be less than LAeq(15 minute) 60 dB(A) for at least 6.5 hours between 7am and 8pm, of which at least 3.25 hours must be below LAeq(15 minute) 55 dB(A). Noise equal to or above LAeq(15 minutes) 60 dB(A) is allowed for the remaining 6.5 hours between 7am and 8pm.	During Construction	C2S SSI 15_7400 COA – E38	Environmental Manager Project Engineer Site Superintendent	Section 4.1.4 Section 7.6 A CNVIS has been developed and approved by the AA
31.	The Proponent must consult with proponents of other construction works in the vicinity of the CSSI and take reasonable steps to coordinate works to minimise cumulative impacts of noise and vibration and maximise respite for affected sensitive receivers.	During Construction	C2S SSI 15_7400 COA – E39	Environmental Manager Project Engineer Site Superintendent	Section 7.13
32.	The Proponent must 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.	During Construction	C2S SSI 15_7400 COA – E40	Environmental Manager Project Engineer Site Superintendent	Section 7.1 Section 7.13
33.	**Mitigation – Non Residential Zones** The Proponent must ensure that residential receivers, located in non-residential zones, likely to experience an internal noise level exceeding Leq(15 minute) 60 dB(A) between 8pm and 9pm or Leq(15 minute) 45 dB(A) between 9pm and 7am (inclusive of a 5 dB penalty if rock breaking or any other annoying activity likely to result in ground-borne noise, or a perceptible level of vibration is planned (including works associated with utility adjustments)) must be offered additional mitigation in accordance with the Sydney Metro City and South West Noise and Vibration Strategy referenced in Condition E32.	During Construction	C2S SSI 15_7400 COA – E41	Environmental Manager Project Engineer	Section 7.1 Appendix C A CNVIS has been developed and approved the AA

No.	Measure	Timing	Requirement	Responsibility	Reference
34.	**Mitigation – Residential receptors in residential zones** The Proponent must ensure that residential receivers in residential zones likely to experience an internal noise level of Leq(15 minute) 45 dB(A) or greater between 8pm and 7am (inclusive of a 5 dB penalty if rock breaking or any other annoying activity likely to result in ground-borne noise, or a perceptible level of vibration is planned (including works associated with utility adjustments)) must be offered additional mitigation in accordance with the Sydney Metro City and South West Noise and Vibration Strategy referenced in Condition E32.	During Construction	C2S SSI 15_7400 COA – E42	Environmental Manager Project Engineer	Section 7.1 Appendix C A CNVIS has been developed and approved by the AA
35.	**Workplace health and safety for nearby workers** At no time can noise generated by construction exceed the National Standard for exposure to noise in the occupational environment of an eight-hour equivalent continuous A-weighted sound pressure level of LAeq,8h, of 85dB(A) for any employee working at a location near the CSSI.	During Construction	C2S SSI 15_7400 COA – E43	Project Engineer Site Superintendent	Section 7.1 Project's Occupational Health Hygiene Welfare Management Plan captures this requirement.

No.	Measure	Timing	Requirement	Responsibility	Reference
36.	Notwithstanding Condition E36 construction associated with the CSSI may be undertaken outside the hours specified under those conditions 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 construction; or (d) 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 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 those for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), and intermittent vibration values measured at the most affected residence are no more than those for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or (e) 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 limits for ground-borne noise and vibration (human comfort) cannot be achieved. All agreements must be in writing and a copy forwarded to the Secretary at least one (1) week before the works commencing; or	During Construction	C2S SSI 15_7400 COA – E44	Environmental Manager	a) Section 7.7 b) Section 7.7, Section 3.3 of the OOHW Protocol c) Section 7.7, Section 7.8 d) Section 7.7 e) Section 7.7, Section 3.2 of the OOHW Protocol f) Section 7.7 g) EPL 21147
37.	On becoming aware of the need for emergency construction in accordance with Condition E44(b), the Proponent must notify the AA, the ER and the EPA) of the need for those activities or work. The Proponent must also use best endeavours to notify all affected sensitive receivers of the likely impact and duration of those works.	During Construction	C2S SSI 15_7400 COA – E45	Environmental Manager Project Engineer Site Superintendent	Section 7.7 Section 7.8 EPL 21147

No.	Measure	Timing	Requirement	Responsibility	Reference
38.	Notwithstanding Conditions E44 and E48, rock breaking and other particularly annoying activities for station shaft or cut and cover stations is not permitted outside of standard construction hours, except at Central (excluding Central Walk works at 20-28 Chalmers St, Surry Hills); or (a) 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 (b) where different construction hours are permitted or required under an EPL in force in respect of the construction or approved through an Out of Hours Work Protocol developed in accordance with Condition E47; or (c) construction that causes LAeq(15 min) 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 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, measures at the most affected residence are no more than those for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006); and iv. intermittent vibration values measured at the most affected residence are no more than those for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006).	During Construction	C2S SSI 15_7400 COA – E46	Environmental Manager Project Engineer Site Superintendent	Not applicable to SMu works. There is no station shaft or cut and cover station.
39.	**Out of Hours Work Protocol for works not subject to an EPL** An Out of Hours Work Protocol for the assessment, management and approval of work outside of standard construction hours, as defined in Condition E36 of this approval, must be prepared in consultation with the EPA and submitted to the Secretary for approval before construction commences for works not subject to an EPL. The protocol must include: (a) the identification of low and high risk construction activities; (b) a risk assessment process in which the AA reviews all proposed out of hours activities and identifies their risk levels; (c) a process for the endorsement of out of hours activities by the AA and approval by the ER for construction activities deemed to be of: i. low environmental risk; or ii. High risk where all construction works cease by 9pm. All other high risk out of hours construction must be submitted to the Secretary for approval unless otherwise approved through an EPL. The protocol must detail standard assessment, mitigation and notification requirements for high and low risk out of hours works, and detail a standard protocol for referring applications to the Secretary.	During Construction	C2S SSI 15_7400 COA – E47	Environmental Manager/ Co-ordinator Project Engineer	Section 7.8 Appendix C EPL 21147 L5.2, 5.6, 5.7, 5.8, 5.12.

No.	Measure	Timing	Requirement	Responsibility	Reference
40.	**24 Hour Construction** Notwithstanding Condition E36 of this approval and subject to Condition E47, the following activities may be undertaken 24 hours per day, seven (7) days per week: (a) tunnelling and associated support activities (excluding cut and cover tunnelling); (b) excavation within an acoustic enclosure; (c) excavation at Central (excluding Central Walk works at 20-28 Chalmers St Sydney) without an acoustic enclosure; (d) station and tunnel fit out; and (e) haulage and delivery of spoil and materials.	During Construction	C2S SSI 15_7400 COA – E48	Environmental Manager Project Engineer Site Superintendent	Section 7.7
41.	All acoustic sheds must be erected as soon as site establishment works at the facilities are completed and before undertaking any works or activities which are required to be conducted within the sheds.	During Construction	C2S SSI 15_7400 COA – E49	Environmental Manager Project Engineer Site Superintendent	Not applicable to SMu works
	EIS Environmental Management Measures				

No.	Measure	Timing	Requirement	Responsibility	Reference
42.	The Construction Noise and Vibration Strategy would be implemented with the aim of achieving the noise management levels where feasible and reasonable. This would include the following example standard mitigation measures where feasible and reasonable: • Provision of noise barriers around each construction site • Provision of acoustic sheds at Chatswood dive site, Crows Nest, Victoria Cross, Barangaroo Martin Place, Pitt Street, Waterloo and Marrickville dive site • The coincidence of noisy plant working simultaneously close together would be avoided • Offset distances between noisy plant and sensitive receptors would be increased • Residential grade mufflers would be fitted to all mobile plant • Dampened rock hammers would be used • Non-tonal reversing alarms would be fitted to all permanent mobile plant • High noise generating activities would be scheduled for less sensitive period considering the nearby receptors • The layout of construction sites would consider opportunities to shield receptors from noise. This would also include carrying out the requirements in relation to construction noise and vibration monitoring.	During Construction	C2S EIS REMM – NV1	Environmental Manager Project Engineer Site Superintendent	This Plan
43.	Where vibration levels are predicted to exceed the screening criteria, a more detailed assessment of the structure and attended vibration monitoring would be carried out to ensure vibration levels remain below appropriate limits for that structure. For heritage items, the more detailed assessment would specifically consider the heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed.	During Construction	C2S EIS REMM – NV3	Environmental Manager Project Engineer	Section 4.2.1 Section 8.2 A CNVIS has been developed and approved by AA
44.	Feasible and reasonable measures would be implemented to minimise ground borne noise where exceedances are predicted.	During Construction	C2S EIS REMM – NV4	Environmental Manager Project Engineer Site Superintendent	Section 7 Section 8.4 A CNVIS has been developed and approved by AA

No.	Measure	Timing	Requirement	Responsibility	Reference
45.	Transport for NSW would engage an Independent Acoustic Advisor to act independently of the design and construction teams and provide oversight of construction methods, construction noise and vibration planning, management and mitigation, and construction noise and vibration monitoring and reporting. The key responsibilities of the Independent Acoustic Advisor would include : • Assurance of contractor noise and vibration planning, modelling, management and monitoring practices • Verification of compliance with relevant guidelines and approval requirements Audit noise and vibration management practices.	Prior to construction	C2S EIS REMM – NV6	Sydney Metro	Independent Acoustic Advisor engaged by Sydney Metro
46.	Alternative demolition techniques that minimise noise and vibration levels would be investigated and implemented where feasible and reasonable. This would include consideration of: • The use of hydraulic concrete shears in lieu of hammers/rock breakers • Sequencing works to shield noise sensitive receptors by retaining building wall elements • Locating demolition load out areas away from the nearby noise sensitive receptors • Providing respite periods for noise intensive works • Methods to minimise structural-borne noise to adjacent buildings including separating the structural connection prior to demolition through saw-cutting and propping, using hand held splitters and pulverisers or hand demolition • Installing sound barrier screening to scaffolding facing noise sensitive neighbours Modifying demolition works sequencing / hours to minimise impacts during peak pedestrian times and / or adjoining neighbour outdoor activity periods.	During Construction	C2S EIS REMM – NV7	Environmental Manager Project Engineer Site Superintendent	Section 7.4 A CNVIS has been developed and approved by AA
47.	Ballast tamping and rock breakers would not be undertaken during the night-time period (10pm to 7am) except where circumstances arise that require the use of this plant to ensure the rail corridor is made safe for the operation of trains by the conclusion of a scheduled rail possession	During Construction	C2S EIS REMM – NV12	Environmental Manager Project Engineer Site Superintendent	Section 7.1
	EIS Environmental Performance Outcomes				

No.	Measure	Timing	Requirement	Responsibility	Reference
48.	Noise levels would be minimised with the aim of achieving the noise management levels where feasible and reasonable	During Construction	C2S EIS EPO – Noise	Environmental Manager Project Engineer Site Superintendent	Section 4.1 Section 7 Section 8.2
49.	The project would avoid any damage to buildings from vibration	During Construction	C2S EIS EPO – Vibration	Environmental Manager Project Engineer Site Superintendent	Section 4.2 Section 7.4 Section 7.5 Section 8.2
	Contractual Requirements				

No.	Measure	Timing	Requirement	Responsibility	Reference
50.	The SSJ Contractor acknowledges and agrees that: (a) the Principal has appointed the Acoustics Advisor as required by an Authority Approval; (b) the Acoustics Advisor: (i) is independent of the parties; (ii) will oversee the implementation of all noise and vibration management plans and monitoring programs required under the Planning Approval, and will advise the Principal upon achievement of the outcomes contemplated in the Planning Approval; (iii) will advise the Principal and the Principal's Representative on the SSJ Contractor's compliance with the Planning Approval; and (iv) will have the authority and independence to: A. direct the SSJ Contractor as to; or B. advise the Principal's Representative to direct the SSJ Contractor as to reasonable steps the SSJ Contractor must take to avoid or minimise unintended or adverse noise and vibration impacts; C. it must comply with the directions of the Acoustics Advisor or the Principal's Representative as contemplated by clause 14.8(b)(iv); and D. it bears the full risk of complying with any directions given by the Acoustics Advisor or the Principal's Representative as contemplated by clause 14.8(c) and none of the Principal, the Principal's Representative or the Acoustics Advisor will be liable upon any Claim arising out or in any way in connection with such directions.	Prior to construction	General Conditions – 14.8 – Acoustics Advisor	Sydney Metro	Noted. Section 2.4 Roles and Responsibilities includes the AA
51.	9.1 Construction Noise and Vibration Management Objectives 9.2 Construction Noise and Vibration Management Implementation 9.3 Construction Noise and Vibration Mitigation	During Construction	Schedule Part D – MR-E	Environmental Manager Project Engineer Site Superintendent	Section 1.5 Section 7
	Construction Environmental Management Framework				

No.	Measure	Timing	Requirement	Responsibility	Reference
52	**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 1.5 The objectives are addressed in the following sections; i) Section 7 ii) Section 4.2, Section7, Section 7.4, Section 7.5 iii) Section7.2, Section 7.6 Section 9.1 iv) Section 7.2 Section 7.6

No.	Measure	Timing	Requirement	Responsibility	Reference
53.	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 (xiii) An Out of Hours Works Protocol applicable to all construction methods and sites.	Prior to construction	CEMF Section 9.2(a)	Environmental Manager	This Plan i) Section1.4, Appendix B ii) Section 1.5, Section 3, Appendix B iii) Section 4, Section 9 iv) Section 3.2 Appendix D v) Section 7 vi) Section 7.2, Section 7.4, Section 7.6, Section 7.8 Appendix C vii) Section 2.2, Section 7.4 Section 8.2 viii) N/A ix) Section 4, Section 7, Section 9.1 x) Section 2.4 xi) Section 8.2 xii) Section 8.3, Section 8.4 xiii) Appendix C
54.	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 undertaken outside of standard construction hours.	Prior to construction	CEMF Section 9.2(b)	Environmental Manager	A CNVIS has been developed and approved by AA

No.	Measure	Timing	Requirement	Responsibility	Reference
55.	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 4 Section 8.2
56.	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	Section 8.2 Section 7.8
57.	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 7.6, Section 7.7 ii)Section 7.3 iii)Section 7.1
Environment Protection Licence (21147)					
58	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	L4.1	Project Engineer Environmental Manager	Section 7
59	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 1800 Saturday; and (c) not be undertaken on Sundays or Public Holidays.	During Construction	L5.1	Project Engineer Environmental Manager	Section 7.7

No.	Measure	Timing	Requirement	Responsibility	Reference
60	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 L5.1 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	L5.2	Project Engineer Environmental Manager	Section 7.8

No.	Measure	Timing	Requirement	Responsibility	Reference
61	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 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.	During Construction	L5.3	Project Engineer Environmental Manager	Section 7.8
62	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 6:00pm 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	During Construction	L5.4	Supervisor Environmental Manager	Section 7.2

No.	Measure	Timing	Requirement	Responsibility	Reference
63	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 L5.5(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 L5.5(a), the results of consultation with receivers in accordance with condition L5.5(b) and the proposed work practices and scheduling to provide receivers with the respite required under condition L5.6(b)(i)&(ii).	During Construction	L5.5	Supervisor Environmental Manager	Section 4.2.3

No.	Measure	Timing	Requirement	Responsibility	Reference
64	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 Condition L5.1) 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 L5.8(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 L5.6(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 L5.6(a).	During Construction	L5.6	Project Engineer Environmental Manager	Section 7.8

No.	Measure	Timing	Requirement	Responsibility	Reference
65	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 L5.1 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 L5.1 would 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 L5.1 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 L5.1 would result in a high risk to the operation and integrity of the utility network; or (iv) the Sydney Metro 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 L5.1; or	During Construction	L5.7	Project Engineer Environmental Manager	Section 7.8

No.	Measure	Timing	Requirement	Responsibility	Reference
66	In undertaking any works or activities under Condition L5.7 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 L5.6 and L5.7 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 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 L5.6 and L5.7 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 L5.8(b) "impact" is defined as noise levels that exceed the noise levels in L5.2.	During Construction	L5.8	Project Engineer Environmental Manager	Section 7.8
67	If works are undertaken by a utilities provider during a scheduled respite period identified by Condition L5.8, 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 L5.7 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	L5.9	Project Engineer Environmental Manager	Section 7.8

No.	Measure	Timing	Requirement	Responsibility	Reference
68	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. Note: This condition applies to out-of-hours works that have not been approved by another condition of this licence.	During Construction	L5.10	Communication and Stakeholder Relations Manager Project Engineer Environmental Manager	Section 7.8
69	Any agreement(s) between the licensee and noise sensitive receivers referred to in Condition L5.10 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	L5.11	Communication and Stakeholder Relations Manager Project Engineer Environmental Manager	Section 7.8

No.	Measure	Timing	Requirement	Responsibility	Reference
70	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 L5.1; • 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 L5.1, and the project website address. This condition does not apply to works undertaken in accordance with Condition L5.3.	During Construction	L5.12	Communication and Stakeholder Relations Manager Project Engineer Environmental Manager	Section 7.6
~~71~~	~~Additional Approved Out of Hours Works~~ ~~(a) Works maybe undertaken 24 hours per day at Burrows Avenue Sydenham for the construction and installation of the new station canopy on a total of three nights, plus 1 contingency night provided that;~~ ~~(i) Rattle guns are not to be used between 10pm and 7am,~~ ~~(ii) All reasonable and feasible noise and vibration mitigation measures are implemented,~~ ~~(ii) These works do not count as evening or night work totals as per condition L4.8(i) and L4.8(ii), and~~ ~~(iv) If the contingency night is required, the licensee must notify the EPA in writing.~~	~~During Construction~~	~~L4.14~~	~~Communication and Stakeholder Relations Manager~~ ~~Project Engineer~~ ~~Environmental Manager~~	~~Section 7.6~~

No.	Measure	Timing	Requirement	Responsibility	Reference
~~72~~	~~The licensee may undertake culvert cut over works at any time between 13 July 2020 and 31 August 2020 provided that the licensee complies with the following~~ ~~(a) The licensee may only undertake these works on a maximum of 4 weekday nights per week;~~ ~~(b) The licensee must only undertake these works on a maximum of 2 consecutive nights in a row;~~ ~~(c) On Saturdays and Sundays, the licensee must only undertake these works between 8am and 6pm;~~ ~~and~~ ~~(d) The licensee must provide at least 3 nights per calendar week where noise sensitive receivers are not impacted by any noise from works associated with the project (this excludes low noise impact works under Condition L4.2 and works required under exceptional circumstances under Condition L4.3).~~	~~During Construction~~	~~L4.15~~	~~Communication and Stakeholder Relations Manager~~ ~~Project Engineer~~ ~~Environmental Manager~~	~~Section 7.6~~
73	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: (i) As soon as practicable; or (ii) At a time agreed with the complainant.	During Construction	M6.5	Communication and Stakeholder Relations Manager Project Engineer Environmental Manager	Section 7.12
74	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

No.	Measure	Timing	Requirement	Responsibility	Reference
75	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
76	The licensee must undertake noise and vibration monitoring as directed by an authorised officer of the EPA.	During Construction	M7.3	Environmental Manager	Section 8.2.5
77	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
778	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

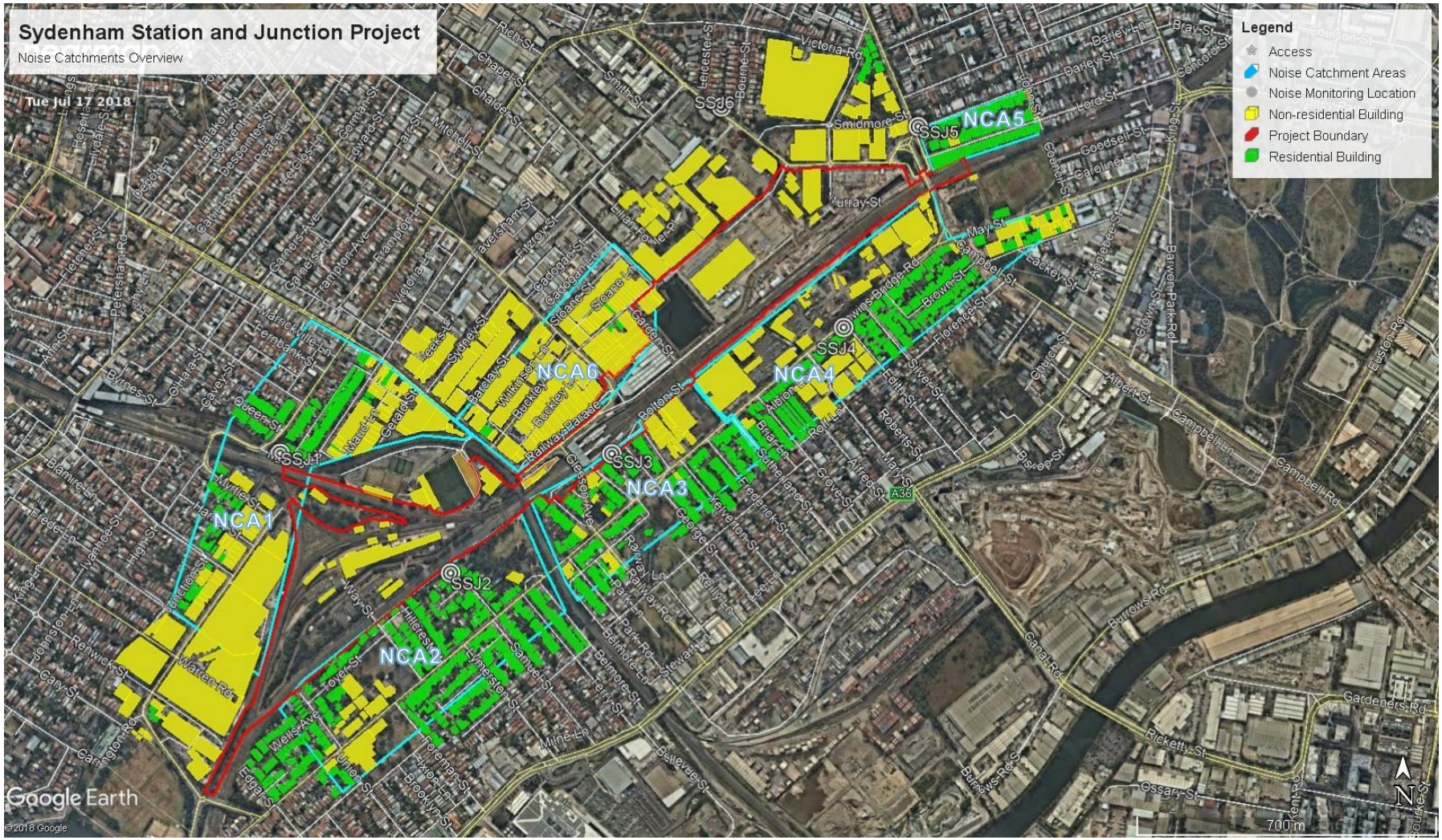
No.	Measure	Timing	Requirement	Responsibility	Reference
79	Out of Standard Hours Works - Validation Report (a) For activities permitted under Condition L5.6 & L5.7, a validation report must be submitted to the EPA that includes the following detail: 1. Confirmation that the equipment used to undertake 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 L5.12 3. Noise monitoring as required by L5.8(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 L5.6 &L5.7 for the carrying out of works outside of standard construction hours in L5.1. (b) The validation report must be submitted to the EPA fortnightly from the commencement of the works permitted by L5.6 & L5.7 by no later than 2 business days from the end of each fortnight.	During Construction	R4.4	Environmental Manager	Section 8.3

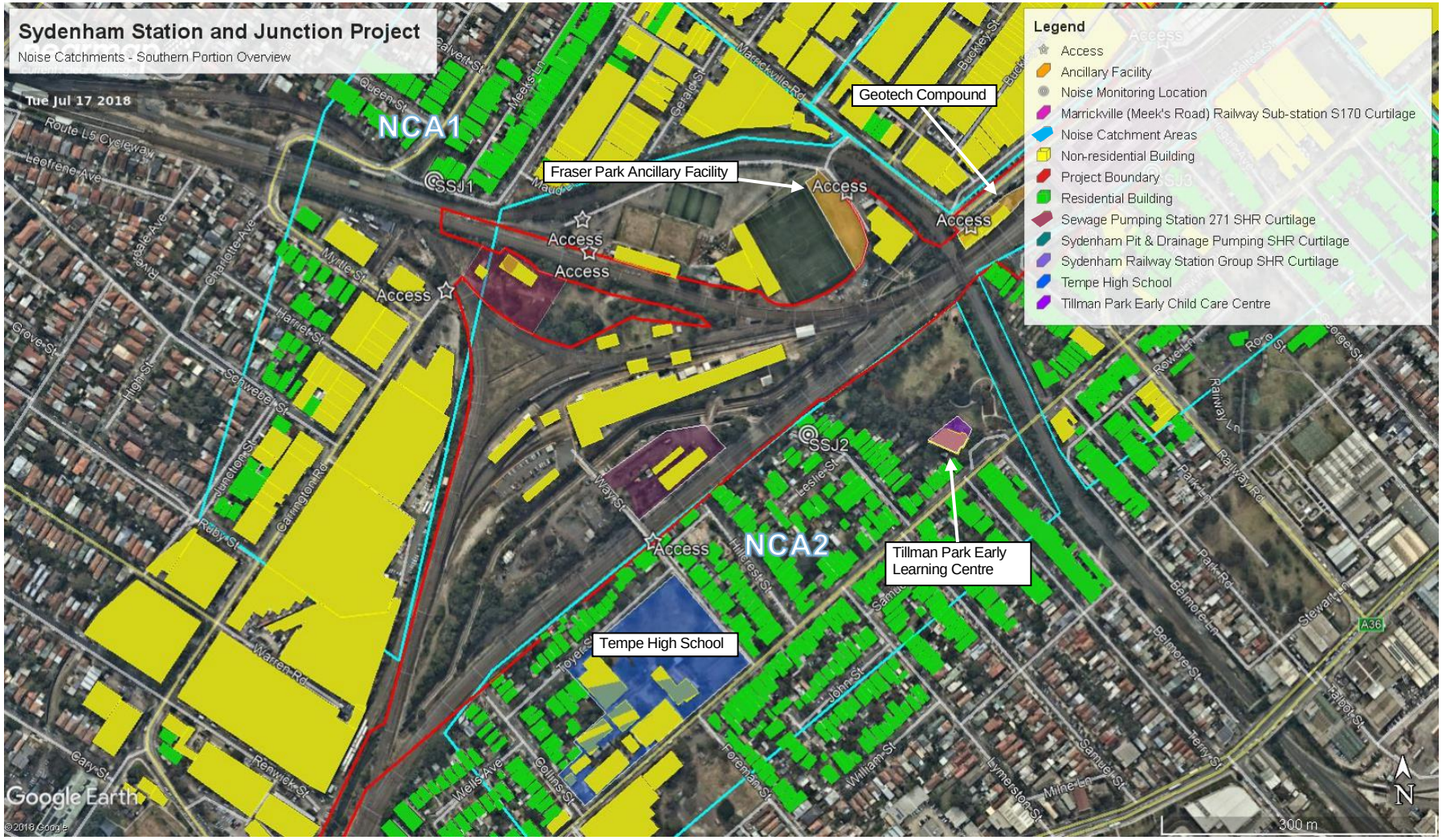
No.	Measure	Timing	Requirement	Responsibility	Reference
80	Requirements for community agreements Any community agreement to permit works to be undertaken outside of standard construction hours (OOHW) under Condition L5.10 must: (a) be prepared and implemented in accordance with the relevant sections 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; 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.	During Construction	E1.1	Communication and Stakeholder Relations Manager Environmental Manager	Section 7.6
81	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
82	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 L5.2(a) and L5.2(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
83	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
84	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 (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 L5.13 apply to community agreements.	During Construction	E1.5	Communication and Stakeholder Relations Manager	Section 7.6
85	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 8.2.5

No.	Measure	Timing	Requirement	Responsibility	Reference
86	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 8.2.5
87	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 8.2.5

APPENDIX B - Noise Catchment Area Maps




Sydenham Station and Junction Project
Noise Catchments - Southern Portion Overview
Tue Jul 17 2018
Legend
Access
Ancillary Facility
Noise Monitoring Location
Marrickville (Meek's Road) Railway Sub-station S170 Curtilage
Noise Catchment Areas
Non-residential Building
Project Boundary
Residential Building
Sewage Pumping Station 271 SHR Curtilage
Sydenham Pit & Drainage Pumping SHR Curtilage
Sydenham Railway Station Group SHR Curtilage
Tempe High School
Tillman Park Early Child Care Centre
NCA1
NCA2
SSJ1
SSJ2
Geotech Compound
Fraser Park Ancillary Facility
Access
Tillman Park Early Learning Centre
Tempe High School
Google Earth
300 m
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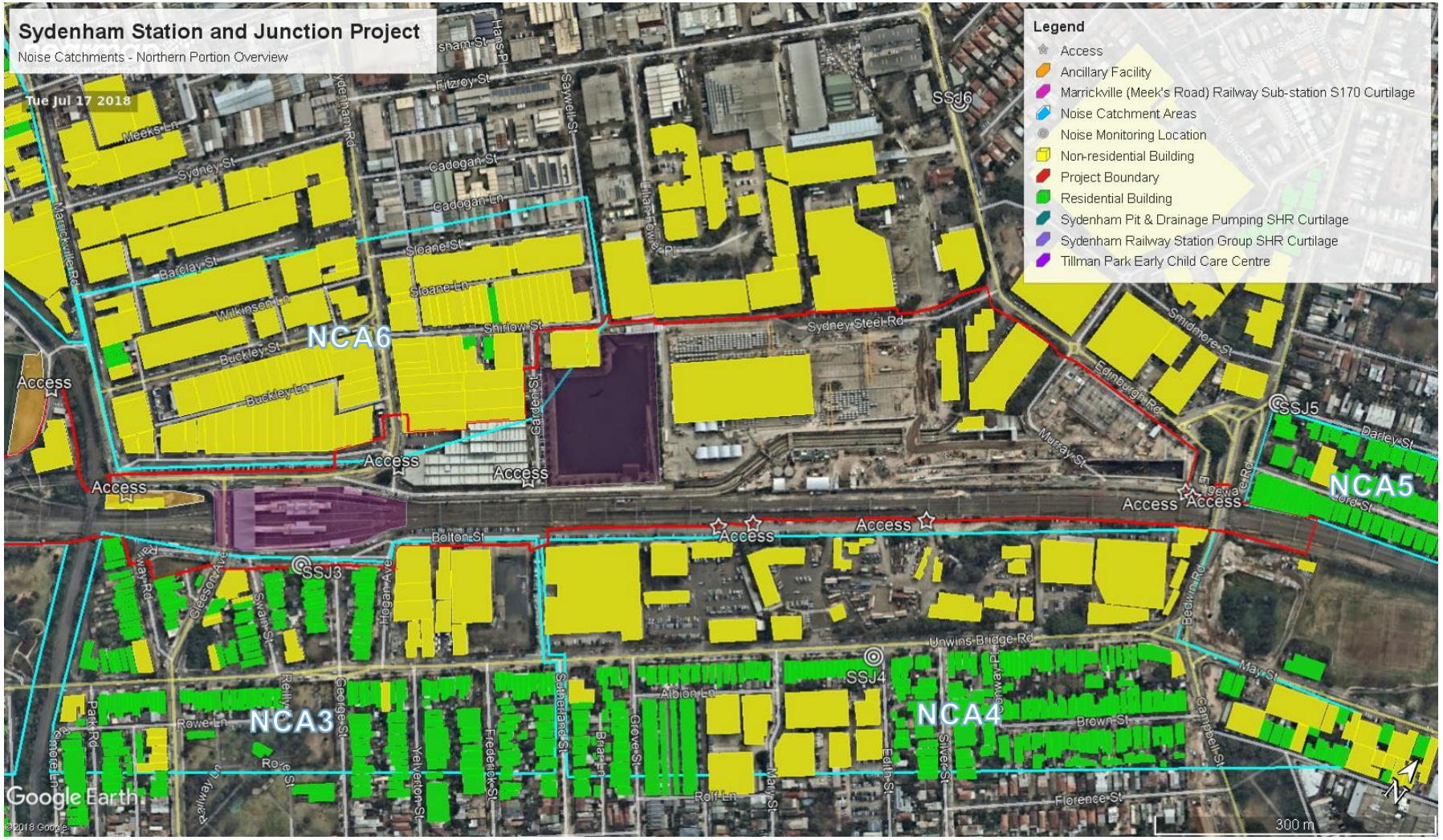
Sydenham Station and Junction Project
Noise Catchments - Northern Portion Overview
Tue Jul 17 2018
Legend
Access
Ancillary Facility
Marrickville (Meek's Road) Railway Sub-station S170 Curtilage
Noise Catchment Areas
Noise Monitoring Location
Non-residential Building
Project Boundary
Residential Building
Sydenham Pit & Drainage Pumping SHR Curtilage
Sydenham Railway Station Group SHR Curtilage
Tillman Park Early Child Care Centre
NCA6
NCA5
NCA4
NCA3
SSJ6
SSJ5
SSJ4
SSJ3
Access
Meeks Ln
Sydney St
Cadogan St
Cadogan Ln
Fitzroy St
Sloane St
Sloane Ln
Barclay St
Wilkinson Ln
Buckley St
Buckley Ln
Shirlow St
Sydney Steel Rd
Smidmore St
Edinburgh Rd
Darley St
Lord St
Murray St
Bolton St
Unwins Bridge Rd
May St
Brown St
Florence St
Albion Ln
Rolfe Ln
Rowe Ln
Rowe St
Google Earth
© 2018 Google
300 m

APPENDIX C - City and Southwest Chatswood to Sydenham Out of Hours Work Protocol

City & Southwest Out of Hours Work Strategy/Protocol

SM-17-00005396 (formerly SM ES-PW-317)

Sydney Metro Integrated Management System (IMS)

Applicable to:	Sydney Metro City & Southwest
Document Owner:	Environment Manager
System Owner:	Director Environment, Sustainability & Planning – City & Southwest
Status:	Final
Version:	5.2
Date of issue:	9 October 2020
Review date:	9 October 2021

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1. Definitions and acronyms

All terminology in this document is taken to mean the generally accepted or dictionary definition. Other terms and jargon specific to this document are defined within the SM-17-00000203 Sydney Metro glossary. Acronyms and terminology specifically used throughout this document are listed below.

	Definitions
AA	Acoustics Advisor
BMP	Business Management Plan
C2S	Chatswood to Sydenham
CEMF	SM-17-00000087 Construction Environment Management Framework
CNVIS	Construction Noise and Vibration Impact Statement
CNVS	SM-17-00000089 City & Southwest Construction Noise and Vibration Strategy
CoA	Conditions of Approval
CSSI	Critical State Significant Infrastructure
DPIE	Department of Planning, Industry and Environment (formerly DPE)
EPA	Environment Protection Authority (of New South Wales)
EPL	Environment Protection Licence
ER	Environmental Representative
ICNG	*Interim Construction Noise Guideline* (DECC, 2009)
MOD	Modification (to a planning approval)
OOH	Out of Hours (i.e. outside of the standard construction hours stipulated in planning approval conditions)
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
REMM	Revised Environmental Mitigation Measure
S2B	Sydenham to Bankstown
Secretary	The Secretary of the New South Wales Department of Planning, Industry and Environment
SPIR	Submissions and Preferred Infrastructure Report
TBM	Tunnel Boring Machine

2. Introduction

This document outlines the process for preparing, considering, assessing, managing and approving work on the City & Southwest project that is undertaken outside of standard construction hours (i.e. Out of Hours) that are subject to the following Critical State Significant Infrastructure (CSSI) planning approvals:

- Chatswood to Sydenham (SSI_7400); and
- Sydenham to Bankstown (SSI_8256).

2.1. Purpose

This document has been developed to comply with various CSSI Conditions of Approval (CoAs) and Revised Environmental Mitigation Measures (REMMs). Table 1 indicates where these requirements have been addressed.

Table 1: Out of Hours Work CSSI CoAs and REMMs

Condition Number	Condition	Where this condition is addressed
C2S CoA A27(g)i.	The approved AA must in conjunction with the ER (where required)… consider requests for out of hours construction activities and determine whether to endorse the proposed activities in accordance with Condition E47.	Other Endorsements and Approval and Figure 1.
C2S CoA A27(g)iv.	The approved AA must in conjunction with the ER (where required)… consider relevant minor amendments made to any noise and vibration document approved by the Secretary that require updating or are of an administrative or minor nature, and are consistent with the terms of this approval and the document approved by the Secretary and, if satisfied such amendment is necessary, approve the amendment. This does not include any modifications to the terms of this approval.	Post-Approval Updates
C2S CoA E36	Construction, except as allowed by Condition E48 (excluding cut and cover tunnelling), must only be undertaken during the following standard construction hours: (a) 7:00am to 6:00pm Mondays to Fridays, inclusive; (b) 8:00am to 1:00pm Saturdays; and (c) at no time on Sundays or public holidays.	Standard Hours
C2S CoA E37	The Proponent must identify all receivers likely to experience internal noise levels greater than $L_{eq(15\ minute)}$ 60 dB(A) inclusive of a 5 dB 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 (including works associated with utility adjustments), between 7am – 8pm at: (a) Crows Nest, Victoria Cross, Blues Point, Barangaroo, Martin Place, Pitt Street, and Central; and (b) Marrickville, Newtown, St Peters, Sydenham and Tempe for works specified in SSI 7400_MOD 4 referenced in Condition A1 (c).	Construction Noise and Vibration Impact Statements.

Condition Number	Condition	Where this condition is addressed
C2S CoA E38	The Proponent must consult with all receivers identified in accordance with Condition E37 with the objective of determining appropriate hours of respite so that construction noise (including ground-borne noise), does not exceed internal noise levels of: (a) $L_{eq(15\ minute)}$ 60 dB(A) inclusive of a 5 dB 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 – 8pm for more than 50 percent of the time; and (b) $L_{eq(15\ minute)}$ 55 dB(A) inclusive of a 5 dB 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 – 8pm for more than 25 percent of the time, unless an agreement is reached with those receivers. This condition does not apply to noise associated with the cutting surface of a TBM as it passes under receivers. *Note this condition requires that noise levels be less than $L_{eq(15\ minute)}$ 60 dB(A) for at least 6.5 hours between 7am and 8pm, of which at least 3.25 hours must be below $L_{aeq(15\ minute)}$ 55 dB(A). Noise equal to or above $L_{eq(15\ minutes)}$ 60 dB(A) is allowed for the remaining 6.5 hours between 7am and 8pm.*	Construction Noise and Vibration Management Plans and each OOH application as relevant (supported by a Construction Noise and Vibration Impact Statement or other type of quantitative impact assessment).
C2S CoA E41	The Proponent must ensure that residential receivers, located in non-residential zones, likely to experience an internal noise level exceeding $L_{eq(15\ minute)}$ 60 dB(A) between 8pm and 9pm or $L_{eq(15\ minute)}$ 45 dB(A) between 9pm and 7am (inclusive of a 5 dB penalty if rock breaking or any other annoying activity likely to result in ground-borne noise, or a perceptible level of vibration is planned (including works associated with utility adjustments)) must be offered additional mitigation in accordance with SM-17-00000089 City & Southwest Construction Noise and Vibration Strategy referenced in Condition E32.	Construction Noise and Vibration Management Plans and each OOH application as relevant (supported by a Construction Noise and Vibration Impact Statement or other type of quantitative impact assessment).
C2S CoA E42	The Proponent must ensure that residential receivers in residential zones likely to experience an internal noise level of $L_{eq(15\ minute)}$ 45 dB(A) or greater between 8pm and 7am (inclusive of a 5 dB penalty if rock breaking or any other annoying activity likely to result in ground-borne noise, or a perceptible level of vibration is planned (including works associated with utility adjustments)) must be offered additional mitigation in accordance with SM-17-00000089 City & Southwest Construction Noise and Vibration Strategy referenced in Condition E32.	Construction Noise and Vibration Management Plans and each OOH application as relevant (supported by a Construction Noise and Vibration Impact Statement or other type of quantitative impact assessment).

Condition Number	Condition	Where this condition is addressed
C2S CoA E44	Notwithstanding Condition E36 construction associated with the CSSI may be undertaken outside the hours specified under those conditions 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 construction; or (d) construction that causes $L_{Aeq(15\ minute)}$ 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 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 those 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 those for human exposure to vibration, specified in Table 2.4 of *Assessing Vibration: a technical guideline* (DEC, 2006); or (e) 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 limits for ground-borne noise and vibration (human comfort) cannot be achieved. All agreements must be in writing and a copy forwarded to the Secretary at least one (1) week before the works commencing; or (f) construction approved through an **Out of Hours Work Protocol** referred to in Condition E47, provided the relevant council, local residents and other affected stakeholders and sensitive receivers are informed of the timing and duration at least five (5) days and no more than 14 days before the commencement of the works. Note: This condition does not apply where an EPL is in force in respect of the construction.	OOH Work
C2S CoA E45	On becoming aware of the need for emergency construction in accordance with Condition E44(b), the Proponent must notify the AA, the ER and the EPA (if an EPL applies) of the need for those activities or work. The Proponent must also use best endeavours to notify all affected sensitive receivers of the likely impact and duration of those works.	Emergency Works and Figure 2

Condition Number	Condition	Where this condition is addressed
C2S CoA E46	Notwithstanding Conditions E44 and E48, rock breaking and other particularly annoying activities for station shaft or cut and cover stations is not permitted outside of standard construction hours, except at Central (excluding Central Walk works at 20-28 Chalmers Street, Surry Hills); or (a) 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 (b) where different construction hours are permitted or required under an EPL in force in respect of the construction or approved through an Out of Hours Work Protocol developed in accordance with Condition E47; or (c) construction that causes $L_{Aeq(15\ min)}$ 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 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, measures at the most affected residence are no more than those for human exposure to vibration, specified in Table 2.2 of *Assessing Vibration: a technical guideline* (DEC, 2006); and iv. intermittent vibration values measured at the most affected residence are no more than those for human exposure to vibration, specified in Table 2.4 of *Assessing Vibration: a technical guideline* (DEC, 2006).	OOH Work and each OOH application as relevant (supported by a Construction Noise and Vibration Impact Statement or other type of quantitative impact assessment).
C2S CoA E47	An **Out of Hours Work Protocol** for the assessment, management and approval of work outside of standard construction hours, as defined in Condition E36 of this approval, must be prepared in consultation with the EPA and submitted to the Secretary for approval before construction commences for works not subject to an EPL. The protocol must include: (a) the identification of low and high risk construction activities; (b) a risk assessment process in which the AA reviews all proposed out of hours activities and identifies their risk levels; (c) a process for the endorsement of out of hours activities by the AA and approval by the ER for construction activities deemed to be of: i. low environmental risk; or ii. high risk where all construction works cease by 9pm. All other high risk out of hours construction must be submitted to the Secretary for approval unless otherwise approved through an EPL. The protocol must detail standard assessment, mitigation and notification requirements for high and low risk out of hours works, and detail a standard protocol for referring applications to the Secretary.	This document and each OOH application.

Condition Number	Condition	Where this condition is addressed
C2S CoA E48	Notwithstanding Condition E36 of this approval and subject to Condition E47, the following activities may be undertaken 24 hours per day, seven (7) days per week: (a) tunnelling and associated support activities (excluding cut and cover tunnelling, and excluding the installation and decommissioning of the Blues Point acoustic shed except where compliance with Condition E44 is achieved); (b) excavation within an acoustic enclosure (excluding the Blues Point temporary site except where compliance with Condition E44 is achieved); (c) excavation at Central (excluding Central Walk works at 20-28 Chalmers Street, Surry Hills) without an acoustic enclosure; (d) station and tunnel fit out; and (e) haulage and delivery of spoil and materials.	OOH Work
C2S CoA E48.1	Notwithstanding E48(a), the Proponent must use best endeavours to schedule annoying activities, including steel hammering and movement of the self-propelled modular trailer, at the Blues Point temporary site between 7am and 8pm.	Construction Noise and Vibration Management Plan applicable to the Blues Point site.
S2B CoA A10	The Proponent may update corresponding strategies, plans, procedures, panels, systems, protocols and programs prepared to meet the requirements of CSSI Approval SSI 7400 [C2S] for the purposes of meeting the requirements of the CSSI consistent with this approval [S2B requirements]. Where a strategy, plan, procedure, panel, system protocol or program in SSI 7400 [C2S] has been updated and remains consistent with that prepared for SSI 7400 [C2S] and meets the requirements of this approval [S2B], the updated version must be submitted to the Planning Secretary for information. Where the update is inconsistent with the prepared document for SSI 7400 [C2S], the approval for the document must be sought in accordance with the requirements of this approval, if required.	S2B Document Requirements
S2B CoA A11	Notwithstanding **Condition A10**, where the following have been approved by the Planning Secretary for the purpose of SSI 7400, further approval is not required for the CSSI where the same individual/company/document is nominated: (a) Environmental Representative; (b) Community Complaints Mediator; (c) Community Communication Strategy; (d) Out-of-Hours Work Protocol; (e) Construction Environmental Management Framework; (f) Independent Property Impact Assessment Panel; (g) Small Business Owners' Support Program; or (h) Design Review Panel. The Proponent must notify the Planning Secretary of any such appointment of an individual/company or application of a document consistent with the requirements of the corresponding condition in SSI 7400.	The Secretary was notified of Sydney Metro's application of the OOH Work Protocol (Version 3) to the Sydenham to Bankstown planning approval scope of works on 21 December 2018. Version 3 will be superseded by any update to this document and the latest version of this document will become applicable to both the Chatswood to Sydenham and Sydenham to Bankstown planning approval scopes of work at the time of finalisation.

Condition Number	Condition	Where this condition is addressed
S2B CoA E19	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.	Standard Hours
S2B CoA E20	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 **Condition E25**; or (e) Construction that causes $L_{Aeq(15\ minute)}$ 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.*	OOH Work
S2B CoA E21	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.	Emergency Works and Figure 2

Condition Number	Condition	Where this condition is addressed
S2B CoA E22	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 **Conditions E19** and **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 an EPL.*	OOH Work (i.e. this document allows for any type of work to be conducted OOH including all activities described in this condition).
S2B 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) 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 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.	Each OOH application (and supporting documentation) as relevant.
S2B CoA E24	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.	In accordance with S2B CoA E20(d), the requirements of this condition are not applicable to works that are subject to this document.

Condition Number	Condition	Where this condition is addressed
S2B CoA E25	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 **Condition 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 (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**.	This document and each OOH application.
S2B CoA E26	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.	Each OOH application.
S2B REMM NVC7	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.	Construction Noise and Vibration Management Plans.
S2B REMM NVC14	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.	Construction Noise and Vibration Management Plans.

Condition Number	Condition	Where this condition is addressed
S2B REMM NVC16	An Out of Hours Work Strategy would be prepared, in consultation with the Environment Protection Authority, to guide the assessment, management, and approval of works outside recommended standard hours.	Consultation.

2.2. C2S Document Requirements

Prior to the approval of Modification 6 (Administrative Modification) of the C2S planning approval on 21 February 2019, the Out of Hours Work Strategy/Protocol needed to meet the following consultation, endorsement and approval requirements in accordance with the C2S CoAs and REMMs:

- Be prepared in consultation with the NSW Environment Protection Authority (EPA);
- Be endorsed by the Acoustics Advisor (AA);
- Be endorsed by the Environmental Representative (ER); and
- Be approved by the Secretary of the NSW Department of Planning and Environment (the Secretary).

These requirements were complied with as demonstrated in Sections 2.2.1 to 2.2.3.

Following the approval of Modification 6 (MOD6), the AA is able to approve any administrative or minor updates to the document (refer to Section 2.2.4).

2.2.1. EPA Consultation

Version 2 of this document was provided to the EPA for consultation and comment on 7 March 2017. Given that the document (and C2S CoA E47) is aimed at addressing work that is 'not subject to an Environment Protection Licence (EPL)', the EPA responded on 21 March 2017 to state that "the EPA does not have comments".

2.2.2. AA/ER Endorsements and Approval

Both the AA and ER reviewed and left comment on Versions 2, 3 and 4 of this document. Versions 2 and 3 were endorsed by both the AA and ER (after comments were sufficiently addressed) in accordance with the C2S CoAs. Copies of the AA and ER endorsements are provided in Appendix A.

2.2.3. Secretary Approval

In accordance with C2S CoA E47, construction did not commence for works that are not subject to an EPL prior to this document's preparation, consultation with EPA and submission to the Secretary. This document was submitted to the Secretary for approval on 30 March 2017 and construction commenced for works that are not subject to an EPL on 5 June 2017 as part of the Demolition A Stage (refer to the Sydney Metro City & Southwest Staging Report).

Version 2 of this document was approved by the Secretary on 14 July 2017. Following this date, all C2S works (irrespective of whether the works are defined as 'construction' in accordance with the C2S planning approval) are subject to this document.

2.2.4. Post-Approval Updates

Modification 6 (Administrative Modification) of the C2S planning approval was approved by the Secretary on 21 February 2019. This modification made changes to C2S CoA A27(g)(iv) that allows the AA to approve administrative and minor updates to this document without an additional approval by the Secretary. The AA's approval(s) of any administrative or minor updates to this document in accordance with CoA A27(g)(iv) is/are provided in Appendix A.

In July 2019 the EPA made significant changes to Schedule 1 of the POEO Act which amongst other alterations changed the definition of 'Railway System Activities'. These changes have a direct impact on the delivery of Sydney Metro through the ability to licence construction activities under the POEO Act and thereby the application of the conditions of approval. The OOHW Strategy/Protocol has been updated in response to the revised Schedule 1 as issued in July 2019 and will be submitted to DPIE for approval.

2.3. S2B Document Requirements

In accordance with S2B CoA A11(d), the Secretary was notified on 21 December 2018 that Sydney Metro will apply the latest version of the Out of Hour Works Strategy/Protocol that was approved by the Secretary for C2S (Version 3) to S2B. The first S2B works commenced on 26 January 2019 as part of early investigation works (i.e. low impact works).

Following 21 December 2018, all S2B works (irrespective of whether the works are defined as 'construction' in accordance with the S2B planning approval) are subject to this document. However in order to meet the requirements of S2B in accordance with S2B CoA A10, Sydney Metro updated this document to Version 4.

2.3.1. Consultation

In accordance with S2B REMM NVC16, the Out of Hour Works Strategy/Protocol must be prepared in consultation with the EPA.

A draft Version 4 of this document and the associated SM-17-00000115 Out of Hours Work Application Form (refer to Section 4.2.2) was provided to the EPA for consultation and comment on 6 February 2019. The EPA responded on 18 February 2019 offering the following paraphrased 'advisory comments only':

- Section 4 of this document would benefit with a reference to S2B CoA E22 and text that outlines the need to provide a clear justification when applying for an OOH approval.
- This document should provide overarching guidance on how the provision of respite will be coordinated for any affected communities.
- SM-17-00000115 Out of Hours Work Application Form should replace the reference to 'standard mitigation measures' with 'all feasible and reasonable work practises in accordance with the Interim Construction Noise Guideline (EPA, 2009)'.

These comments were sufficiently addressed in a subsequent draft Version 4 of this document as confirmed by the EPA in its email dated 22 March 2019.

2.3.2. Notification to the Secretary

Version 5.1 of this document (this version) remains generally consistent with the previous Version 4 of this document and meets the requirements of the S2B planning approval. Therefore in accordance with S2B CoA A10, Revision 4 of this document was submitted to the Secretary for information.

2.4. Governance

This document should be used in conjunction with SM-17-00000087 Construction Environment Management Framework, SM-17-00000089 City & Southwest Construction Noise and Vibration Strategy and any applicable EPLs. These documents establish minimum requirements for managing noise and vibration impacts on the City & Southwest project.

2.4.1. Construction Environment Management Framework

The CSSI planning approvals include SM-17-00000087 Construction Environment Management Framework in their documentation. The CEMF represents Sydney Metro's minimum requirements for environmental management and specifies a standard framework that each contractor must establish and document in their Construction Environmental Management Plan and sub-plans. These requirements, including those relating to construction noise and vibration management, are specified in Chapter 9.

2.4.2. Construction Noise and Vibration Strategy

The SM-17-00000089 City & Southwest Construction Noise and Vibration Strategy (CNVS):

- Establishes a framework for managing construction noise and vibration impacts and adopting appropriate mitigation measures (including minimum requirements);
- Is included in the CSSI planning approval documentation;
- Forms part of the contract requirements that contractors must comply with; and
- Sets minimum requirements for all OOH work, including the need for and development of Construction Noise and Vibration Impact Statements and Construction Noise and Vibration Management Plans.

2.4.2.1. Construction Noise and Vibration Management Plans

A CNVMP sets out how noise and vibration impacts will be mitigated and managed. These may also include a Noise & Vibration Monitoring Program, which typically outline how noise and vibration monitoring will be undertaken, how the results of monitoring will be reported and procedures to identify and implement additional mitigation measures as necessary.

2.4.2.2. Construction Noise and Vibration Impact Statements

A Construction Noise and Vibration Impact Statement (CNVIS) assesses and documents the anticipated noise and vibration impacts at receivers of proposed construction activities. In accordance with the CSSI planning approvals, a CNVIS is to be prepared for each construction site before construction noise and vibration impacts commence and include specific mitigation measures identified through consultation with affected sensitive receivers.

Furthermore, CNVISs subject to the S2B planning approval must also:

- Include the results of the land use survey in accordance with S2B CoA E18;
- Augment the applicable Construction Noise and Vibration Management Plan; and
- Be informed by a suite of potential management/mitigation options provided in the Construction Noise & Vibration Management Plan (CNVMP).

2.4.3. Environment Protection Licence

An Environment Protection Licence (EPL) is a regulatory approval issued to strategically control the localised, cumulative and acute impacts of pollution. The NSW Environment Protection Authority (EPA) is responsible for issuing EPLs for 'scheduled activities' under the Protection of the Environment Operations (POEO) Act 1997 (NSW).

Some aspects of the City & Southwest construction and operation works will constitute 'scheduled activities' under the POEO Act and therefore need to be subject to an EPL. City & Southwest contractors are required to either comply with Sydney Trains' EPL or obtain and comply with any EPLs as applicable to their scope of works.

The process for approving OOH work outside of those already permitted in accordance with an EPL, is governed by the conditions of the EPL. In order for these types of OOH work to be approved, an application to vary the EPL is to be prepared and submitted to the EPA for approval. The application is to be in accordance with the CNVS and EPL requirements.

OOH work that is subject to an EPL does not require an 'OOH approval' prior to the commencement of the proposed OOH works in accordance with the CSSI planning approval conditions.

2.5. 2.5. Roles and Responsibilities

2.5.1. Sydney Metro City & Southwest Director of Sustainability, Environment & Planning

The Sydney Metro City & Southwest Director of Sustainability, Environment & Planning is accountable for this document. Accountability includes authorising the document, monitoring its effectiveness and performing a formal document review.

Roles reporting to the Director are accountable for ensuring the requirements of this document are implemented within their area of responsibility. The roles that are accountable for specific projects/programs are accountable for ensuring associated contractors comply with the requirements of this document.

2.5.2. Sydney Metro Environment Manager

A Sydney Metro Environment Manager will be allocated to each contract package on the City & Southwest project. The Environment Manager is responsible for ensuring that all environmental management requirements associated with their contract package are being complied with.

2.5.3. Place Manager

Either a Sydney Metro or contractor Place Manager will be allocated to each site on the City & Southwest project. The Place Manager is responsible for ensuring that all project communication requirements with the surrounding community are being complied with.

2.5.4. Independent Acoustics Advisor

C2S CoA A25 requires an Acoustics Advisor (AA) to be appointed. The AA is to act as an independent point of contact for all noise and vibration matters under the C2S planning approval. Refer to C2S CoA A25 and A27 for a comprehensive description of the AA's responsibilities under the C2S planning approval.

Section 4.2.2 includes descriptions of the AA's responsibilities with respect to reviewing, identifying risk level, endorsing and deferring OOH work under the C2S planning approval.

The S2B planning approval conditions do not require the appointment of an Acoustics Advisor. The Acoustics Advisor responsibilities under this document will be undertaken by the Environmental Representative for all works that are subject to the S2B planning approval.

2.5.5. Independent Environmental Representative

The CSSI planning approval conditions require an Environmental Representative (ER) to be appointed to the project (under both the C2S and S2B CoAs). The ER is to act as an independent point of contact for all environmental and planning approval compliance matters. Refer to C2S CoA A24 and S2B CoA A26 for a comprehensive list of the ER's responsibilities under the respective CSSI planning approvals.

Section 4.2.2 includes descriptions of the ER's responsibilities with respect to reviewing and approving OOH work.

3. Standard Hours

The City & Southwest CSSI planning approval conditions define standard construction hours as:

- 7:00am to 6:00pm Mondays to Fridays, inclusive;
- 8:00am to 1:00pm Saturdays for works subject to the C2S planning approval;
- 8:00am to 6:00pm Saturdays for works subject to the S2B planning approval; and
- At no time on Sundays or public holidays.

Construction activity on the City & Southwest project must only be undertaken within these standard hours, unless otherwise permitted in accordance with this document or the conditions of an applicable EPL.

If OOH work is to be undertaken in accordance with one or more of the C2S CoAs E44, E46 or E48 at the Crows Nest, Victoria Cross, Barangaroo, Martin Place, Pitt Street or Central station sites, the work must also comply with the specific requirements of C2S CoA E37 and E38. The intent of C2S CoAs E37 and E38 is to support certain types of work at these sites between 7am and 8pm. This should be considered when identifying risk levels for OOH work applications (refer to Section 4.2.2).

4. OOH Work

Out of Hours (OOH) work is defined as any work that is undertaken outside of standard construction hours.

In accordance with C2S CoA E44(f) and S2B CoA E20(d), any type of OOH work is permitted to be undertaken on the City & Southwest project provided that it is subject to this document (excluding activities subject to C2S CoA E46).

A list of work activities that may typically be undertaken OOH is provided in S2B CoA E22. All works that are proposed to be undertaken OOH and are subject to this document must be supported by a clear statement justifying the reason(s) why the work is being proposed to be undertaken OOH. Furthermore, this statement must demonstrate how the works are being scheduled in accordance with the following OOH work period prioritisation list:

1. Standard Hours.
2. Daytime OOH.
3. Evening OOH.
4. Night Time OOH.

Further guidance on the provision of justification is provided in SM-17-00000115 Out of Hours Work Application Form (refer to Section 4.2.2). Program acceleration is generally not a justifiable reason to undertake works OOH.

4.1. OOH Work Endorsement and Approval

In accordance with C2S CoA E47 and with the exception of OOH work that is subject to an EPL, all OOH work subject to the C2S planning approval requires endorsement by the AA and approval by either the ER, or in the case of 'high risk' works undertaken after 9pm, endorsement by the AA and approval by the Secretary. This includes all work subject to C2S CoA E37, E38 and E48. The requirements of these conditions are to be specifically addressed in each OOH application as relevant (refer to Section 4.2.2).

In accordance with S2B CoA E25(d), OOH work that is subject to the S2B planning approval and not subject to an EPL only require approval from the ER, or in the case of 'high risk' works undertaken after 9pm, approval by the Secretary. However to ensure a consistent approach across the entire City & Southwest project, this document requires the ER to apply the same responsibilities as the AA under this document to all OOH work subject to the S2B planning approval unless subject to an EPL.

4.2. OOH Work Approval Process

Figure 1 provides the OOH work approval process for the City & Southwest project. This includes a requirement to prepare an application that covers the assessment of noise and vibration impacts, mitigation measures (including community notification requirements) and review and approval for all proposed OOH work.

All OOH work applications that are not subject to an EPL will be submitted to the Place Manager, Sydney Metro Environment Manager, AA (if subject to the C2S planning approval) and ER for review and comment. These reviews will take into consideration a range of aspects, including reviewer experience and expert understanding, local knowledge of the area, current understanding of sensitive receiver requirements and other relevant documents (for example, the applicable Business Management Plan detailing predicted impacts to affected businesses, key issues and appropriate mitigation measures for implementation). This review process is further explained in Section 4.2.2.

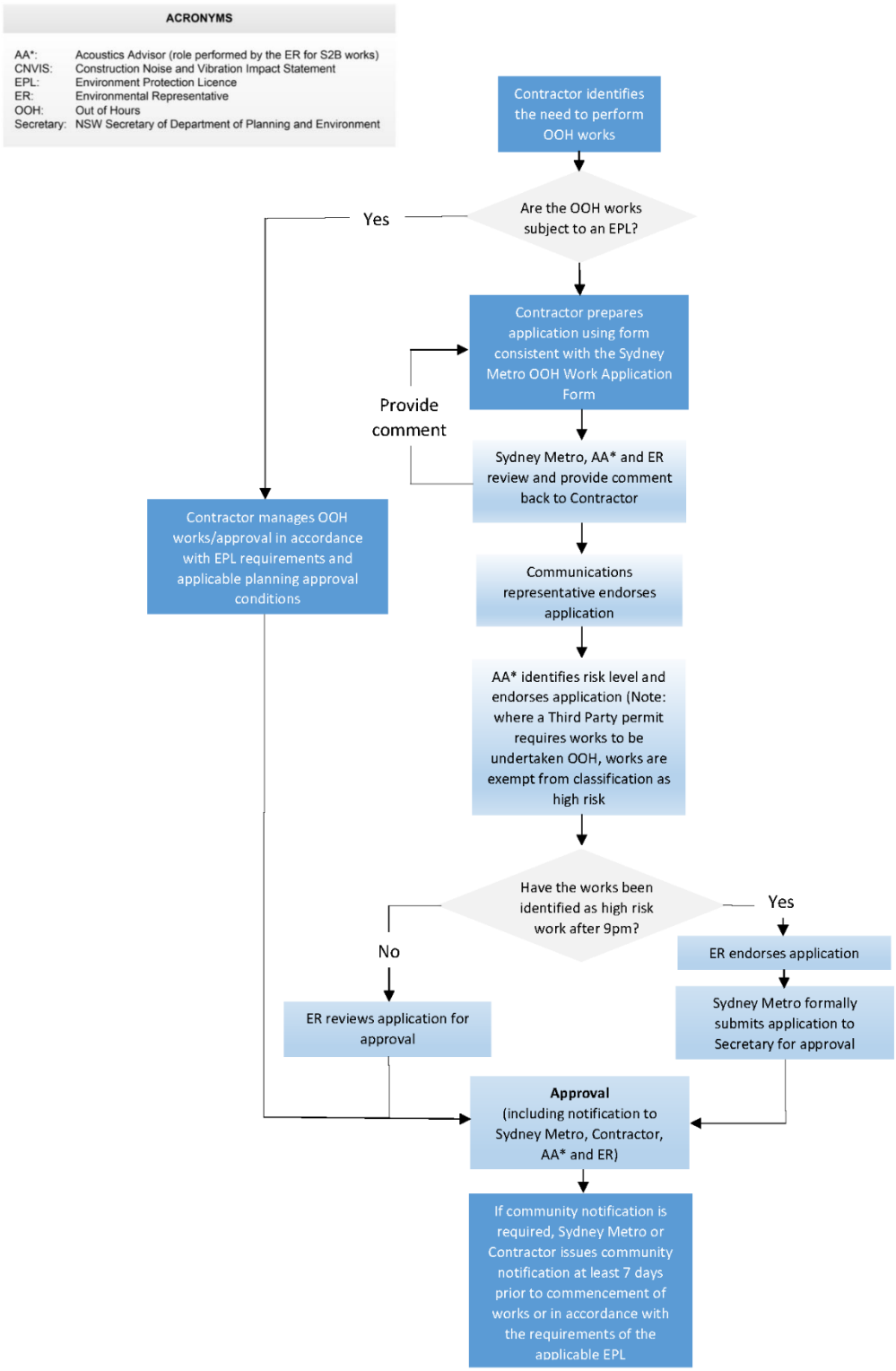

Figure 1: OOH Work Approval Process

4.2.1. OOH Work subject to an EPL

For OOH work that is subject to an EPL, the EPL conditions will dictate the approval process. As a minimum however, for proposed OOH work that is not approved in the EPL and a variation is required, the contractor is expected to:

- Prepare an application to the EPA in accordance with the CNVS and EPL requirements;
- Submit the revised application to the EPA for approval and submit the application to the Place Manager, Sydney Metro Environment Manager, AA (if subject to the C2S planning approval) and ER for information;
- Notify Sydney Metro, the AA (if subject to the C2S planning approval) and ER upon receiving EPA approval; and
- Ensure any required community notifications have been issued (by either Sydney Metro or the contractor directly) within the timeframe(s) specified and in accordance with any relevant conditions of the EPL.

For individual OOH work applications that are subject to an EPL (including Sydney Trains' EPL), endorsement/approval from the AA/ER is not required. However, Sydney Metro may request the AA/ER's endorsement prior to approval and commencement of the proposed OOH works (at Sydney Metro's discretion).

4.2.2. OOH Work not subject to an EPL

For OOH work that is not subject to an EPL, the approval process is dictated by either C2S CoA E47 or S2B CoA E25.

Contractors are required to prepare an OOH application using a form consistent with SM-17-00000115 Out of Hours Work Application Form. This form requires a noise and vibration impact assessment to be undertaken and contains a consolidated and conservative version of Table 14 from the CNVS. This facilitates simpler consideration of applicable additional mitigation measures to implement. The form also requires demonstration of how a range of additional noise and vibration mitigation measures have been considered for implementation, including community notifications and respite offers. The applicant is also required to indicate its risk level for the proposed OOH work within the application.

Where Third Party permits (e.g. Road Occupancy Licences and/or rail possessions) require works to be undertaken OOH, these works will be exempt from classification as 'high risk' (described under section 4.2.2.3) and will be subject to endorsement by the AA and approval by ER as required under C2S CoA E47 or approval by the ER under S2B CoA E25 in accordance with the 'Low Risk' approval pathway. Evidence of Third Party approval applicable to the works, specifying the time that the works must be undertaken must be included as part of application.

4.2.2.1. Respite

Respite offers for impacted receivers will be considered in accordance with the CNVS. Respite may be offered in the form of a reduction or absence of noise emissions for a period of time, or by removing the affected receiver from the noise emission point source (e.g. dinner/movie tickets and/or alternative accommodation offers).

The CNVS requires respite offers to be considered for all OOH works that are predicted to generate impacts higher than the applicable exceedance criteria for the applicable OOH period. Proposed OOH works must be coordinated to avoid the same receiver being affected over consecutive nights as much as is reasonable. OOH works must be staggered as much as is reasonable in order to maximise the respite period between OOH works.

If consideration of respite offers is required, a decision to implement respite offers will be determined on a case-by-case basis and considering, but not limited to, the following factors:

- The predicted maximum exceedance level;
- The predicted exceedance levels and associated duration and timings of those exceedance levels;
- The overall duration of the predicted exceedance levels;
- Surrounding land uses;
- Community feedback provided by Place Managers; and
- Any other OOH works (Sydney Metro or otherwise) that have affected or will affect the same receivers concurrently or within three days of either the start or end of the proposed OOH works.

In the event that respite is determined to be implemented for works that are subject to the S2B planning approval, respite will be implemented to meet the intent of S2B CoA E24 as applicable and so far is reasonable and practicable.

4.2.2.2. Review

Once the contractor has prepared an OOH work application, the application is submitted to the Place Manager, Sydney Metro Environment Manager, AA (if subject to the C2S planning approval) and ER for review. Any of the reviewers may provide comments on the application, which need to be adequately addressed by the contractor in a resubmitted application to the satisfaction of the comment provider(s).

4.2.2.3. Communications Endorsement and Default Risk Level Identification

The first endorsement of an OOH application is from the applicable communications representative (from Sydney Metro). This endorsement represents an agreement from the communications representative that the OOH works have been proposed in accordance with the relevant communications requirements and that the community's interests have been addressed as much as is reasonable (including appropriate consideration and implementation of additional mitigation measures, such as respite). This person may also add any comments and/or conditions that need to be complied with.

Following this person's endorsement, the AA is required to consider the applicant's risk level for the proposed OOH work and determine whether this risk level is appropriate. Once the AA has considered the applicant's risk level, the AA indicates the risk level of the proposed OOH work in its own professional judgement in accordance with C2S CoA E47 (this role will be undertaken by the ER for OOH work subject to the S2B approval). This risk level will be categorised as either 'Low risk' or 'High risk'.

As a default risk level, OOH work will be categorised as 'high risk' if all of the following three criteria apply:

- The type and sensitivity of the affected noise sensitive receivers is categorised as either Moderate Impact receivers (e.g. standard residential/typical density) or High Impact receivers (e.g. elderly/high density/persistent complainers/residents experiencing construction noise fatigue); and
- The predicted noise level of the OOH work has a likelihood for potential sleep disturbance (i.e. Rating Background Level + 15 dB or more); and
- The type of and intensity of noise emitted from the OOH work is categorised as High Impact (e.g. prolonged high noise and/or vibration intensive activities), and

These criteria are based on Section 6.4 General Assessment Procedure of the CNVS.

For non-residential receivers, OOH work may be considered as 'high risk' if undertaken during trading hours and in close proximity to their place of business (for example, during Saturday evening trading hours). Since each non-residential receiver has different business needs, it is imperative that the Place Manager and the AA (or the ER if subject to the S2B planning approval) discuss each OOH work application to better understand how the proposed OOH work would impact the business.

4.2.2.4. Modification of Default Risk Level

Using the default risk level as a 'starting point', the AA (or the ER if subject to the S2B planning approval) will consider all other relevant factors in order to identify a final risk level. These relevant factors include:

- Those identified in Section 6.4 of the CNVS (noting that the reference to 'impact levels' is different from the 'risk level' with respect to C2S CoA E47(c));
- Those listed in Table 2 of this document;
- Third Party permits; and
- Any other factors the AA (or ER if subject to the S2B planning approval) considers relevant in their professional opinion.

These factors may cause the default risk level to be modified from either 'high risk' to 'low risk' (or vice-versa), as the AA/ER deems appropriate in their professional opinion.

Once the AA/ER has identified a final risk level for the OOH work application, the AA/ER indicates the risk level on the application (including any risk identification commentary), as well as whether the application includes works after 9pm, and signs and dates the application.

4.2.2.5. Other Endorsements and Approval

Following the identification of risk level by the AA/ER, the AA/ER endorses the OOH work application and provides any conditions or comments. This endorsement represents an agreement from the AA/ER that the OOH works have been proposed in accordance with the relevant requirements (as applicable to their respective roles) and that additional mitigation measures (including respite) have been appropriately considered and proposed for implementation.

If the AA/ER identifies that the OOH work application is high risk and includes works after 9pm, the application is forwarded to the ER for endorsement only. This endorsement represents an agreement from the ER that the OOH works have been proposed in accordance with the relevant requirements and that additional mitigation measures (including respite) have been appropriately considered and proposed for implementation. Following the ER's endorsement, the application is then formally submitted by Sydney Metro to the Secretary for approval in accordance with C2S CoA E47 or S2B CoA E25.

For all other applications, the ER indicates their approval (or otherwise) on the application, including any conditions or comments, and forwards directly to Sydney Metro, the contractor and AA (if subject to the C2S planning approval).

4.2.2.6. Approval Notification Arrangements

Community notifications for approved OOH applications will be made available to the Secretary, the EPA and the community through the Sydney Metro website within five (5) days and not more than fourteen (14) days of the works commencing. The community will also be issued with hard-copy community notifications.

Table 2: Risk Level Considerations

	Risk Level Considerations
Predicted Noise Exceedance	Degree of predicted noise level exceedance above the Rating Background Level or Noise Management Level as appropriate
Specific Scope of Work	Works that are not subject to C2S CoA E37 and E38
5 dBA Penalty	If 5 dBA penalty is required in accordance with C2S CoA E37, E38, E41 and E42
Certainty	Rating background levels, noise management levels or predicted noise impacts are not well understood
Past Experience	Nature of works are new, in a new location or have not been undertaken by the contractor on the project already
Negotiated Agreement with Sensitive Receivers	No negotiated agreement with sensitive receivers has been obtained in accordance with C2S CoA E44(e)
Potential Sleep Disturbance	Likely to generate potential sleep disturbance (Rating Background Level + 15dB or greater)
Non-Residential Receivers	Impacted non-residential receivers operating during the same period of proposed OOH work
Special Events	The timing and location of special events in the area of the proposed OOH work may be scheduled at the same time or immediately before or after the special event (e.g. festivals, public gatherings, etc.)

Place Manager Feedback	Feedback from the Place Manager for the area will provide the AA and ER an understanding of the types and requirements of surrounding sensitive receivers.
Sensitive Receivers	Moderate impact sensitive receivers (e.g. standard residential, medium density receivers) or high impact sensitive receivers (e.g. residential home for the elderly, high density unit blocks, persistent complainers, residents deemed to have 'construction noise fatigue')
High Impact Works	Prolonged high noise or vibration intensive activities
Other Impacts	Impacts other than noise and vibration impacts are likely to be generated (e.g. lighting, traffic, etc.)

4.3. Community Notifications

Community notifications can be used as a mitigation measure for receivers of noise and vibration impacts from OOH work.

Community notifications usually comprise of letterbox-dropped or hand-distributed notification letters to identified stakeholders prior to the commencement of works. Communities are more likely to understand and accept the impacts from noise and vibration if they are provided with honest detailed information and commitments on mitigation measures to be implemented that are adhered to by the project prior to the works commencing.

Community notification requirements are included in the CNVS and outlined in the Community Communications Strategy for the City & Southwest project.

Community notification is an example of an additional mitigation measure that may be considered for implementation in accordance with the CNVS and the additional mitigation measure tables contained in SM-17-00000115 Out of Hours Work Application Form.

4.3.1. Negotiated Agreements with Sensitive Receivers

A negotiated agreement for particular OOH work may be formed with the potentially affected sensitive receivers in accordance with the C2S and/or S2B CoA. These negotiated agreements would be undertaken and documented by either the contractor or Sydney Metro as part of an OOH application.

The negotiated agreement needs to reach a minimum 65% acceptance rate of those sensitive receivers that are contactable. 'Contactable' is defined as having received correspondence (either verbal or written) from receivers within a two week timeframe. The preparation of a CNVIS and the Place Manager will advise of potentially affected sensitive receivers to be contacted.

Upon ER approval of any OOH applications containing negotiated agreements, Sydney Metro will forward the negotiated agreement documentation to the Secretary for information at least one week prior to the OOH work commencing. In the event that community notification is required as a mitigation measure prior to the OOH work commencing, this would be undertaken at the same time (i.e. at least five days and not more than fourteen days prior to the works commencing).

4.4. Emergency Works

Occasionally there may be a need to undertake emergency works outside of standard work hours. In this situation, the works are permitted to proceed without prior approval, provided that the works were:

- Unforeseen, and
- Required to avoid injury or the loss of life, damage or loss of property or to prevent environmental harm.

Work 'over-runs' (i.e. work activities that have taken longer to complete than expected) are not emergency works, unless the continuation of the activity is required to 'avoid injury or the loss of life, damage or loss of property or to prevent environmental harm'.

Figure 2 outlines the emergency work process.

On becoming aware of the need to undertake emergency works, contractors must notify Sydney Metro, the AA (if subject to the C2S planning approval), the ER and the EPA (if it is required under an EPL if relevant) of the need to undertake the works. This notification should be in the form of a written email or text message to Sydney Metro, the AA (if subject to the C2S planning approval) and the ER. The requirements for notifying the EPA will be dictated in the conditions of the EPL if relevant.

As a form of mitigation, community notification is to be undertaken within two hours of the commencement of emergency works. These notifications will generally be prepared by the contractor using a small hand-written Sydney Metro template card for distribution to the immediate surrounding community. These cards will include the following details as a minimum:

- Scope;
- Location;
- Hours;
- Duration;
- Types of equipment to be used; and
- Likely impacts.

Within 24 hours of any emergency works commencing, the applicant is to provide a written emergency works report to Sydney Metro. The emergency works report is to include as a minimum:

- Date, time, duration and cause of the emergency;
- Description of emergency works undertaken;
- Mitigation measures implemented to address the impacts of the emergency works; and
- Actions/Measures taken or to be taken to prevent or mitigate recurrence of the emergency. If there are no appropriate actions/measures to be taken, explanation is to be provided as to why.

The emergency works report will be used by Sydney Metro to determine whether the works qualified as emergency works under the applicable planning approval. If Sydney Metro determines that the works did not qualify as emergency works, the works may be considered an incident and/or non-compliant dependent on the applicable planning approval conditions.

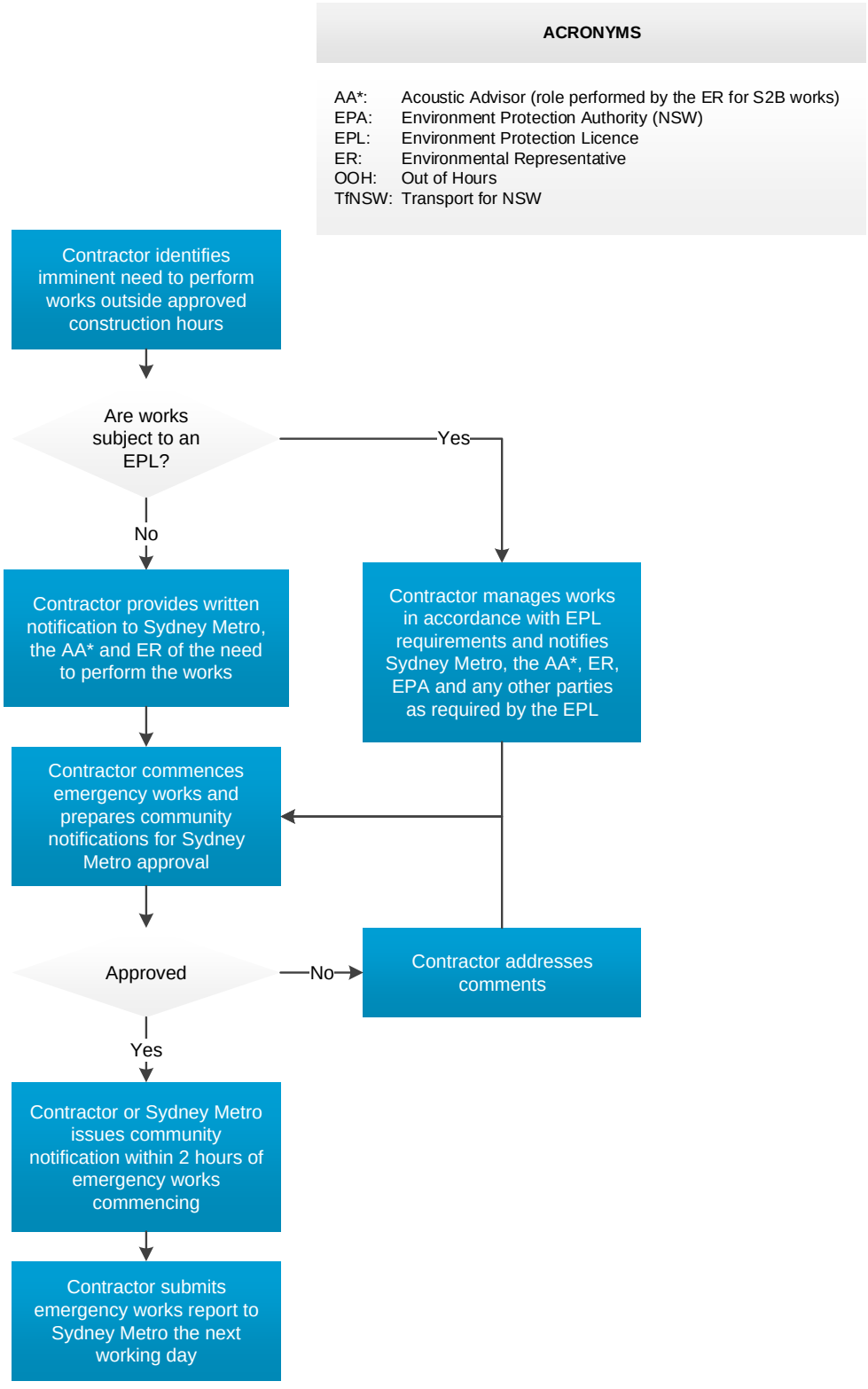

Figure 2: Emergency Works Process

5. Related documents and references

Related documents and references
• SM-17-00000022 Environment & Sustainability Management Manual • SM-17-00000087 Construction Environment Management Framework • SM-17-00000089 City & Southwest Construction Noise and Vibration Strategy • SM-17-00000115 Out of Hours Work Application Form • SM-18-00002281 Overarching Community Communications Strategy • EPA Interim Construction Noise Guideline • SM-17-00000203 Sydney Metro glossary

6. Superseded documents

Superseded documents
There are no documents superseded as a result of this document.

7. Document history

Version	Date of approval	Notes
1.0	28 March 2015	New document
2.0	14 July 2017	Edits to address the Secretary's comments
3.0	14 August 2018	Minor modification to emergency works criterion
4.3	25 March 2019	Updated to address requirements of the S2B planning approval
5.0	14 April 2020	Minor modification in response to POEO Act Schedule 1 changes
5.1	5 May 2020	Minor modification to Section 4.3.1 in response to Secretary's comments
5.2	9 October 2020	Minor modification to Table 1 in response to modification 7 of C2S CoAs

Appendix A: OOH Work Strategy/Protocol Endorsements and Approval(s)

APPROVAL

CITY & SOUTHWEST ACOUSTIC ADVISOR

Review of	**Out of Hours Work Protocol / Strategy**	**Document reference:**	Sydney Metro City & Southwest Out of Hours Work Protocol / Strategy Document number SM-17-00005396 (formerly SM ES-PW-317) Version 5.2, 9 October 2020
Prepared by:	Larry Clark Alternate Acoustics Advisor		
Date of issue:	28 October 2020		

As approved Alternate Acoustics Advisor for the Sydney Metro City & Southwest project, I have reviewed version 5.2 of the Out of Hours Work Protocol / Strategy and Application Form, as required under A27 (g) (iv) of the Sydney Metro Chatswood to Sydenham project approval conditions.

The Protocol / Strategy has been revised to incorporate Mod 7 of the Chatswood to Sydenham SSI Approval 15_7400 for the Sydney Metro City and Southwest Project.

The associated Application Form has also been revised, to clarify which AMMs require consideration for implementation.

I consider that version 5.2 of the Protocol / Strategy is appropriate for submission to the Secretary for information.

Larry Clark, City & Southwest Alternate Acoustics Advisor

APPENDIX D – CNVIS Results

CNVIS Scenarios

	Description	Location	Work Period	Main Equipment Used	Typical L_W $L_{Aeq,15min}$	Typical L_W L_{Amax}
SC_01	Demolition of 11 Sydenham Road	11 Sydenham Road	Standard	24t excavator x2	106	116
				Jack hammer x2	**114 +5**	
				Crane truck	105	
				Hand tools	107	
				Truck and Dog	107	
				Watercart	109	
SC_02	Platform demolition	Station platforms	Standard and OOH	6.5t Excavator	103	116
				Concrete saw	**113 +5**	
				Jackhammer	**114 +5**	
				Hydrema	107	
SC_03	Platform civil works	Station platforms	Standard and OOH	CFA piling rig	108	111
				Concrete truck	107	
				Concrete pump	102	
				5t excavator	103	
				60t crane	99	
SC_04	Platform construction works	Station platforms	Standard and OOH	450t crane	106	110
				Cherry picker	100	
				Hand tools	107	

SC_05	Bridge works	Gleeson Ave Bridge ARTC Bridge Bedwin Road Bridge	Standard and OOH	EWP	100	110
				Hand tools	107	
				Multicrane	105	
				Telehandler	105	
SC_06	Track recon works	Rail corridor southwest of station	Standard and OOH	13t excavator	106	115
				Front end loader	112	
				Hydrema	107	
				Telehandler	105	
				Tamper	**115 +5**	
				Regulator	**110 +5**	
				Vibratory roller	**105 +5**	
SC_07	Track grinding	Rail corridor southwest of station	Standard and OOH	Rail grinder	**117 +5**	117
SC_08	Track civil works	Rail corridor northeast of station	Standard and OOH	13t excavator x2	106	112
				Concrete truck	107	
				Concrete pump	102	
				Crane truck x2	105	
				Hydrema	107	
				Vac truck	107	
				Trench roller	105	

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

Predicted Worse Case noise levels for Scenario 1 Residential Receivers

Receiver	NML	Predicted Worst-Case $L_{Aeq,15min}$
NCA 01	**57**	36
NCA 02	**51**	42
NCA 03	**61**	65
NCA 04	**68**	48
NCA 05	**68**	44
NCA 06	**62**	50

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

Predicted Worse Case noise levels for Scenario 2 Residential Receivers (OOH)

Receiver	NML	Predicted Worst-Case $L_{Aeq,15min}$	Predicted L_{Amax}
NCA 01	**45**	35	56
NCA 02	**45**	42	59
NCA 03	**47**	74	82
NCA 04	**48**	43	63
NCA 05	**43**	40	58
NCA 06	**43**	45	66

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 (OOH)

Receiver	NML	Predicted Worst-Case $L_{Aeq,15min}$	Predicted L_{Amax}
NCA 01	**45**	33	38
NCA 02	**45**	38	42
NCA 03	**47**	68	68
NCA 04	**48**	41	47
NCA 05	**43**	35	41
NCA 06	**43**	43	50

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 4 Residential Receivers (OOH)

Receiver	NML	Predicted Worst-Case $L_{Aeq,15min}$	Predicted L_{Amax}
NCA 01	**45**	28	29
NCA 02	**45**	34	32
NCA 03	**47**	71	73
NCA 04	**48**	32	33
NCA 05	**43**	32	33
NCA 06	**43**	34	35

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 (OOH)

Receiver	NML	Predicted Worst-Case $L_{Aeq,15min}$	Predicted L_{Amax}
NCA 01	**45**	42	39
NCA 02	**45**	55	54
NCA 03	**47**	74	75
NCA 04	**48**	54	47
NCA 05	**43**	73	74
NCA 06	**43**	51	35

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 (OOH)

Receiver	NML	Predicted Worst-Case $L_{Aeq,15min}$	Predicted L_{Amax}
NCA 01	**45**	54	47
NCA 02	**45**	85	80
NCA 03	**47**	55	55
NCA 04	**48**	40	34
NCA 05	**43**	33	25
NCA 06	**43**	52	47

Noise levels shaded light blue indicate exceedances above the applicable NML. Noise levels shaded orange are above the Highly Noise Affected Management Level. Noise levels shaded green exceed the sleep disturbance screening criteria.

Predicted Worse Case noise levels for Scenario 7 Residential Receivers (OOH)

Receiver	NML	Predicted Worst-Case $L_{Aeq,15min}$	Predicted L_{Amax}
NCA 01	**45**	50	43
NCA 02	**45**	85	80
NCA 03	**47**	52	54
NCA 04	**48**	35	29
NCA 05	**43**	31	22
NCA 06	**43**	47	42

Noise levels shaded light blue indicate exceedances above the applicable NML. Noise levels shaded orange are above the Highly Noise Affected Management Level. Noise levels shaded green exceed the sleep disturbance screening criteria.

Predicted Worse Case noise levels for Scenario 8 Residential Receivers (OOH)

Receiver	NML	Predicted Worst-Case $L_{Aeq,15min}$	Predicted L_{Amax}
NCA 01	**45**	31	24
NCA 02	**45**	32	27
NCA 03	**47**	38	36
NCA 04	**48**	52	52
NCA 05	**43**	63	60
NCA 06	**43**	38	33

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 commercial receivers

	Predicted Worst-Case $L_{Aeq,15min}$			
	NCA 01	**NCA 03**	**NCA 04**	**NCA 06**
NML		**70**		
Scenario 01	40	71	66	71
Scenario 02	40	73	61	78
Scenario 03	37	70	54	63
Scenario 04	30	67	51	62
Scenario 05	50	67	68	65
Scenario 06	54	51	42	58
Scenario 07	50	48	39	57
Scenario 08	26	44	71	46

Note: There are no commercial receivers for NCA 05 considered in the assessment.
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 03**	**NCA 04**
NML		**75**	
Scenario 01	34	51	56
Scenario 02	32	51	51
Scenario 03	29	58	41
Scenario 04	23	45	35
Scenario 05	40	40	40
Scenario 06	59	41	37
Scenario 07	54	36	35
Scenario 08	25	33	66

Note: There are no industrial receivers for NCA 02, NCA 05 or NCA 06 considered in the assessment.

Predicted Worse Case noise levels for other sensitive receivers

ID	Receiver Type	NML	Scenario							
			1	2	3	4	5	6	7	8
NCA 02_OSR_1	Child Care Centre	**55**	33	40	31	28	53	53	51	25
NCA 02_OSR_2	Educational Institution	**55**	25	30	21	19	28	48	41	23
NCA 03_OSR_1	Passive Recreation	**65**	61	68	60	63	44	41	36	33
NCA 03_OSR_2	Passive Recreation	**65**	39	44	28	25	49	45	39	25
NCA 04_OSR_1	Passive Recreation	**65**	21	24	15	10	39	21	14	44
NCA 05_OSR_1	Child Care Centre	**55**	31	31	26	25	47	28	24	51
NCA 05_OSR_2	Educational Institution	**55**	34	32	29	26	30	27	24	44
NCA 05_OSR_3	Place of Worship	**55**	32	31	26	26	47	28	24	50
NCA 06_OSR_1	Medical Facility	**55**	29	36	27	23	28	39	32	27

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
SC_01	**Standard**						
SCA 02	**Standard**						
	OOHW 1						
	OOHW 2						
SCA 03	**Standard**						
	OOHW 1						
	OOHW 2						
SCA 04	**Standard**						
	OOHW 1						
	OOHW 2						
SCA 05	**Standard**						
	OOHW 1					LB	
	OOHW 2		LB, M			AA, M, IB, LB, PC, SN	
SCA 06	**Standard**		LB, M				
	OOHW 1		M, IB, LB, RO, PC, SN				
	OOHW 2		AA, M, IB, LB, PC, SN				
SCA 07	**Standard**		LB, M				
	OOHW 1		M, IB, LB, RO, PC, SN				
	OOHW 2		AA, M, IB, LB, PC, SN				
SCA 08	**Standard**						
	OOHW 1						
	OOHW 2					LB, M	

Note: AMM for NCA 03 and NCA 04 has considered the mitigation provided by the heavy double glazing found at these properties.

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
Jack Hammer	0.2	0.1	<0.1	-	-	1m (nominal)	Avoid contact with structure
Large Vibratory Roller (20t)	7	4.5	3	2.3	2	25m	100m
Heavy Hydraulic Hammer (1500kg hammer on 30t exc)	4.5	2.5	0.5	0.2	0.12	22m	73m
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 E – Consultation Register

Agency	Comment	JHLOR Response
Environment Protection Authority	No response was received from the EPA on this Plan, including the Noise and Vibration Monitoring Program.	N/A
Inner West Council	No comment was made by Inner West Council on this plan, including the Noise and Vibration Monitoring Program.	N/A