Detailed Noise and Vibration Impact Statement (Parramatta)

Project Name:	Sydney Metro West		
Client Name:	Sydney Metro		
Project Address:	Delta will demolish buildings across the following sites: 1. Parramatta 2. Clyde 3. Westmead		
Project Description/Scope:	Delta Pty Ltd (Delta) is responsible for the full structural demolition of existing structures including removal of all hazardous materials of the Sydney Metro West Demolition Project.		
Prepared By: (Consulting Engineer)	Name: [redacted]	Signature: [redacted]	Date:25/10/2021
Reviewed By: (Project Manager)	Name: [redacted]	Signature: [redacted]	Date:25/10/2021
Authorised By (Project Director):	Name: [redacted]	Signature: [redacted]	Date:25/10/2021

TABLE OF CONTENTS

1 AUTHORISATION AND CONTROL

1.1 Authorisation

This Plan is endorsed by the AA and ER, and approved by the Secretary. All project personnel are to ensure that their work activities and those of Project Consultants, Contractors and Suppliers are carried out in accordance with the requirements of this Plan.

1.2 Distribution

This Plan is a Controlled Document and must be distributed and revised under the guidance of the Project Manager. People who hold Controlled copies are responsible for maintaining their copies up-to-date.

1.3 Revision

The Project Director will monitor the implementation of this Plan and review the need for change or improvements having due regard to:

- Change in work scope, client comments etc.
- Internal and external audits
- Suggestions and comments from project personnel
- Incidence and frequency of non-conformance
- Necessity for corrective or preventative action
- Legal Update and Requirements
- Review by Delta Groups Management team
- Annual Review

Minor amendments of this plan are endorsed by the ER, or otherwise by the Planning Secretary where amendments are not deemed minor. Changes to the recent revision will be highlighted.

The following table provides a record of amendments made to this document.

Rev	***Date***	***Description***	***Page***	***Developed By***	***Approved By***
0	25/08/21	Draft – Issued for comment	All	[redacted]	
1	24/09/21	Updated to address stakeholder review comments	All	[redacted]	
2	16/10/2021	Updated to address stakeholder review comments	All	[redacted]	
3	25/10/2021	Updated to address stakeholder review comments	All	[redacted]	

Distribution Register			
Rev No.	***Date of Issue***	***Name of Recipient***	***Position / Organisation***
0	***25/08/21***	[redacted]	***Principal Representative / Sydney Metro***
1	***27/09/2021***	[redacted]	***Principal Representative / Sydney Metro***
2	***16/10/2021***	[redacted]	***Principal Representative / Sydney Metro***
3	***25/10/2021***	[redacted]	***Principal Representative / Sydney Metro***

2 INTRODUCTION

2.1 Purpose

This Detailed Noise and Vibration Impact Statement (DNVIS) has been prepared by Delta Pty Ltd (Delta) to comply with the requirements of Section 13 of the Sydney Metro Construction Environmental Management Framework (CEMF) and the Sydney Metro West - Concept and Stage 1 Conditions of Approval (SSI 10038). This DNVIS exists as a sub-plan to the Noise and Vibration Management Plan for the project.

The principal issues addressed within this DNVIS include:

- Identification of noise sensitive receivers near to the site;
- Prediction of the level of noise and vibration impact on these sensitive receivers from demolition activities including assessment of predicted compliance with project Noise and Vibration Management Levels;
- Details of the plant and equipment to be used on the site including details of noise mitigation measures to be employed to reduce noise impacts on adjacent noise sensitive receivers.

2.2 Project Description

The Sydney Metro West project is a new 24-kilometre metro line with stations confirmed at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock, The Bays, Pyrmont and Hunter Street in the Sydney CBD. Refer to Figure 1 for an overview of the alignment.

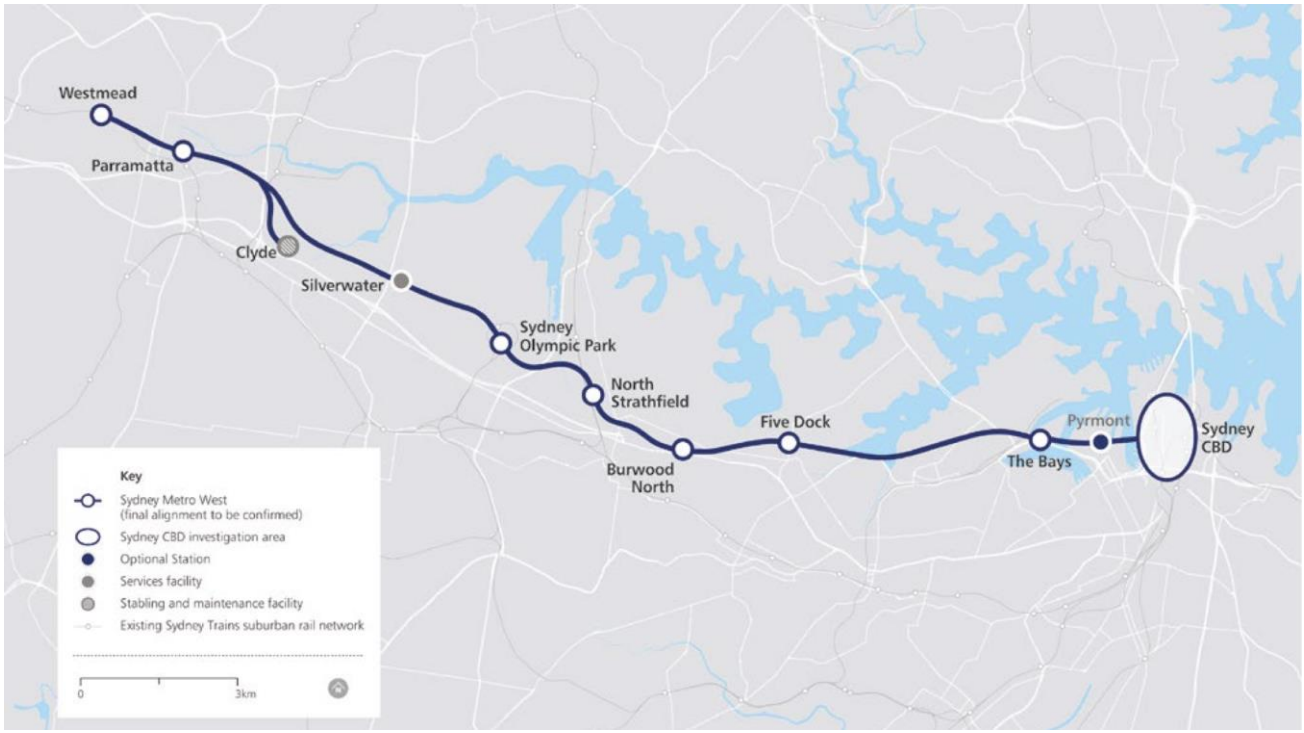

Figure 1: Sydney Metro West Alignment

Source: Sydney Metro West Amendment Report

Delta will be delivering the Parramatta Enabling Works package. The scope of work includes site establishment works, service disconnections and relocations, hazardous materials (HAZMAT) removal, internal strip-out of structures, demolition of existing structures and site clearing.

Sydney Metro will advise Delta of the items to be salvaged and the location where the items are to be delivered. Delta will then carry out this work prior to commencement of heavy structural demolition. Storage of items will be offsite at location as advised by Sydney Metro. This will remove any risk of damage as a result of site works.

2.3 Site Overview

The Parramatta site is located in Parramatta CBD on the block bounded by George, Macquarie, Church and Smith Streets. Works on the site involve demolition of a number of low- and mid-rise commercial buildings. The site will be used for the Parramatta Metro Station. Structures to be demolished and those that are to be retained are highlighted in Figure 2.

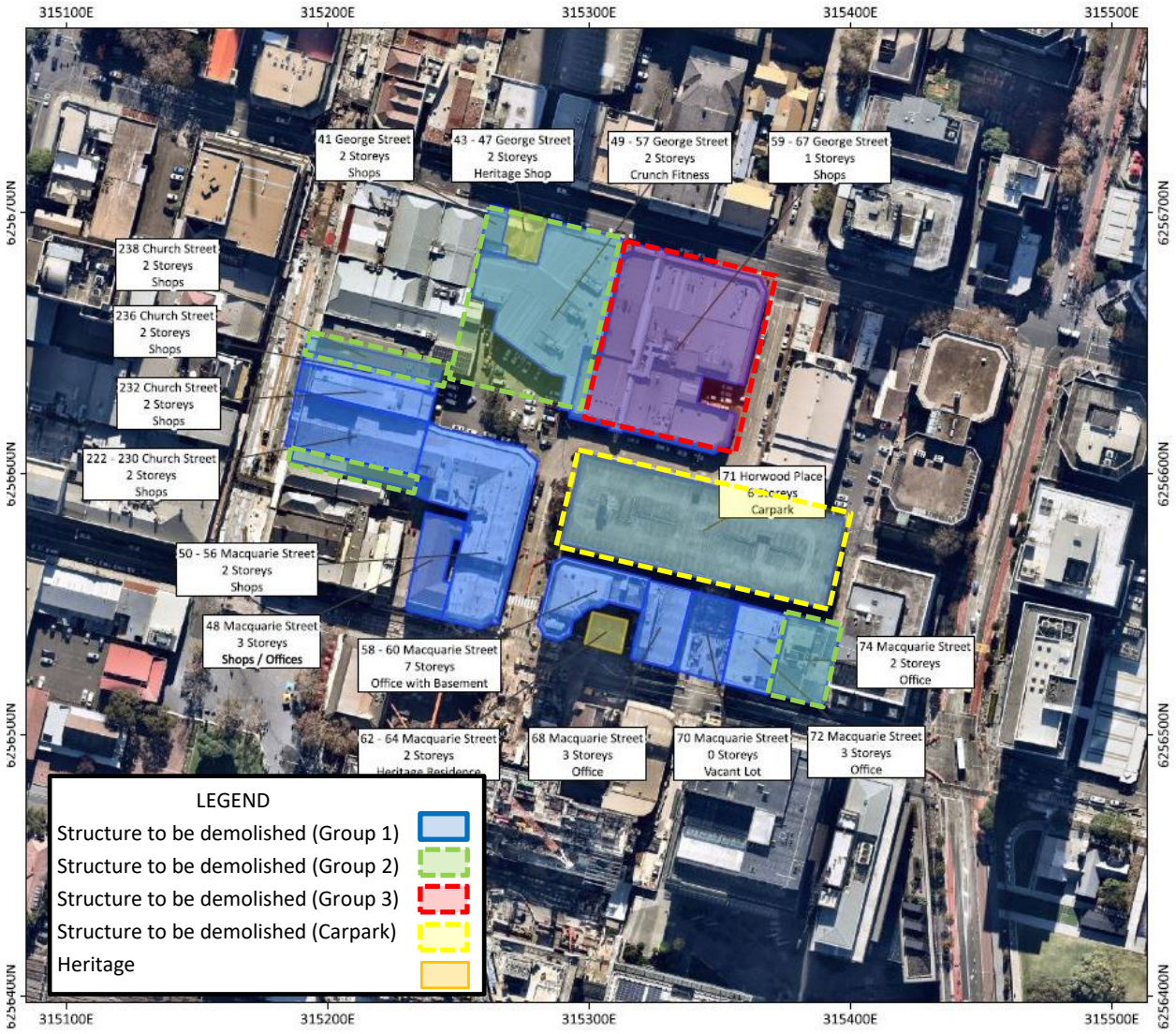

Figure 2: Parramatta Site Map

Site layout, boundaries and vehicle access are illustrated in Figure 3 below.

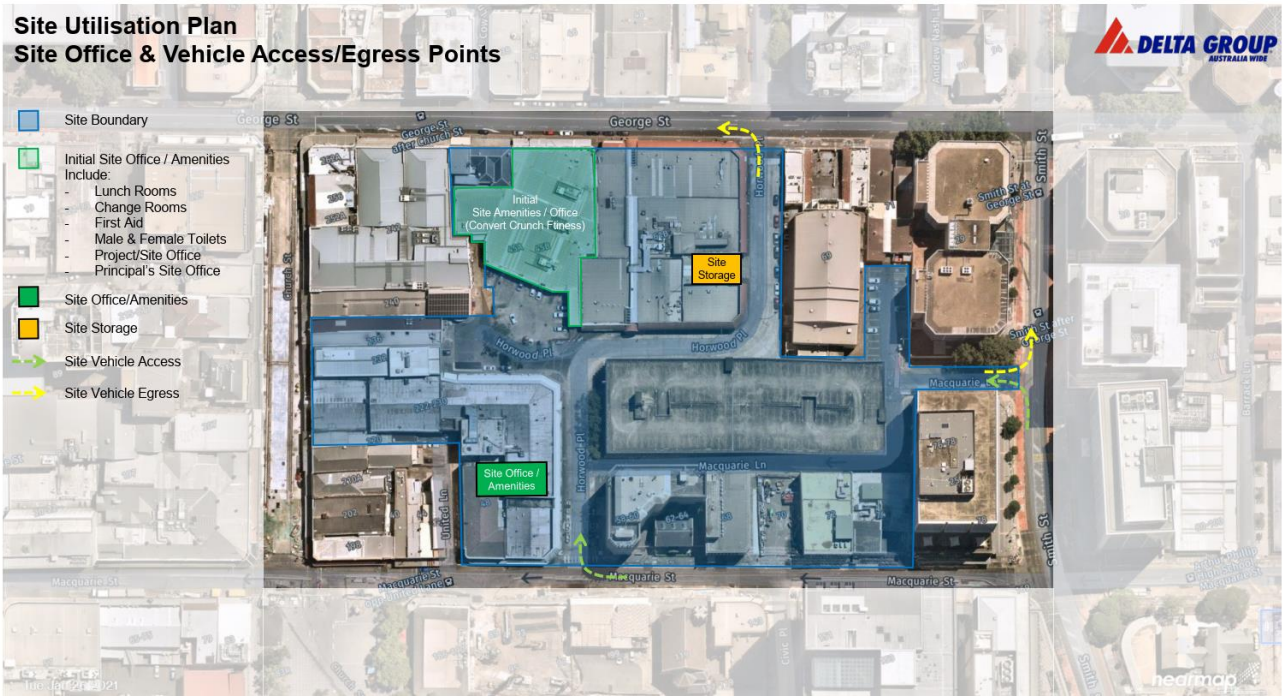

Figure 3: Parramatta Site Layout and Access

Note that Crunch Fitness will be initially retained and converted into site offices whilst maintaining use of the gym's existing amenities. Site offices and amenities will move into temporary external facilities to allow for demolition of Crunch Fitness in later stages of work.

3 REQUIREMENTS

3.1 Sydney Metro Requirements

Requirements for noise and vibration management are provided within Sydney Metro Requirements of Authority Approval (Schedule 20). The relevant noise and vibration requirements addressed by this DNVIS are addressed in Table 1 below.

Table 1: CoA

CoA	Relevant requirement	Where addressed
C-A1	Approval is granted to the 'Concept' as described in Schedule 1 and in Chapter 6 and in Chapter 7 of the Sydney Metro West – Westmead to The Bays and Sydney CBD Environmental Impact Statement dated 15 April 2020, as amended by the following: (a) Sydney Metro West – Westmead to The Bays and Sydney CBD Amendment Report dated 20 November 2020; and (b) Sydney Metro West – Westmead to The Bays and Sydney CBD Submissions Report dated 20 November 2020.	
A1	The Proponent must carry out Stage 1 of the CSSI in accordance with the conditions of this approval and generally in accordance with the: (a) Sydney Metro West – Westmead to The Bays and Sydney CBD Environmental Impact Statement dated 15 April 2020; (b) Sydney Metro West – Westmead to The Bays and Sydney CBD Submissions Report dated 20 November 2020; and (c) Sydney Metro West – Westmead to The Bays and Sydney CBD Amendment Report dated 20 November 2020.	
C16	The Noise and Vibration Construction Monitoring Program and Blasting Construction Monitoring Program must include: (a) noise and vibration monitoring determined in consultation with the AA to confirm the best-achievable construction noise and vibration levels with consideration of all reasonable and feasible mitigation and management measures that will be implemented; (b) for the purposes of (a), noise monitoring must be undertaken during the day, evening and night-time periods and within the first month of work as well as throughout the construction period and cover the range of activities being undertaken at the sites; and (c) a process to undertake real time noise and vibration monitoring. The results of the monitoring must be readily available to the construction team, the Proponent, ER and AA. The Planning Secretary and EPA must be provided with access to the results on request.	
C17	Groundwater Construction Monitoring Program must include: (a) groundwater monitoring networks at each construction excavation site; (b) detail of the location of all monitoring bores with nested sites to monitor both shallow and deep groundwater levels and quality; (c) define the location of saltwater interception monitoring where sentinel groundwater monitoring bores will be installed between the saline sources of the estuary or river and that of the stations or shafts; (d) results from existing monitoring bores; (e) monitoring and gauging of groundwater inflow to the excavations, appropriate trigger action response plan for all predicted groundwater impacts upon each noted neighbouring groundwater system component for each excavation construction site; (f) trigger levels for groundwater quality, salinity and groundwater drawdown in monitoring bores and / or other groundwater users; (g) daily measurement of the amount of water discharged from the water treatment plants; (h) water quality testing of the water discharged from treatment plants; (i) management and mitigation measures and criteria; (j) groundwater inflow to the excavations to enable a full accounting of the groundwater take from the Sydney Basin Central Groundwater Source; and (k) reporting of groundwater gauging at excavations, groundwater monitoring, groundwater trigger events and action responses; and (l) methods for providing the data collected to Sydney Water where discharges are directed to their assets.	
C18	With the exception of any Construction Monitoring Programs expressly nominated by the Planning Secretary to be endorsed by the ER, all Construction Monitoring Programs must be submitted to the Planning Secretary for approval.	

CoA	Relevant requirement	Where addressed
C19	The Construction Monitoring Programs not requiring the Planning Secretary's approval must obtain the endorsement of the ER as being in accordance with the conditions of approval and all undertakings made in the documents listed in Condition A1 of this schedule. Any of these Construction Monitoring Programs must be submitted to the ER for endorsement at least one (1) month before the commencement of construction or where construction is phased no later than one (1) month before the commencement of that phase.	
C20	Any of the Construction Monitoring Programs which require Planning Secretary approval must be endorsed by the ER and then submitted to the Planning Secretary for approval at least one (1) month before the commencement of construction or where construction is phased no later than one (1) month before the commencement of that phase.	
C21	Unless otherwise agreed with the Planning Secretary, construction must not commence until the Planning Secretary has approved, or the ER has endorsed (whichever is applicable), all of the required Construction Monitoring Programs and all relevant baseline data for the specific construction activity has been collected.	
C22	The Construction Monitoring Programs, as approved by the Planning Secretary or the ER has endorsed (whichever is applicable), including any minor amendments approved by the ER, must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary or the ER (whichever is applicable), whichever is the greater.	
C23	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, ER and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program. Note: Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.	
D34	A detailed land use survey must be undertaken to confirm sensitive receivers (including critical working areas such as operating theatres and precision laboratories) potentially exposed to construction noise and vibration and construction ground-borne noise. The survey may be undertaken on a progressive basis but must be undertaken in any one area before the commencement of work which generates construction noise, vibration or ground-borne noise in that area. The results of the survey must be included in the Noise and Vibration CEMP Sub-plan required under Condition C5 of this schedule.	Section 5.1
D39	All reasonable and feasible mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration criteria: (a) construction 'Noise affected' noise management levels established using the Interim Construction Noise Guideline (DECC, 2009); (b) vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure); (c) Australian Standard AS 2187.2 - 2006 "Explosives – Storage and Use - Use of Explosives" (for human exposure); (d) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and (e) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration- effects of vibration on structures (for structural damage for structurally unsound heritage items). Any work identified as exceeding the noise management levels and/or vibration criteria must be managed in accordance with the Noise and Vibration CEMP Sub-plan. Note: The ICNG identifies 'particularly annoying' activities that require the addition of 5 dB(A) to the predicted level before comparing to the construction Noise Management Level.	Section 4 Section 6.2.1
D40	All reasonable and feasible mitigation measures must be applied when the following residential ground-borne noise levels are exceeded: (a) evening (6:00 pm to 10:00 pm) — internal LAeq(15 minute): 40 dB(A); and (b) night (10:00 pm to 7:00 am) — internal LAeq(15 minute): 35 dB(A). The mitigation measures must be outlined in the Noise and Vibration CEMP Sub-plan, including in any Out-of-Hours Work Protocol, required by Condition D38 of this schedule.	Section 4.2 Section 6.2.1
D41	Noise generating work in the vicinity of potentially-affected community, religious, educational institutions and noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) resulting in noise levels above the NMLs must not be timetabled within sensitive periods, unless	Section 6.2.1

CoA	Relevant requirement	Where addressed
	other reasonable arrangements with the affected institutions are made at no cost to the affected institution.	
D42	Industry best practice construction methods must be implemented where reasonably practicable to ensure that noise levels are minimised around sensitive land user(s). Practices must include, but are not limited to: (a) use of regularly serviced low sound power equipment; (b) temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting; and (c) use of alternative construction and demolition techniques.	Section 6.2.1
D43	Detailed Noise and Vibration Impact Statements (DNVIS) must be prepared for any work that may exceed the NMLs, vibration criteria and / or ground-borne noise levels specified in Conditions D39 and D40 of this schedule at any residence outside construction hours identified in Condition D35 of this schedule, or where receivers will be highly noise affected. The DNVIS must include specific mitigation measures identified through consultation with affected sensitive land user(s) and the mitigation measures must be implemented for the duration of the works. A copy of the DNVIS must be provided to the AA and ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.	This Plan (Applicable for Parramatta Site) Section 6.2.2
D44	DNVIS 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 land users.	This Plan (Applicable for Parramatta Site) Section 6.2.2
D45	Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage must be notified before works that generate vibration commences in the vicinity of those properties. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owners and occupiers are to be provided a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances, unless otherwise agreed by the owner and occupier. These properties must be identified and considered in the Noise and Vibration CEMP Subplan.	Section 6.2.2
D46	Vibration testing must be conducted 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 attended 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. Such measures must include, but not be limited to, review or modification of excavation techniques.	Section 6.2.1
D47	The Proponent must seek the advice of a heritage specialist on methods and locations for installing equipment used for vibration, movement and noise monitoring at Heritage items.	Section 5.5.1 Section 5.5.2 Section 6.1.3
D49	If a Heritage item is found to be structurally unsound (following inspection) a more conservative cosmetic damage criterion of 2.5 mm/s peak component particle velocity (from DIN 4150) must be applied.	Section 4.3.2

3.2 Revised Environmental Mitigation Measures

The list of mitigation measures and performance outcomes presented in Chapter 27 of the Environmental Impact Statement have been revised on the basis of submissions received and additional assessment work carried out. In some cases new measures have been added, while in others, the wording of existing measures has been adjusted. Table 2 provides the REMMs applicable to the scope of this DNVIS.

Table 2: Revised Environmental Mitigation Measures

Condition	Requirement	Relevant section of this CNVMP
NV01	Further engagement and consultation would be carried out with: • The affected communities to understand their preferences for mitigation and management measures. • 'Other sensitive' receivers such as schools, medical facilities or places of worship to understand periods in which they are more sensitive to impacts. Based on this consultation, appropriate mitigation and management options would be considered and implemented where feasible and reasonable to minimise the impacts.	Section 6.2.1

NV02	Alternative construction methodologies and measures that minimise noise and vibration levels during noise intensive works 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 receivers by retaining building wall elements • Locating demolition load out areas away from the nearby noise sensitive receivers • Providing respite periods for noise intensive works • Minimising structural-borne noise to adjacent buildings including separating the structural connection prior to demolition through saw-cutting and propping, using handheld splitters and pulverisers or hand demolition • Installing sound barrier screening to scaffolding facing noise sensitive neighbours • Using portable noise barriers around particularly noisy equipment, such as concrete saws • Modifying demolition works sequencing / hours to minimise impacts during peak pedestrian times and / or adjoining neighbour outdoor activity periods.	Section 6.2.1
NV03	Appropriate respite would be provided to affected receivers in accordance with the Sydney Metro Construction Noise and Vibration Standard. This would include consideration of impacts from Stage 1 utility and power supply works when determining appropriate respite periods for affected receivers. When determining appropriate respite, the need to efficiently undertake construction would be balanced against the communities' preferred noise and vibration management approach.	Section 6.2.1
NV04	The use of noise intensive equipment at construction sites with 'moderate' and 'high' out-of-hours noise management level exceedances would be scheduled for standard construction hours, where feasible and reasonable. Where this is not feasible and reasonable, the works would be undertaken as early as possible in each work shift.	Section 6.2.1
NV05	Air brake silencers would be used on heavy vehicles that access construction sites multiple times per night or over multiple nights.	Section 6.2.1
NV06	Perimeter site hoarding would be designed with consideration of on-site heavy vehicle movements with the aim of minimising sleep disturbance impacts.	Section 6.2.1
NV09	Feasible and reasonable measures would be implemented to minimise ground-borne noise where exceedances are predicted. This may require implementation of less ground-borne noise and less vibration intensive alternative construction methodologies.	Section 6.2.1
NV14	Further assessment of construction traffic would be completed during detailed design, including consideration of the potential for exceedances of the NSW Road Noise Policy base criteria (where greater than 2 dB increases are predicted). The potential impacts would be managed using the following approaches, where feasible and reasonable: • On-site spoil storage capacity would be maximised to reduce the need for truck movements during sensitive times • Vehicle movements would be redirected away from sensitive receiver areas and scheduled during less sensitive times • The speed of vehicles would be limited and the use of engine compression brakes would be avoided • Heavy vehicles would not be permitted to idle near sensitive receivers.	Section 5.6
NV16	Where vibration levels are predicted to exceed the screening criteria, a more detailed assessment of the structure (in consultation with a structural engineer) and 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.	Section 4.3 Section 6.2.1
NV17	Condition surveys of buildings and structures near to the tunnel and excavations would be undertaken prior to the commencement of excavation at each site, where appropriate. For heritage buildings and structures the surveys would consider the heritage values of the structure in consultation with a heritage specialist.	Note: While REMM NV17 is applicable to this phase no excavation or tunnelling works are in this scope of works and is therefore not

		applicable to this DNVIS
NV18	The likelihood of cumulative construction noise impacts would be reviewed during detailed design when detailed construction schedules are available. Co-ordination would occur between potentially interacting projects to minimise concurrent or consecutive works in the same areas, where possible. Specific mitigation strategies would be developed to manage impacts. Depending on the nature of the impact, this could involve adjustments to construction program or activities of Sydney Metro West or of other construction projects.	Section 5.7

4 APPLICABLE CRITERIA

4.1 Airborne Noise Management Levels

Noise Management Levels (NMLs) on this site are assessed under the broader requirements of the approval conditions which are consistent with the Sydney Metro Environmental Impact Statement (EIS) and Construction Noise and Vibration Standard (CNVS), and based on the Interim Construction Noise Guideline (ICNG). The NMLs applicable to Delta's scope of works on this site are outlined below.

4.1.1 Residential Receivers

Despite indications in the EIS that a residential receiver is present approximately 20m to the north of the site on the corner of George St and Horwood Place, subsequent investigations as part of this document have identified that in fact this premises is currently an office space. Notwithstanding, for the purpose of completeness the ICNG noise criteria for residential receivers is reproduced in Table 3.

Table 3: ICNG Noise Criteria for Residential Receivers

Time of Day	Management Level $L_{Aeq\ (15\ min)}$*	How to apply
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays / Public Holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq\ (15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • 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 75 dB(A)	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 relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5 dB	• 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 5 dB(A) above the noise affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see section 7.2.2.

*Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Due to COVID-19 lockdown restrictions in place at the time of writing, attending the Parramatta site for the purpose of establishing a Rating Background Level (RBL) was not possible. Further, RBL monitoring undertaken during COVID-19 lockdowns would not be considered a true representation of the acoustic environment during normal working conditions. As such, RBL data has been sourced from the project EIS. Unattended noise monitoring was undertaken at

one sensitive receiver located in the vicinity of Parramatta metro station construction site between March and July 2019. RBL results and calculated Noise Management Levels are summarised in Table 4.

Table 4: Noise Management Levels for Residential Receivers

	Background Noise (RBL) L_{A90}			Noise Management Level $L_{Aeq\ (15\ min)}$		
Location	**Day**	**Evening**	**Night**	**Day**	**Evening**	**Night**
L03 - Arthur Phillip High School Parramatta	58	53	43	**68**	58	48

(Source: Sydney Metro West Environmental Impact Statement (April, 2020))

4.1.2 Other Sensitive Land Uses

The project specific $L_{Aeq(15minute)}$ NMLs for other non-residential noise sensitive receivers from the ICNG are provided in Table 5.

Table 5: ICNG Noise Criteria for 'Other' Sensitive Receivers

Land Use	Management Level $L_{Aeq\ (15\ min)}$ (Applied when the land is in use)
Classrooms at schools and other education institutions	Internal noise level of 45dB(A)
Hospital wards and operating theatres	Internal noise level of 45dB(A)
Places of worship	Internal noise level of 45dB(A)
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	External noise level of 65dB(A)
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, e.g. reading, meditation)	External noise level of 60dB(A)
Community centres	Depends on the intended use of the centre. Refer to the recommended 'maximum' internal levels in Australian Standard 2107 – Acoustics – Recommended design sound levels and reverberation times for building interiors for specific uses.

Other noise-sensitive businesses require separate project specific noise goals. The Interim Construction Noise Guideline recommends that the internal construction noise levels at these premises are determined based on the 'maximum' internal levels presented in AS 2107. These recommended 'maximum' internal noise levels are provided in Table 6.

Table 6: AS2107 Noise Criteria for 'Other' Sensitive Receivers

Description	Time Period	AS2107 Classification	Recommended 'Maximum' Internal $L_{Aeq\ (15\ min)}$
Hotel	Daytime and evening	Bars and lounges	50
	Night-time	Sleeping areas (hotels near major roads)	40
Cafe	When in use	Coffee bar	50
Bar/Restaurant	When in use	Bars and lounges / Restaurant	50
Library	When in use	Reading areas	45
Recording studio	When in use	Music recording studios	25
Theatre / Auditorium	When in use	Drama theatres	30

4.1.3 Commercial and Industrial Premises

NMLs for commercial and industrial premises have been set based on the Interim Construction Noise Guidelines. For commercial premises, including offices, retail outlets and small commercial premises an external NML of $L_{eq(15\ minute)}$ 70 dB(A) has been adopted. An external NML of $L_{eq(15\ minute)}$ 75 dB(A) has been adopted for industrial premises. For both land use types, the external noise levels should be assessed at the most affected occupied point on the premises.

Notwithstanding the above, 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 $LA_{eq,(8h),}$ of 85dB(A) for any employee working at a location near the CSSI.

4.2 Ground-borne Noise Management Levels

Ground-borne Noise Management Levels for residential receivers are provided in Table 7.

Table 7: ICNG NMLs for Ground-borne Noise

Land Use	Noise Management Level $L_{Aeq\ (15\ min)}$
Daytime 7am - 6pm	Internal noise level of 45dB(A)
Evening 6pm - 10pm	Internal noise level of 40dB(A)
Night-time 10pm - 7am	Internal noise level of 35dB(A)

4.3 Construction Vibration

4.3.1 General Criteria

Condition D39 of the Conditions of Approval for the project stipulate that vibration from construction activities shall 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 ground-borne vibration.

British Standard 7385: Part 2 1993 suggests levels of vibration at which 'cosmetic', 'minor 'and 'major 'damage may occur. This standard is based on data collated from a wide range of national and international sources which collectively saw relatively few cases of damage caused by vibration. BS7385 suggests that vibration levels up to the cosmetic damage level are considered 'safe' and have produced no observable damage for particular building types.

For the purposes of this standard, damage includes minor non-structural effects such as hairline cracks on drywall surfaces, hairline cracks in mortar joints and cement render, enlargement of existing cracks and separation of partitions or intermediate walls from load bearing walls.

BS7385 is based on peak particle velocity and specifies damage criteria for transient vibration within the range of frequencies usually encountered in buildings, being 4Hz to 250Hz. This criteria is reproduced in Table 8.

Table 8: BS7385: Part 2 Structural Damage Criteria

Group	Type of Structure	Damage Level	Peak component particle velocity, mm/s		
			4 Hz - 15 Hz	15 Hz - 40 Hz	40 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	Cosmetic	50 (all frequencies)		
		Minor	100 (all frequencies)		
		Major	200 (all frequencies)		
2	Unreinforced or light framed structures Residential or light commercial type buildings	Cosmetic	15 to 20	20 to 50	50
		Minor	30 to 40	40 to 100	100
		Major	60 to 80	80 to 200	200

Where dynamic loading caused by continuous vibration may result in magnification of vibration through a building structure the guideline values may need to be reduced by up to 50 per cent. Rock breaking, rock hammering and sheet piling activities are considered to have the potential to cause dynamic loading in some structures (eg residences).

For construction activities involving intermittent vibration sources such as rock breakers, piling rigs, vibratory rollers, excavators and the like, the predominant vibration energy occurs at frequencies greater than 4 Hz (and usually in the 10 Hz to 100 Hz range). On this basis, and consistent with the guidance from BS7385, the following conservative vibration damage screening levels per receiver type have been adopted for the project:

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

As per REMM NV16, where vibration levels are predicted to exceed the screening criteria, a more detailed assessment of the structure (in consultation with a structural engineer) and vibration monitoring shall be carried out to ensure vibration levels remain below appropriate limits for that structure.

4.3.2 Heritage Structures

With regards to heritage items, BS7385 states that "a building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive". Therefore it is reasonable to apply the General Criteria presented in Section 4.3.1 subject to satisfactory assessment of the following:

1. The structural condition of the building (in consultation with a structural engineer where required); and
2. The heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed.

Where a heritage item is found to be structurally unsound, a more conservative cosmetic damage criterion of **2.5mm/s** peak component particle velocity must be applied.

4.3.3 Warning Levels

The INFRA Monitoring System proposed for use on this project features a number of real time alerts and alarms that enable instant notification where limits are approached or exceeded. Where vibration-intensive works are planned to occur in close proximity to sensitive receivers, and works are expected to approach the limits for cosmetic damage, monitoring equipment shall be equipped with visual and/or audible alarms that are triggered when the levels of vibration exceed the control criteria presented in Table 9.

Table 9: Operator Warning and Halt Levels

Structure	Site Control Criteria (PPV in any Orthogonal Direction)	
	Operator Warning Level	Operator Halt Level
Reinforced or framed structures	20 mm/s	25 mm/s
Unreinforced or light framed structures	5 mm/s	7.5 mm/s
Heritage structures	5 mm/s	7.5 mm/s
Heritage structures (Structurally unsound)	2mm/s	2.5mm/s

5 NOISE AND VIBRATION ASSESSMENT

5.1 Sensitive Receivers

Due to COVID-19 lockdown restrictions in place at the time of writing, sensitive receivers were identified through a desktop study of information presented in the Sydney Metro EIS. This information was subsequently correlated with the list of sensitive receivers identified in the Parramatta Light Rail - Stage 1 Noise and Vibration Management Sub Plan. Finally, key sensitive receivers were searched online to confirm operating status and accuracy of address information.

The majority of sensitive receivers identified around the Parramatta site were of a Commercial nature and could be rationalised into two categories:

- Commercial receivers on zero-boundary with the project site, or
- Commercial receivers directly across the road from the project site on one of four bounding streets at an approximate average distance of 20m.

A limited number of 'Other' sensitive receiver types were identified including educational institutions, places of worship, public buildings and a childcare centre. Sensitive receivers are summarised in Table 10 and illustrated in Appendix A. Structures predicted to exceed the vibration screening criteria for cosmetic damage and those of Heritage classification are also identified in Table 10.

While best endeavours have been made to identify all sensitive receivers, it must be noted that the list of receivers presented may not be exhaustive due to the inability to attend site for 'ground-truthing'. Delta shall seek to confirm the land-use assumptions presented herein as early as practical.

Table 10: Sensitive Receivers

ID	Receiver	Address	Category	Heritage	Predicted Vibration Exceedance
1	Roxy Theatre	69 George Street, Parramatta	Other – Theatre	Yes	Potential
2	Various Eateries	71 George St	Other – Café		
3	MBE	29 George St	Commercial		
	Office Suites	75 George St	Commercial		
4	EY Building Decco Cafe	25 Smith St	Commercial		Yes
5	Convict Drain	SE Corner of Site	Subsurface Drain	Yes	Potential
6	Kia Ora	62-64 Macquarie St	Commercial	Yes	Potential
7	Manaeesh Bakery & Pizza	46 Macquarie St	Commercial		
8	Vision in White Bridal	44 Macquarie St	Commercial		
	Medical Centre	42 Macquarie St	Commercial		
	Vacant	40 Macquarie St	Commercial		
	Bendigo Bank	198 Church St	Commercial	Yes	
	Chemist Warehouse	202 Church St	Commercial		
	Just 4 Fun	210 Church St	Commercial		
9	TSG Tobbacconist Smart Dollar	216 Church St	Commercial		Yes
10	Pharmacy 4 Less CK Design Habitation Design Scram Escape Rooms	240 Church St	Commercial		Yes
11	Optix	242 Church St	Commercial		Yes
12	Golden Tree Massage	256 Church St	Commercial		
	Dlux Jewellers	260 Church St	Commercial		
	Destination Roll Tax Tips 7 Eleven	262 Church St	Commercial		
13	Romeo's IGA St George	37-39 George St	Commercial		Yes
14	Lead College	37-39 George St	Education		Yes
15	Max Tax Salon Al Eman Barber PTE Institute High Cut Hairdresser	43-47 George St	Commercial	Yes	Yes
16	Westpac	264 Church St	Commercial	Yes	
	Mayfair Plaza Arcade	26 George St	Commercial		
17	Office Building	28 George St	Commercial		
	George St Dental	38-40 George St	Commercial		

	Dragon House				
	Tax Today	42 George St	Commercial		
	Vacant	46 George St	Commercial		
	Mixed Retail Arcade Office Suites	48-50 George St	Commercial	Yes	
	In the Mood For Thai Astor Legal Litsas and Co Accountant	52-56 George St	Commercial (Not residential as indicated in EIS)	Yes	
18	The Optical Co Pacific Smiles Dental Office Suites	80 George St	Commercial		
	Story Factory	90 George St	Commercial		
	Raine & Horne	33 Smith St	Commercial		
19	Western Sydney Uni	100 George St	Education		
20	Reggio Emilia ELC	100 George St	Other - Childcare		
21	Office Suites	20 Smith St	Commercial		
	Office Suites	18 Smith St	Commercial		
	Office Suites	10-14 Smith St	Commercial		
22	Arthur Phillip High School	Cnr Smith & Macquarie Streets	Educational		
23	Western Sydney University	169 Macquarie Street	Educational		
24	3 Parramatta Square	153 Macquarie St	Commercial		
	Parramatta Mission	119A Macquarie St	Commercial		
25	Leigh Memorial Church	119 Macquarie Street	Other - Place of Worship	Yes	
26	Double Mac Café iFade Barber Red Lobster Cafe	186-190 Macquarie St	Commercial		
27	Centenary Square	Cnr Church and Macquarie St	Passive Recreation		
28	Former Chophouse Restaurant	83 Macquarie St	Commercial		
29	Coffee Emporium Dallas Newsagency Peter Wynns Culture Kings	197 Church St	Commercial		
30	IMB Bank Richmond School of Business	207 Church St	Commercial		
31	University of New England	211 Church Street	Educational	Yes	
32	Unknown	215 Church St	Commercial	Yes	
33	Formerly ANZ	219 Church St	Commercial		
	Surplus City	223 Church St	Commercial		
	La Roue Café Lichaa Menswear Forward Legal CBA	235 Church St	Commercial		
34	Urban Tactical	239 Church St	Commercial		

5.2 Construction Activities and Sources of Noise

Noise impacts from demolition works are assessed using a scenario-based approach whereby noise-generating machinery and activities are assessed wholistically to provide a realistic assessment of overall resulting noise levels. Key construction scenarios on this site include internal strip out and structural demolition. Structural demolition scenarios are divided into 4 groups as illustrated earlier in Figure 2:

1. Group 1 Structures – Aged brick structures with tin roof
2. Group 2 Structures – Aged brick structures with tin roof, sharing common boundary with sensitive receivers
3. Group 3 Structure – Steel structure with tin roof
4. Carpark – Multi-level reinforced concrete structure

A list of construction scenarios and associated noise sources is presented in Table 11. The nominal Sound Power Levels (SPL) are sourced from equipment specifications and have been assessed for compliance against the Maximum Allowable Plant Sound Power Levels presented in Table 13 of the CNVS. Noise mitigation measures that are incorporated into the noise assessment are also identified in Table 11 below to produce an 'Effective Sound Power Level' for predictions calculations.

Table 11: Construction Scenarios and Noise Sources

Scenario	Noise Sources	Nominal Sound Power Level (dB)	Attenuation Factor / Penalty (dB)	Effective Sound Power Level (dB)
Strip Out	5T Excavator w/bucket	93	$-10^{(I)}$, $-10^{(H)}$	73
	Mustang Bobcats	110	$-10^{(I)}$, $-10^{(H)}$	90
	12T Excavator w/bucket for loadout	100	$-10^{(H)}$	90
	Truck movements	105	$-10^{(H)}$	95
Demolition (Group 1 Structures)	12T Excavator with bucket for demo	100	$-10^{(H)}$	90
	47T Excavator with grab/bucket for demo	106	$-10^{(H)}$	96
	47T Excavator with hammer for double-brick demo	118	$-10^{(H)}$ $+5^{(A)}$	113
	Truck movements	105	$-10^{(H)}$	95
Demolition (Group 2 Structures)	12T Excavator w/bucket for demo/loadout	100	$-10^{(H)}$	90
	47T Excavator with grab/bucket for demo	106	$-10^{(H)}$	96
	Powered Hand Tools for separation	113	$-10^{(H)}$ $+5^{(A)}$	108
	Truck movements	105	$-10^{(H)}$	95
Demolition (Group 3 Structures)	12T Excavator w/bucket	100	$-10^{(H)}$	90
	47T Excavator with shears for steel demolition	106	$-10^{(H)}$	96
	47T Excavator with grab for loadout	106	$-10^{(H)}$	96
	Truck movements	105	$-10^{(H)}$	95
Strip Out & Demolition Multi-level Carpark	47T Excavator with pulveriser to demolish slabs	106	$-10^{(S)}$	96
	47T Excavator with hammer for column demo	118	$-10^{(S)}$ $+5^{(A)}$	113
	47T Excavator with bucket for loadout	106	$-10^{(S)}$	96
	Truck movements	105	$-10^{(S)}$	95

(H) Noise attenuation due to perimeter hoarding
(I) Noise attenuation due to operation inside a premises with open windows
(A) Noise penalty for annoying or tonal noise characteristics
(S) Noise attenuation due to operation within scaffolded carpark

5.3 Airborne Noise Predictions

Noise levels have been predicted at surrounding sensitive receivers for each construction scenario based on the Effective Sound Power Levels presented in Table 11 above. Noise sources for each construction scenario have been added together to provide a realistic assessment of the $L_{Aeq\ (15\ minute)}$ noise level by assuming a percentage of the 15-minute interval that each noise source is actively working. To use the Strip Out scenario as an example, during any given 15-minute period, powered hand tools may be active for 50% of the period, a Mustang Bobcat may be active for 90% of the period, the 12T Excavator loading trucks for 90% of the period and Truck movements occurring for 30% of the period.

The resulting $L_{Aeq\ (15\ minute)}$ noise levels have been calculated at a representative distance from the works to the nearest sensitive receiver to produce a realistic assessment of likely noise impacts. Predicted noise levels are presented in Table 12.

Table 12: Predicted Noise Levels

ID	Receiver	Noise Goal dB $L_{Aeq(15\ minute)}$	Predicted Noise Levels dB $L_{Aeq(15\ minute)}$				
			Strip Out	Demolition (Group 1)	Demolition (Group 2)	Demolition (Group 3)	Demolition (Carpark)
2	Other - Café[1]	50[1]	27[1]	N/A	37[1]	36[1]	44[1]
3	Commercial	70	55	57	60	54	68
4	Commercial	70	67	69	72	N/A	75
7	Other - Café[1]	50[1]	47[1]	53[1]	N/A	N/A	N/A
8	Commercial	70	61	67	66	N/A	N/A
9, 10, 15	Commercial	70	67	67	72	N/A	62
11, 13	Commercial	70	67	N/A	72	N/A	62
12	Commercial	70	54	N/A	59	N/A	N/A
14	Educational - Lead College[1]	45[1]	41[1]	N/A	46[1]	N/A	N/A
16, 29, 33	Commercial	70	55	58	60	N/A	N/A
17	Commercial	70	57	N/A	62	62	N/A
18	Commercial	70	55	N/A	N/A	59	N/A
19	Educational - WSU[2]	45[2]	16[2]	N/A	N/A	22[2]	31[2]
20	Other - Childcare[1]	45[1]	21[1]	N/A	N/A	27[1]	36[1]
21	Commercial	70	N/A	N/A	N/A	N/A	62
22	Other - Arthur Phillip High School	60	44	N/A	51	N/A	56
23	Educational - WSU[2]	45[2]	29[2]	34[2]	34[2]	N/A	37[2]
24	Commercial	70	57	63	62	N/A	64
25	Other - Leigh Memorial Church[1]	45[1]	37[1]	43[1]	N/A	N/A	44[1]
26	Other – Café[1]	50[1]	37[1]	43[1]	N/A	N/A	40[1]
27	Passive Recreation	60	51	57	N/A	N/A	57
28, 34	Commercial	70	47	54	57	N/A	N/A
30, 32	Commercial	70	57	63	62	N/A	N/A
31	Educational - UNE[1]	45[1]	37[1]	43[1]	42[1]	N/A	N/A

[1]Values are internal noise levels. Noise predictions assume a 20dB reduction factor from external to internal environment.

[2]Values are internal noise levels. Internal noise predictions assume a 25dB reduction factor from external levels based on building construction and non-opening windows.

Based on the predicted noise levels presented in Table 12, a summary of noise impacts to sensitive receivers for the Parramatta site is provided in Table 13 below.

Table 13: Noise Impacts

ID	Receiver	Impact
All	**General**	Noise predictions are generally compliant with NMLs. Potential for exceedance increases as works approach the sensitive receivers on zero-boundary with the site.
4	**Commercial**	Potential for minor exceedance of NML at times during demolition of 74 Macquarie St Potential for minor exceedance of NML during demolition of eastern end of carpark structure
7	**Other - Café**	Potential for minor exceedance of NML at times during demolition of 48 Macquarie St where hammering is required to facilitate removal of any double-brick walls. It is noted that there is minimal requirement for hammering of such walls and thus compliance with NML would be generally expected.
9,10,11, 13,15	**Commercial**	These receivers share a common boundary with the site. Potential exists for minor exceedance of NML at times during demolition of adjoining Group 2 structures. This is mainly anticipated where noise-intrusive hand power tools such as concrete saws and small jackhammers are required to facilitate separation of structures.
14	**Educational**	This receiver shares a common boundary with the site. Potential exists for minor exceedance of the internal NML at times during demolition of adjoining Group 2 structure. This is mainly anticipated where noise-intrusive hand power tools such as concrete saws and small jackhammers are required to facilitate separation of structures.
20	**Other - Childcare**	Compliant with both the internal NML for sleep/play areas and external NML for 'active recreation' play area.
25	**Other - Church**	Internal noise predictions are compliant with NML
26	**Other - Café**	Predicted noise levels from demolition works on the site are compliant with the NML however cumulative impacts to this receiver are likely given the construction site next door, as well as the Parramatta Light Rail construction along Macquarie St.

5.4 Ground-borne Noise

As demolition works are not anticipated to involve significant ground excavation, ground-borne noise is expected to be an issue only where sensitive receivers are directly coupled to the works (structure-borne noise). The sensitive receivers directly coupled to the works and likely to experience structure-borne noise are summarised in Table 14 below.

Table 14: Sensitive Receivers Likely Affected by Structure-Borne Noise

Address	Sensitive Receiver
216-218 Church Street	Retail (Ground)
	Dance studio (First floor) - appears closed due to COVID
37-39 George st	Romeo's Food Hall IGA
240 Church st	Pharmacy 4 Less
25 Smith St	Julie Owens MP Office (Ground)
	EY Offices (Upper floors)

Predictions of structure-borne noise have not been provided on the basis that works will preference separating structures with saw cutting and hand tools to minimise vibration transmission. Where required, structure-borne noise impacts to sensitive receivers will be confirmed through site trials. These trials will involve commencement of works activities away from the sensitive receiver with monitoring in place. Monitoring will continue as works approach the sensitive receiver thus ensuring impacts to the sensitive receiver are managed.

5.5 Vibration Predictions

Vibration at the nearest sensitive receivers (adjacent to the building foundation) has been estimated using the formula

$$PPV_{Receiver} = PPV_{Ref} \times \left(\frac{d_{ref}}{d}\right)^{1.5}$$

from the FTA's Guideline "Transit Noise and Vibration Impact Assessment".

Where: $PPV_{Receiver}$ = peak particle velocity at the receiver in mm/s
PPV_{Ref} = peak particle velocity of the source, measured at the reference distance (7.6 m)
d_{ref} = reference distance for the vibration source (7.6 m)
d = horizontal distance from the source to the receiver (m)

The values of PPV_{Ref} are based on a review of current literature and are provided in Table 15 for reference.

Table 15: Reference PPVs

Equipment	PPV @ 7.6m (mm/s)
2T Excavators	2.5
5T Excavators	2.9
12T Excavators	3.3
20T Excavators w/hammer	5.1
47T Excavators w/hammer	7.6
12T Excavators w/hydraulic shears/pulverisers	1.8
20T Excavators w/hydraulic shears/pulverisers	2.5
47T Excavators w/hydraulic shears/pulverisers	3.3
Mustang Bobcats	0.3
Powered Hand Tools	0.2
Trucks	1.9

The predicted levels of vibration at the nearest sensitive receivers are provided in Table 16. Note that:

- these predictions assume that equipment is operating at the nearest point of works to the sensitive receiver and therefore represent **worst-case** scenarios.
- these predictions represent maximum instantaneous levels for the purpose of assessing the likelihood of cosmetic damage and are not applicable for the assessment of human comfort which is measured as vibration dose values.

Table 16: Predicted Ground Vibration

Equipment	Predicted PPV (mm/s)			
	Receivers on opposite side of George, Smith, Macquarie and Church Streets[1]	Adjacent 'zero-boundary' receivers	Reggio Emilia Early Learning Centre	Western Sydney University
2T Excavators	0.6	18.5	<0.1	0.3
5T Excavators	0.7	21.5	<0.1	0.4
12T Excavators	0.8	24.4	<0.1	0.4
20T Excavators w/hammer	1.2	37.8	0.1	0.7
47T Excavators w/hammer	1.8	56.3	0.1	1.0
12T Excavators w/hydraulic shears/pulverisers	0.4	13.3	<0.1	0.2
20T Excavators w/hydraulic shears/pulverisers	0.6	18.5	<0.1	0.3
47T Excavators w/hydraulic shears/pulverisers	0.8	24.4	<0.1	0.4
Mustang Bobcats	0.1	2.2	<0.1	<0.1
Powered Hand Tools	<0.1	1.5	<0.1	<0.1
Trucks	0.4	14.1	<0.1	0.2

[1]Includes commercial receivers, UNE study rooms and Leigh Memorial Church

With the exception of sensitive receivers on zero-boundary, Table 16 indicates that predicted vibration levels are well below the vibration damage screening criteria for the project. Further, considering German Standard DIN 4150 Part 2 which presents human perception thresholds for 'noticeable' and 'easily noticeable 'vibration of 1mm/s and 2.2mm/s respectively, vibration from demolition works is, for the most part, not anticipated to be noticeable to receivers that are not on zero-boundary with the site.

For sensitive receivers on zero-boundary with the site, demolition works are likely to occur immediately adjacent the boundary and on structures that may be coupled to some degree with boundary receivers. As such, it is necessary to determine safe working distances from vibration-sensitive receivers for each machinery type, and this is presented in Table 17 below. Note that these calculations consider ground vibration only. Where structures to be demolished are coupled with the sensitive receivers, methods for separation such as saw cutting etc shall be employed prior to works commencing. Where multiple machines are working in close proximity, these distances may need to be increased further.

Table 17: Safe Working Distance to 'Zero-Boundary' Sensitive Receivers

Equipment	Safe Working Distances (m)		
	Adjacent Commercial Receivers	Adjacent Structurally 'Sound' Heritage Receivers	Adjacent Structurally 'Unsound' Heritage Receivers
2T Excavators	2	4	8
5T Excavators	2	4	9
12T Excavators	2	5	9
20T Excavators w/hammer	3	6	12
47T Excavators w/hammer	4	8	16
12T Excavators w/hydraulic shears/pulverisers	2	3	6
20T Excavators w/hydraulic shears/pulverisers	2	4	8
47T Excavators w/hydraulic shears/pulverisers	2	5	9
Mustang Bobcats	1	1	2
Powered Hand Tools	1	1	2
Trucks	2	3	6

5.5.1 Convict Drain

The Parramatta metro station construction site marginally encroaches on a portion of the curtilage of the convict drain heritage item, located beneath Macquarie Lane. The exact location, depth and fabric condition of the portion of the drain within the site is unknown although its approximate alignment is shown in Appendix A. It is noted that Condition of Approval D49 states that if a Heritage item is found to be structurally unsound (following inspection) a more conservative cosmetic damage criterion of 2.5mm/s peak component particle velocity must be applied. As such, further investigation of the condition of this receiver is required.

Pursuant to CoA D47, a heritage specialist shall provide advice regarding noise and vibration monitoring of the Convict Drain.

5.5.2 Kia Ora, Heritage Shops and Roxy Theatre

A number of heritage buildings are located on the boundary of the Parramatta metro station construction site and include the Kia Ora building on Macquarie St, the heritage shops on George St and the Roxy Theatre also on George St. As with the Convict Drain, further inspection of the structural condition of these receivers is required to determine whether the more conservative cosmetic damage criterion of 2.5mm/s peak component particle velocity as specified by CoA D49 must be applied.

Pursuant to CoA D47, a heritage specialist shall provide advice regarding noise and vibration monitoring of the Kia Ora, Heritage Shops and Roxy Theatre structures.

5.5.3 Other Heritage Receivers

All other heritage receivers opposite the Parramatta metro station construction site on George, Macquarie and Church Streets are located at a sufficient distance where predicted levels of vibration are well below the conservative criterion of 2.5mm/s.

5.6 Construction Traffic Noise

Pursuant to REMM NV14, construction traffic noise has been assessed for the Parramatta site on the basis of a maximum of 11 heavy vehicle movements per hour. All vehicles shall pull directly into the site on arrival thus avoiding any requirement to idle on local streets. Considering the short exposure duration of sensitive receivers to passing construction vehicles, predicted noise levels did not increase by greater than 2dB above the average noise levels presented in the EIS. As such, no further mitigation measures have been identified as necessary for construction traffic noise.

5.7 Cumulative Impacts

A number of other major construction works are currently underway in Parramatta CBD with the potential to cause cumulative impacts to sensitive receivers. These are identified below.

Other Works	Impact
Parramatta Light Rail	Currently in various stages of completion along Church and Macquarie Streets. Track laying is currently progressing along Macquarie Street to the East. These works are expected to coincide with initial demolition works on the site resulting in potential cumulative noise impacts to receivers along Macquarie St.
85 Macquarie St	Holdmark Property Group is currently constructing a 13-storey tower which is expected to continue into 2022 resulting in potential cumulative noise impacts to 186-190 Church Street.
Parramatta Square	Parramatta Square is a commercial business precinct integrating commercial office space with retail. Construction is currently underway on a number of commercial towers and will continue throughout demolition works resulting in potential cumulative noise impacts to 119 and 153 Macquarie Street.

Figure 4: Other Works with Potential for Cumulative Impacts

5.8 Impact Classification

As per Section 3.1 of the Sydney Metro CNVS, a subjective classification of the noise & vibration impact has been evaluated for each sensitive receiver and documented as:

- Low Impact
- Moderate Impact
- High Impact

The classifications were determined on a case-by-case basis using the metrics defined in the CNVS, including:

- The location of the works in relation to the NSR's with consideration of the noise attenuation features such as distance to NSR's, noise barriers, attenuation factor of NSR's windows and elements, Topographical features etc.
- The type and sensitivity of the NSR's:
    - Lower impact: e.g. commercial buildings/scattered residential (low density)
    - Moderate impact: eg standard residential (typical density)
    - High impact: e.g residential home for elderly/high density unit blocks/persistent complainers/residents deemed to have "construction noise fatigue", highly sensitive commercial (jewellers, etc.) or health applications e.g. operating theatres, MRI's, Psychotherapy units, Audio & video production studios etc. and schools/childcare centres.
- Predicted noise and vibration levels and extent of noise exceedance above Noise Management Level
- The type of and intensity of noise emitted from works (ie tonal or impulsive):
    - Lower Impact: No high noise and/or vibration intensive activities
    - Moderate Impact: Short/intermittent high noise and/or vibration intensive activities
    - High Impact: Prolonged high noise and/or vibration intensive activities.
- The duration of any OOHW required.

Site plans illustrating the location and impact classification of sensitive receivers can be found in Appendix A - Monitoring Locations and Sensitive Receivers.

6 NOISE AND VIBRATION MANAGEMENT

6.1 Environmental Monitoring, Auditing & Reporting

Noise and vibration monitoring shall be undertaken using Sigicom INFRA remote-access monitoring installations at the nearest representative sensitive receivers around the site. Noise and vibration data will be accessible in real-time through the Infra Net web portal and shall be monitored closely at the start of key activities to confirm levels and refine the prediction model.

6.1.1 Monitoring Locations

Permanent monitoring locations are detailed in Table 18 and illustrated in Appendix A. Note that not all monitoring locations will be active concurrently. Monitors will be relocated as and when required to ensure effective monitoring of active construction areas.

Table 18: Monitoring Locations

Property	Monitoring Points		Monitoring Location	Catchment
	Noise	Vibration		
48 George St	**1**	-	Front (south facing) facade	Northern commercial receivers across George St
43-47 George St	-	**3**	Eastern, southern and western facade	Heritage property
37-39 George St	**1**	**1**	Eastern facade	Commercial receivers to north west of project site
240 Church St	**1**	**1**	Southern (site facing) facade	Commercial receivers to north west of project site
211 Church St	**1**	-	Front (east facing) facade	Western commercial receivers across Church St
United Lane	**1**	**1**	Hoarding	Commercial receivers to south west of project site
119 Macquarie St	**1**	-	TBD	Southern commercial receivers across Macquarie St
64 Macquarie St	-	**3**	Eastern, northern and western facade	Heritage property
25 Smith St	**1**	**1**	Western (site facing) facade	Commercial receivers to south east of project site Heritage tunnel
75 George St	**1**	-	South west corner	Commercial receivers to north east of project site
Roxy Theatre	-	**1**	South west corner	Heritage property
TOTAL MONITORING POINTS	**36**	**55**		

6.1.2 Attended Monitoring

Attended monitoring may be conducted where data from permanent installations is considered inadequate. For example, where complaints are received, additional monitoring may be conducted at the specific location of complaint. Attended monitoring may also be conducted to establish relationships between levels recorded externally by permanent monitors and those experienced at other locations of interest such as an internal environments.

Operator-attended noise monitoring will be conducted for a minimum of 15 minutes at each location during the demolition works. Where a longer monitoring duration is required, measurements shall be made in consecutive 15-minute periods.

6.1.3 Heritage-listed Structures

Effective monitoring of heritage-listed structures can pose unique challenges where sensitive heritage fabrics are involved. CoA D47 stipulates that a heritage specialist shall provide advice regarding noise and vibration monitoring of heritage-listed structures. Due to COVID-19 lockdown restrictions in place at the time of writing, no site investigations have been conducted and therefore no such advice from the heritage specialist could be provided. This document will be updated and a copy of the heritage advice included in Appendix B once this situation changes. It is noted that no works shall proceed before monitoring is implemented in accordance with advice from the heritage specialist.

6.1.4 Auditing

All noise-generating items of plant identified in Table 11 shall have noise audits conducted upon arrival on site, and at 6-month intervals thereafter, to ensure compliance with the Maximum Allowable Plant Sound Power Levels listed in Table

13 of the Sydney Metro Construction Noise and Vibration Standard (CNVS). The following process for plant noise audits shall apply:

- Measurements of Sound Pressure Level (SPL) at 7 m (with plant or equipment stationary) shall be undertaken using procedures that are consistent with the requirements of Australian Standard AS2012 1990 Acoustics Measurement of Airborne Noise Emitted by Earthmoving Machinery and Agricultural Tractors Stationary Test Condition Part 1: Determination of Compliance with Limits for Exterior Noise.
- Measurements of Sound Power Level (SWL) shall be determined using procedures that are consistent with the requirements of International Standard ISO9614-2 1996 Acoustics Determination of sound power levels of noise sources using sound intensity - Part 2: Measurement by scanning.
- If measuring the SPL at 7 m of moving plant, compliance measurements would be guided by the requirements of Australian Standard AS2012 1977 Method for Measurement of Airborne Noise From Agricultural Tractors and Earthmoving Machinery.
- For all measurements, the plant or equipment under test would be measured while operating under typical operating conditions. If this is not practical, it may be appropriate to conduct a stationary test at high idle.
- In the case of an exceedance in sound power levels the item of plant would either be replaced, or the advice of an acoustic consultant would be sought to provide suitable mitigation measures, which may include:
  - ensuring all bolts are tightened and no parts are loose
  - cleaning and/or lubricating moving parts
  - replacing old or worn parts
  - implementing additional or upgrading existing muffling devices
  - building enclosures around items of stationary plant (e.g. pumps or generators).
- A register of measured sound power levels for each item of plant would be kept for reference where future noise audits are conducted. The register would be reviewed annually in conjunction with the CNVS and corresponding revisions made to the Sound Power Levels presented in Section 4.3 of the CNVS to represent contemporary plant noise emission levels.

6.1.5 Reporting

Monitoring results shall be compiled into a weekly report for ongoing review and assessment against the criteria presented in Section 0 of this document. Reports shall be forwarded to Delta's Environment Manager and site project manager within one week of being undertaken or at weekly intervals for continuous monitoring. Delta's Environment Manager will manage the wider dissemination of all compliance reports, and such reports shall be made available upon request to all authorised parties. All compliance reports will be stored on Delta's project server for no less than 7 years after project completion. All noise and vibration monitoring results are stored on the Osterman INFRA Net online database for 10 years.

6.1.6 Dilapidation Surveys

Pursuant to Section 6.5 of the CNVS, if demolition works have the potential to cause damage through vibration to nearby public utilities, structures, buildings and their contents, an Existing Condition Inspection of these items shall be undertaken in accordance with AS 4349.1 "Inspection of Buildings". The potential to cause damage is defined as any property at risk of exceeding the cosmetic damage screening criteria presented in Section 4.3 of this document. A number of properties on zero boundary with the Parramatta site meet this criteria and are identified in Table 10: Sensitive Receivers. These properties as a minimum shall be subject to Existing Condition Inspections.

Prior to conducting the Existing Condition Inspections, the property owners will be advised of the inspection scope and methodology and the process for making a property damage claim. A register shall be maintained of all properties inspected and of any properties where owners refused the inspection offer.

The findings of all dilapidation surveys conducted for each Sydney Metro construction site shall be compiled into a report to be forwarded to the construction contractor and project manager. Follow-up Condition Inspections would be required at the completion of certain major works.

6.2 Mitigation Measures

6.2.1 Standard Mitigation Measures

A range of standard noise and vibration mitigation measures shall be adopted on the site so as to minimise the impact of works on neighbouring sensitive receivers. These are outlined in Table 19.

All reasonable and feasible mitigation measures must be implemented with the aim of achieving the construction noise management levels and vibration criteria defined in CoA D39. Further, all reasonable and feasible mitigation measures must be applied when the residential ground-borne noise levels defined in CoA D40 are exceeded.

Table 19: Noise and Vibration Mitigation Measures

Action Required	Details
Management	
Consultation regarding mitigation measures	Further engagement and consultation would be carried out with: • The affected communities to understand their preferences for mitigation and management measures. • 'Other sensitive 'receivers such as schools, medical facilities or places of worship to understand periods in which they are more sensitive to impacts. Based on this consultation, appropriate mitigation and management options would be considered and implemented where feasible and reasonable to minimise the impacts.
Consultation regarding scheduling	Noise generating work in the vicinity of potentially-affected community, religious, educational institutions and noise and vibration-sensitive businesses and critical working areas (such as theatres, laboratories and operating theatres) resulting in noise levels above the NMLs must not be timetabled within sensitive periods, unless other reasonable arrangements with the affected institutions are made at no cost to the affected institution.
Implement community consultation measures	• Periodic Notification (monthly letterbox drop) detailing all upcoming construction activities at least 14 days prior to commencement of relevant works • Website • Project information and construction response telephone line • Email distribution list • Place Managers • Operate in accordance with the Overarching Community Communications Strategy (OCCS)
Register of Noise Sensitive Receivers	A register of all noise and vibration sensitive receivers (NSRs) would be kept on site. The register would include the following details for each NSR: • Address of receiver • Category of receiver (e.g. Residential, Commercial etc.) • Contact name and phone number
Complaints handling	All complaints handling would be in accordance with the Sydney Metro Construction Complaints Management System.
Site inductions	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: • 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 procedures
Behavioural practices	• No swearing or unnecessary shouting or loud stereos/radios; on site. • No dropping of materials from height; throwing of metal items; and slamming of doors. • No excessive revving of plant and vehicle engines • Controlled release of compressed air. • Turn off machinery when not in use
Monitoring	A noise monitoring program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Attended vibration measurements	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 applicable safe-working distances.
Construction methodology	Industry best practice construction methods must be implemented where reasonably practicable to ensure that noise levels are minimised around sensitive land user(s). Practices must include, but are not limited to:

	a) use of regularly serviced low sound power equipment; b) temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting; and c) use of alternative construction and demolition techniques.
Alternative construction and demolition techniques	Alternative construction methodologies and measures that minimise noise and vibration levels during noise intensive works would be investigated and implemented where feasible and reasonable. This would include consideration of: • The use of hydraulic concrete shears and pulverisers in lieu of hammers/rock breakers • Sequencing works to shield noise sensitive receivers by retaining building wall elements • Locating demolition load out areas away from the nearby noise sensitive receivers • Providing respite periods for noise intensive works • Minimising 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 • Using portable noise barriers around particularly noisy equipment, such as concrete saws • Modifying demolition works sequencing / hours to minimise impacts during peak pedestrian times and / or adjoining neighbour outdoor activity periods.
Ground-borne Noise	Feasible and reasonable measures would be implemented to minimise ground-borne noise where exceedances are predicted. This may require implementation of less ground-borne noise and less vibration intensive alternative construction methodologies.
Condition surveys	Condition surveys shall be carried out where there is potential to cause damage through vibration to nearby public utilities, structures, buildings and their contents. The potential to cause damage is defined as any property at risk of exceeding the cosmetic damage screening criteria.
Structural Assessment	Where vibration levels are predicted to exceed the screening criteria, a more detailed assessment of the structure (in consultation with a structural engineer) and 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.
Scheduling	Where feasible and reasonable, construction would be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels would be scheduled during less sensitive time periods.
Scheduling	The use of noise intensive equipment at construction sites with 'moderate' and 'high' out-of-hours noise management level exceedances would be scheduled for standard construction hours, where feasible and reasonable. Where this is not feasible and reasonable, the works would be undertaken as early as possible in each work shift.
Construction respite period	High noise and vibration generating activities[1] may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block[2]. [1]Includes jack and rock hammering, sheet and pile driving, rock breaking and vibratory rolling [2]Any period during which there is less than a 60 minutes respite between ceasing and recommencing works
Source Controls	
Equipment selection - General	Use quieter and less vibration emitting construction methods where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits.
Equipment selection – Residential areas	Long term construction site support equipment and machinery would be low noise emitting and suitable for use in residential areas, where feasible and reasonable. Examples include: • Low noise water pumps for use in water treatment facilities • Low noise generators and compressors • Low noise air conditioner units for use of amenities buildings.
Maximum noise levels	The noise levels of plant and equipment must have operating Sound Power Levels compliant with the criteria in Table 13 of the CNVS.
Rental plant and equipment	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 13 of the CNVS.
Plan worksites and activities to minimise noise and vibration	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Non-tonal reversing alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Minimise disturbance arising from delivery of goods to construction sites	• Loading and unloading of materials/deliveries is to occur as far as possible from NSRs • Select site access points and roads as far as possible away from NSRs • Dedicated loading/unloading areas to be shielded if close to NSRs • Delivery vehicles to be fitted with straps rather than chains for unloading, wherever feasible and reasonable

Path Controls	
Shield stationary noise sources such as pumps, compressors, fans etc	Stationary noise sources would be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained. Appendix F of AS 2436: 1981 lists materials suitable for shielding.
Shield sensitive receivers from noisy activities	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.

With regards to **REMM NV05**, on the basis that heavy vehicles will access sites primarily within standard construction hours, the requirement for airbrake silencers to be fitted to heavy vehicles that access construction sites multiple times per night or over multiple nights would be considered as part of an application for Out-of-Hours Works.

With regards to **REMM NV06**, site hoarding has been designed on the basis that heavy vehicles will access sites primarily within standard construction hours. Standard A-Class hoarding with a nominal noise reduction factor of 10db is therefore considered adequate for the purpose of minimising sleep disturbance impacts. Alternative mitigation measures for minimising sleep disturbance impacts would be considered as part of an application for Out-of-Hours Works.

6.2.2 Site-specific Mitigation Measures

Condition of Approval D44 states that specific mitigation measures must be identified through consultation with affected sensitive receivers. Due to COVID-19 lockdown restrictions in place at the time of writing, consultation is still ongoing and shall be added to Appendix C – Consultation Register as it occurs. This section shall be updated as new mitigation measures are identified.

Table 20: Site-specific Noise and Vibration Mitigation Measures

Action Required	Details
Confirm Convict Drain location	Identify Convict Drain curtilage with surface markers and ensure suitable monitoring in place when working within curtilage area.
Minimise risk of damage to Convict Drain	Avoid use of hammers within the Convict Drain curtilage
Per Condition of Approval D45	Owners and occupiers of properties at risk of exceeding the screening criteria for cosmetic damage have been identified in Table 10. These receivers must be notified before works that generate vibration commences in the vicinity of those properties. If the potential exceedance is to occur more than once or extend over a period of 24 hours, owners and occupiers are to be provided a schedule of potential exceedances on a monthly basis for the duration of the potential exceedances, unless otherwise agreed by the owner and occupier.
Per Condition of Approval D46	Vibration testing must be conducted 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 attended 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. Such measures must include, but not be limited to, review or modification of excavation techniques. Heritage properties identified under this requirement are listed in Table 10 and include Roxy Theatre, Convict Drain, Kia Ora and heritage shops at 43-47 George St.

6.2.3 Additional Mitigation Measures

Where exceedance of imposed noise and vibration criteria is predicted even with implementation of the Standard Mitigation Measures presented in Table 19, Additional Mitigation Measures (AMMs) shall be implemented to offset noise and vibration impacts. AMMs are summarised in Table 21 below and are applied in accordance with the requirements of Table 16, Table 17 and Table 18 of the CNVS for airborne noise, ground-borne noise and ground-borne vibration impacts, respectively.

Table 21: Additional Mitigation Measures Abbreviations

Measure	Description	Abbreviation
Alternative accommodation	Alternative accommodation options may be provided for residents living in close proximity to construction works that are likely to incur unreasonably high impacts over an extended period of time. Alternative accommodation will be determined on a case-by-case basis.	AA
Monitoring	Where it has been identified that specific construction activities are likely to exceed the relevant noise or vibration goals, noise or vibration monitoring may be conducted at	M

	the affected receiver(s) or a nominated representative location (typically the nearest receiver where more than one receiver have been identified). Monitoring can be in the form of either unattended logging or operator attended surveys. The purpose of monitoring is to inform the relevant personnel when the noise or vibration goal has been exceeded so that additional management measures may be implemented.	
Individual briefings	Individual briefings are used to inform stakeholders about the impacts of high noise activities and mitigation measures that will be implemented. Communications representatives from the contractor would visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the project.	IB
Letter box drops	For each Sydney Metro project, a newsletter is produced and distributed to the local community via letterbox drop and the project mailing list. These newsletters provide an overview of current and upcoming works across the project and other topics of interest. The objective is to engage and inform and provide project-specific messages. Advanced warning of potential disruptions (e.g. traffic changes or noisy works) can assist in reducing the impact on the community. Content and newsletter length is determined on a project-by-project basis. Most projects distribute notifications on a monthly basis. Each newsletter is graphically designed within a branded template.	LB
Project specific respite offer	The purpose of a project specific respite offer is to provide residents subjected to lengthy periods of noise or vibration respite from an ongoing impact.	RO
Phone calls and emails	Phone calls and/or emails detailing relevant information would be made to identified/affected stakeholders within 7 days of proposed work. Phone calls and/or emails provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs etc.	PC
Specific notifications	Specific notifications would be letterbox dropped or hand distributed to identified stakeholders no later than 7 days ahead of construction activities that are likely to exceed the noise objectives. This form of communication is used to support periodic notifications, or to advertise unscheduled works.	SN

Based on the predicted levels of noise and vibration presented in Section 5, Additional Mitigation Measures applicable to the site are outlined below.

Airborne Noise

No AMMs identified on the basis that predicted noise levels do not exceed applicable NMLs by >10db at any receiver.

Ground-borne Noise

There is no NML for ground-borne noise during standard hours. Refer to AMMs for ground-borne vibration.

Ground-borne Vibration

AMMs applicable to ground-borne vibration are presented in Table 22 below.

Table 22: Additional Mitigation Measures

ID	Receiver	Address	Type	Additional Mitigation Measures	
				Demolition Group 2 Scenario	All Other Scenarios
4	EY Building Decco Cafe	25 Smith St	Commercial	LB, M, RO	Nil
9	TSG Tobbacconist Smart Dollar	216 Church St	Commercial	LB, M, RO	Nil
10	Pharmacy 4 Less CK Design Habitation Design Scram Escape Rooms	240 Church St	Commercial	LB, M, RO	Nil
11	Optix	242 Church St	Commercial	LB, M, RO	Nil
13	Romeo's IGA St George	37-39 George St	Commercial	LB, M, RO	Nil
14	Lead College	37-39 George St	Education	LB, M, RO	Nil
15	Max Tax Salon Al Eman Barber PTE Institute High Cut Hairdresser	43-47 George St	Commercial	LB, M, RO	Nil

7 SUMMARY

Sensitive receivers for the Parramatta project can be broadly classified into two categories - those sharing a boundary with the site, and those opposite one of 4 bounding streets.

For sensitive receivers opposite the site, predicted noise levels were generally compliant with airborne noise management levels. Vibration and regenerated noise impacts to receivers opposite the site are also predicted to be minimal.

For sensitive receivers on zero-boundary with the site, exceedances of NMLs become increasingly likely as demolition activities approach these receivers. As works will occur immediately adjacent to some boundary receivers, vibration and regenerated noise impacts will require preference of shears/pulverisers in lieu of hammers, and separation of structures where possible using saw cutting and hand tools. Additional mitigation measures will be necessary for the management of noise and vibration impacts to these receivers.

There is also potential for cumulative impacts to occur to receivers along Macquarie Street due to concurrent construction of the Parramatta Light Rail as well as a number of other commercial mid- and high-rise developments in this area. Consultation with affected receivers will take place once COVID restrictions allow and site-specific mitigation measures will be updated where necessary.

Finally, a number of heritage structures including the sub-surface heritage drain will require monitoring where demolition activities approach these receivers.

8 REFERENCES

Additional guidelines and standards relating to the management of construction noise and vibration from this project include:

- Australian Standard AS/NZS 2107, 2000, Acoustics - Recommended design sound levels and reverberation times for building interiors
- Australian Standard AS2436, 1981, Guide to Noise Control on Construction, Maintenance and Demolition Sites
- British Standard BS 6472, 2008, Evaluation of human exposure to vibration in buildings (1- 80Hz)
- British Standard 7385: Part 2, 1993, Evaluation and measurement of vibration in buildings
- Department of Environment and Climate Change, 2009, Interim Construction Noise Guideline (ICNG)
- Department of Planning, Industry and Environment, 2021, Sydney Metro West - Concept and Stage 1 Conditions of Approval
- Federal Transit Administration, 2006, Transit Noise and Vibration Impact Assessment
- German Standard DIN4150, 1999, Structural vibration Part 3: Effects of vibration on Structures
- NSW Dept. of Environment, Climate Change and Water, 2011, Road Noise Policy
- NSW Environment Protection Authority, 2017, Noise Policy for Industry
- NSW Department of Environment and Conservation, 2006, Assessing vibration: a technical guideline
- Roads and Traffic Authority, 2001, Environmental Noise Management Manual (ENMM)
- Sydney Metro, 2020, Sydney Metro Construction Noise and Vibration Standard
- Sydney Metro, 2020, Sydney Metro West Westmead to The Bays and Sydney CBD – Environmental Impact Statement
- Sydney Metro, 2020, Sydney Metro West Westmead to The Bays and Sydney CBD - Submissions Report

9 APPENDICES

Appendix A - Monitoring Locations and Sensitive Receivers

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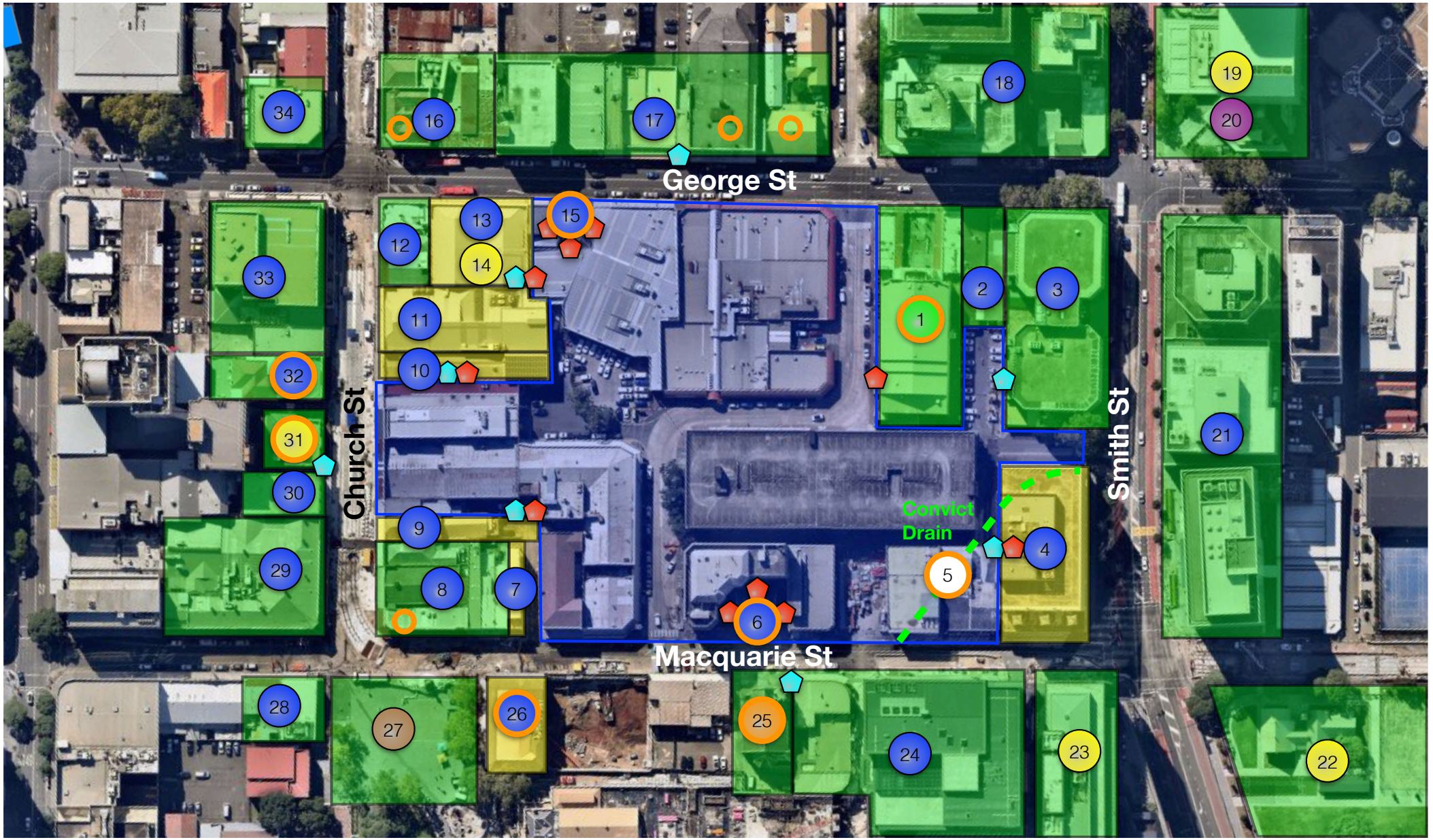

Impact Category

- Low Impact
- Moderate Impact
- High Impact
- Demolition Zone

Monitoring Category

- Noise
- Regenerated Noise
- Vibration
- Noise & Vibration

Sensitive Receiver Category

- Commercial
- Residential
- Educational
- Other - Theatre
- Childcare
- Place of worship
- Passive Recreation
- Heritage

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Sydney Metro Demolition - Parramatta
Noise and Vibration Sensitive Receivers

Date: 18/09/2021
Created by: MDS
Project No: 0121 023

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Appendix B - Heritage Specialist Advice on Monitoring Methods and Locations

To be included once lockdown restrictions enable onsite consultation with heritage consultant.

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Appendix C – Consultation Register

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REVIEW COMMENTS SHEET

DOCUMENT NO.	TITLE	VER	STATUS	NO.	DATE	COMPANY	RAISED BY	REVIEW DOC. NO.*	DOCUMENT REF*	DEED REF*	COMMENTS / RESPONSE	COMMENT CATEGORY*	CLOSED OUT
SMWSDDS-DLT-PTA-PA-PLN	Detailed Noise & Vibration Impact Statement (Parramatta)	01.01	RVW	01	7/09/2021	SMD	APARKER	SMWSDDS-DLT-PTA-PA-PLN-000042	N/A	N/A	No mention to pre construction surveys in noise and vibration mitigations. Should this be included?	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	N/A	N/A		Observation	Y
				01.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	N/A	N/A	Covered in Section 6.1.6 but added to Table 15 to be sure to be sure	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	N/A	N/A		Observation	Y
				02	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	General		The CNVS is referred to briefly in a couple of places in the document but the overall DNVIS requirements in the CNVS are not spelt out or specifically addressed, e.g. in 2.1	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	General			Observation	Y
				02.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	General		The CNVS requirements of DNVIS are now listed in the overarching CNVMP document in Section 7 and include references to where these requirements are addressed.	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	General			Observation	Y
				03	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	Table numbering		Table 1 appears twice	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	Table numbering			Observation	Y
				03.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	Table numbering		All numbering has been reformatted using cross-references	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	Table numbering			Observation	Y
				04	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	3.1		3.1 should refer to the requirements in the CNVMP, including D34, D39, D40, D45 and REMM NV18	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	3.1			Observation	Y
				04.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	3.1		Amended	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	3.1			Observation	Y
				05	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	4.1.1		4.1.1 states "no residential sensitive receivers were identified for the Parramatta site". Please clarify how this has been determined, noting: - the comment in the EIS thatthe nearest residential receiver is "about 20 metres to the north of the construction site on the corner of George Street and Horwood Place". - any more recent insight from the PLR team	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	4.1.1			Observation	Y
				05.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	4.1.1		Confirmed that this receiver (52 George St) is not residetial as indicated in EIS. Refer link: https://www.onthehouse.com.au/property/nsw/parramatta-2150/6-52-george-st-parramatta-nsw-2150-12586817	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	4.1.1			Observation	Y
				06	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	4.3		4.3 does not address the vibration criteria applicable to unsound structures (e.g. D39, D49).	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	4.3			Actual Non-Compliance	Y

DOCUMENT NO.	TITLE	VER	STATUS	NO.	DATE	COMPANY	RAISED BY	REVIEW DOC. NO.*	DOCUMENT REF*	DEED REF*	COMMENTS / RESPONSE	COMMENT CATEGORY*	CLOSED OUT
				06.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	4.3		See revised Section 4.3.2	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	4.3			Actual Non-Compliance	Y
				07	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	5.1		Section 5.1refers to the PLR management plan, but please confirm the PLR comms /stakeholder team have also provided more up todate input.	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	5.1			Actual Non-Compliance	Y
				07.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	5.1		PLR have not yet provided any more up to date information than is available publicly.	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	5.1			Actual Non-Compliance	Y
				08	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	5.1		Given the desktop approach, it would be logical to ground truth the land-use assumptions as early as practical. Can this be included in the plan?	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	5.1			Actual Non-Compliance	Y
				08.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	5.1		Comment added to Section 5.1	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	5.1			Actual Non-Compliance	Y
				09	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	Table 8		Table 8 appears to be missing some relevant receivers, based on Google maps, e.g.: - the passive recreation area at the junction of Church and Macquarie Streets - the heritage building 43-47 George Street	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	Table 8			Actual Non-Compliance	Y
				09.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	Table 8		Complete review of all sensitive receivers completed. These receivers and more now added. Refer Table 9.	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	Table 8			Actual Non-Compliance	Y
				10	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	Table numbering		Table 8 appears twice	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	Table numbering			Actual Non-Compliance	Y
				10.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	Table numbering		All numbering has been reformatted using cross-references	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	Table numbering			Actual Non-Compliance	Y
				11	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	5.3		Do the prediction noise levels include the 5dBA penalty forannoying noise as per the approval?	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	5.3			Actual Non-Compliance	Y
				11.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	5.3		Yes. Refer to updated Section 5.2 and 5.3	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	5.3			Actual Non-Compliance	Y
				12	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	5.2		5.2 states "Sound power levels provided in the table above should be verified against specifications of actual equipment used onsite." This conflicts with Section 8.3.6 of the CNVMP which requires "Noise levels of plant and equipment shall be assessed for compliance with the Maximum Allowable Plant Sound Power Levels listed in the DNVIS for the project."	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	5.2			Minor Non-Compliance	Y

DOCUMENT NO.	TITLE	VER	STATUS	NO.	DATE	COMPANY	RAISED BY	REVIEW DOC. NO.*	DOCUMENT REF*	DEED REF*	COMMENTS / RESPONSE	COMMENT CATEGORY*	CLOSED OUT
				12.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	5.2		Comment deleted. Added Section 6.1.4 Auditing to DNVIS	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	5.2			Minor Non-Compliance	Y
				13	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	5.4		Please confirm Table 10 lists all receivers likely to be directly coupled to the works.	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	5.4			Minor Non-Compliance	Y
				13.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	5.4		Confirmed and updated	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	5.4			Minor Non-Compliance	Y
				14	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	5.5		Table 13 needs to be updated to address potentially unsound structures (D39, D49)	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	5.5			Actual Non-Compliance	Y
				14.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	5.5		Updated	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	5.5			Actual Non-Compliance	Y
				15	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	5.5.1		5.5.1 addressed D49 but only in respect if the convict drain. The same principle applies to allstructures.	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	5.5.1			Actual Non-Compliance	Y
				15.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	5.5.1		Added commentary on Kia Ora, Heritage Shops, Roxy Theatre and Other Heritage Receivers	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	5.5.1			Actual Non-Compliance	Y
				16	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	7.1		7.1 states monitoring results will be reviewed "to ensure ongoing compliance". Additional objectives should include: - confirming levels at the start of key activities - reviewinglevels in the event of complaints - providing feedback into the prediction model, where appropriate - identifying opportunities to reduce impact	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	7.1			Observation	Y
				16.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	7.1		Now Section 6.1. Updated with additional objectives.	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	7.1			Observation	Y
				17	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	7.1		7.1 does notaddressattendedmonitoring (required by 8.3.4 of CNVMP)	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	7.1			Minor Non-Compliance	Y
				17.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	7.1		Now Section 6.1. Updated to address attended monitoring.	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	7.1			Minor Non-Compliance	Y
				18	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	7.2.1		Reference to CNVS as Strategy (current version is Standard)	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	7.2.1			Minor Non-Compliance	Y
				18.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	7.2.1		Amended	Minor Non-Compliance	Y

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								SMWSDDS-DLT-PTA-PA-PLN-000042	7.2.1			Minor Non-Compliance	Y
				19	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	7.2.3		7.2.3 does not address theadditional mitigation requirements of the CNVS	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	7.2.3			Minor Non-Compliance	Y
				19.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	7.2.3		Complete revision of standard and addition mitigation measures has been conducted in line with CNVS requirements.	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	7.2.3			Minor Non-Compliance	Y
				20	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	General		The document should be revised to ensure that it meets the requirements of the Sydney Metro Construction Noise and Vibration Standard, specifically Sections 3, 4, 5 and 6 which outline the construction noise and vibration assessment methodology, the application of mitigation measures and the monitoring, auditing and reporting requirements respectively. The current revision of the document does not satisfy the requirements of each of these sections.	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	General			Minor Non-Compliance	Y
				20.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	General		Assessment methodology has been updated as per CNVS and documented in the CNVMP. Complete revision of standard and addition mitigation measures has been conducted in line with CNVS requirements. Monitoring, auditing and reporting requirements have also been addressed.	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	General			Minor Non-Compliance	Y
				21	7/09/2021	ACS	DANDERSON	SMWSDDS-DLT-PTA-PA-PLN-000042	References		Reference to CNVS as Strategy (current version is Standard)	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	References			Minor Non-Compliance	Y
				21.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	References		Amended	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	References			Minor Non-Compliance	Y
				22	7/09/2021	SMD	JIEROKLIS	SMWSDDS-DLT-PTA-PA-PLN-000042	Figure 1	N/A	Figure 1 is out of date. There is no longer a proposed Metro station at Rydalmere. Please use the attached figure instead.	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	Figure 1	N/A		Observation	Y
				22.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	Figure 1	N/A	Updated	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	Figure 1	N/A		Observation	Y
				23	13/09/2021	HBI	JROBERTSON	SMWSDDS-DLT-PTA-PA-PLN-000042	2.1	SSI	Correct reference for SSI should be Sydney Metro West - Concept and Stage 1 Conditions of Approval (SSi 10038), not "Demolition phase"	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	2.1	SSI		Observation	Y
				23.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	2.1	SSI	Amended	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	2.1	SSI		Observation	Y
				24	13/09/2021	HBI	BMCLENNAN	SMWSDDS-DLT-PTA-PA-PLN-000042	2.2	N/A	Outline the scope of works, not the Particular Specification	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	2.2	N/A		Observation	Y

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				24.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	2.2	N/A	Updated with brief summary of Delta's SoW	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	2.2	N/A		Observation	Y
				25	13/09/2021	HBI	BMCLENNAN	SMWSDDS-DLT-PTA-PA-PLN-000042	2.2	N/A	Please update to show howsalvage and location of items storage relate to the DNVIS	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	2.2	N/A		Observation	Y
				25.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	2.2	N/A	Updated wording in management plan "Sydney Metro will advise Delta of the items to be salvaged and the location where the items are to be delivered. Delta will then carry out this work prior to commencement of heavy structural demolition. Storage of items will be offsite at location as advised by Sydney Metro. This will remove any risk of damage as a result of site works"	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	2.2	N/A		Observation	Y
				26	13/09/2021	HBI	BMCLENNAN	SMWSDDS-DLT-PTA-PA-PLN-000042	Figure 2	N/A	No legend in Figure 2 to determine which is demolished or demolished	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	Figure 2	N/A		Observation	Y
				26.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	Figure 2	N/A	Amended	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	Figure 2	N/A		Observation	Y
				27	13/09/2021	HBI	BMCLENNAN	SMWSDDS-DLT-PTA-PA-PLN-000042	Figure 2	NVM15	Is site office / Amenities proposed after demolition of Crunch Fitness? How will the proposed location aid in mitigation NVM15?	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	Figure 2	NVM15		Observation	Y
				27.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	Figure 2	NVM15	NVM15 no longer exists. Note after Figure 3 regarding Crunch Fitness	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	Figure 2	NVM15		Observation	Y
				28	13/09/2021	HBI	BMCLENNAN	SMWSDDS-DLT-1NL-EM-PLN-000042	General	N/A	Check cross references and duplication of references throughout document.	Observation	Y
								SMWSDDS-DLT-1NL-EM-PLN-000042	General	N/A		Observation	Y
				28.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-1NL-EM-PLN-000042	General	N/A	All numbering has been reformatted using cross-references	Observation	Y
								SMWSDDS-DLT-1NL-EM-PLN-000042	General	N/A		Observation	Y
				30	13/09/2021	HBI	BMCLENNAN	SMWSDDS-DLT-1NL-EM-PLN-000042	4.1.1	CNVS	Note from theEIS - The nearest residential receiver is located about 20 metres to the north of the construction site on the corner of George Street and Horwood Place. Please indicate if conditions have changed and how this was determined. Also note the requirements from the Sydney Metro Construction Noise and Vibration Standard) -All noise and vibration predictions are to be presented (as a minimum) as façade noise maps for a distance of at least 300 m in all directions from each work site / project area under assessment Sm	Minor Non-Compliance	Y
								SMWSDDS-DLT-1NL-EM-PLN-000042	4.1.1	CNVS		Minor Non-Compliance	Y

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				30.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-1NL-EM-PLN-000042	4.1.1	CNVS	Confirmed that this receiver (52 George St) is not residetial as indicated in EIS. Refer link: https://www.onthehouse.com.au/property/nsw/parramatta-2150/6-52-george-st-parramatta-nsw-2150-12586817Agreed with all stakeholders in Management Plan Review Meeting on 16/09/2021 that facade noise maps/contours were not suitable/required given the generally low predictednoise/vibration impacts and expected compliance thereof beyond the nearest immediate receivers. All receivers have been assessed to a distance beyond which noise/vibration impacts are negligible.	Minor Non-Compliance	Y
								SMWSDDS-DLT-1NL-EM-PLN-000042	4.1.1	CNVS		Minor Non-Compliance	Y
				31	13/09/2021	HBI	BMCLENNAN	SMWSDDS-DLT-1NL-EM-PLN-000042	5.1 Table 8	CNVS	Update table for receivers within 300m as per the CNVS	Minor Non-Compliance	Y
								SMWSDDS-DLT-1NL-EM-PLN-000042	5.1 Table 8	CNVS		Minor Non-Compliance	Y
				31.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-1NL-EM-PLN-000042	5.1 Table 8	CNVS	Agreed in Management Plan Review Meeting on 16/09/2021 that including receivers out to 300m was unnecessary given the generally low predictednoise/vibration impacts and expected compliance thereof beyond the nearest immediate receivers.	Minor Non-Compliance	Y
								SMWSDDS-DLT-1NL-EM-PLN-000042	5.1 Table 8	CNVS		Minor Non-Compliance	Y
				32	13/09/2021	HBI	BMCLENNAN	SMWSDDS-DLT-PTA-PA-PLN-000042	5.1 - 5.3, Table 8	CoA + REMMS	Please incorporate the CoA and REMMS into the assessment of the predicted noise levels. Table 8 - The DNVIS should include the plant proposed for site and maximum levels checked against the CNVS The predicted noise model doesn't include scenario based impacts to receivers or the frequency of the impacts. Items that are "particularly annoying" as per the ICNG have not been identified and the addition of 5 dB(A) included.	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	5.1 - 5.3, Table 8	CoA + REMMS		Actual Non-Compliance	Y
				32.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	5.1 - 5.3, Table 8	CoA + REMMS	Assessment methodology has been updated as per CNVS. Noise predictions are now scenario-based. Noise mitigation measures and penalties included in assessment now identified.	Actual Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	5.1 - 5.3, Table 8	CoA + REMMS		Actual Non-Compliance	Y
				33	13/09/2021	HBI	BMCLENNAN	SMWSDDS-DLT-PTA-PA-PLN-000042	General	CNVS	The document doesn't satisfy the requirements of the CNVS, please update construction noise and vibration assessment methodology, mitigation measures, monitoring, auditing and reporting in relation to the CNVS.	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	General	CNVS		Minor Non-Compliance	Y
				33.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	General	CNVS	Assessment methodology has been updated as per CNVS and documented in the CNVMP. Complete revision of standard and addition mitigation measures has been conducted in line with CNVS requirements. Monitoring, auditing and reporting requirements have also been addressed.	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	General	CNVS		Minor Non-Compliance	Y
				34	13/09/2021	HBI	BMCLENNAN	SMWSDDS-DLT-PTA-PA-PLN-000042	7.2.2	CoA D38, D43, D44, D51; REMM NV01	Community consultation and feedback has not been included in the DNVMP. Noting that consultation may include non-contact means (email/phone/letters), this should be incorporated into the plan and OOHW.	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	7.2.2	CoA D38, D43, D44, D51; REMM NV01		Minor Non-Compliance	Y
				34.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	7.2.2	CoA D38, D43, D44, D51; REMM NV01	An Appendix will be added to the back of the plan that will Community Consultation as it is completed. This will include consultation such as - Workshop delivered on 08/09 and 09/09, this comments register and any other comments that are received.	Minor Non-Compliance	Y

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								SMWSDDS-DLT-PTA-PA-PLN-000042	7.2.2	CoA D38, D43, D44, D51; REMM NV01		Minor Non-Compliance	Y
				35	13/09/2021	HBI	BMCLENNAN	SMWSDDS-DLT-PTA-PA-PLN-000042	7.1.1	REMM NC16	Include outcomes from consultation with the heritage specialist.	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	7.1.1	REMM NC16		Minor Non-Compliance	Y
				35.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-PTA-PA-PLN-000042	7.1.1	REMM NC16	(Now Section 6.1.1) GML has been engaged by Delta as Heritage specialist for the project. A time will be arranged in coordination with Sydney Metro Property Team, GML and Osterman to assess the Heritage Structures as soon as restrictions allow.Note these properties are currently occupied until 21st October.	Minor Non-Compliance	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	7.1.1	REMM NC16		Minor Non-Compliance	Y
				36	13/09/2021	HBI	BMCLENNAN	SMWSDDS-DLT-1NL-EM-PLN-000042	4.3.1	REMM NV16	Where vibration levels are predicted to exceed the screening criteria, a more detailed assessment of the structure (in consultation with astructural engineer) and vibration monitoring would be carried out to ensure vibration levels remain below appropriate limits for thatstructure.	Minor Non-Compliance	Y
								SMWSDDS-DLT-1NL-EM-PLN-000042	4.3.1	REMM NV16		Minor Non-Compliance	Y
				36.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-1NL-EM-PLN-000042	4.3.1	REMM NV16	This is already stated in Section 4.3. Wording in Section 4.3 has been made consistent with the CoA.	Minor Non-Compliance	Y
								SMWSDDS-DLT-1NL-EM-PLN-000042	4.3.1	REMM NV16		Minor Non-Compliance	Y
				37	13/09/2021	HBI	BMCLENNAN	SMWSDDS-DLT-1NL-EM-PLN-00042	7.2	REMM NV14	REMM has not been incorporated into mitigation measures. Please check all CoA, REMMS, CEMF and CNVS requirements are included.	Actual Non-Compliance	Y
								SMWSDDS-DLT-1NL-EM-PLN-00042	7.2	REMM NV14		Actual Non-Compliance	Y
				37.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-1NL-EM-PLN-00042	7.2	REMM NV14	Added NV14 to Table Added Section 5.6 - no further mitigation measures have been identified as necessary for construction traffic noise	Actual Non-Compliance	Y
								SMWSDDS-DLT-1NL-EM-PLN-00042	7.2	REMM NV14		Actual Non-Compliance	Y
SMWSDDS-DLT-PTA-PA-PLN-000042	**Detailed Noise & Vibration Impact Statement (Parramatta)**	02.01	RVW	29	13/09/2021	HBI	BMCLENNAN	SMWSDDS-DLT-1NL-EM-PLN-000042	3.1 Table 1	CoA	Table header should be CoA. Please include all CoA relevant to the DNVIS. Add relevant REMMS and CEMF requirements to compliance matrix.	Actual Non-Compliance	Y
								SMWSDDS-DLT-1NL-EM-PLN-000042	3.1 Table 1	CoA		Actual Non-Compliance	Y
				29.01	27/09/2021	DLT	DKADYAN	SMWSDDS-DLT-1NL-EM-PLN-000042	3.1 Table 1	CoA	Amended	Actual Non-Compliance	Y
								SMWSDDS-DLT-1NL-EM-PLN-000042	3.1 Table 1	CoA		Actual Non-Compliance	Y
				29.01.01	4/10/2021	HBI	BMCLENNAN				Please include the following CoA's - C-A1, A1, C16-C23 Make note that while REMM NV17 is applicable to this Phase, no excavation or tunnelling works are in this scope of works and is therefore not applicable to this DNVIS.	Actual Non-Compliance	Y
												Actual Non-Compliance	Y
				29.01.01 .01	16/10/2021	DLT	ALUMSDEN				updated table to address comments	Actual Non-Compliance	Y
												Actual Non-Compliance	Y
				38	4/10/2021	HBI	BMCLENNAN	SMWSDDS-DLT-PTA-PA-PLN-000042	6.1.6	N/A	Suggest removing references to "shaft bulk excavation works" as it is not part of the Delta scope in 2.2	Observation	Y
								SMWSDDS-DLT-PTA-PA-PLN-000042	6.1.6	N/A		Observation	Y
				38.01	16/10/2021	DLT	ALUMSDEN				reference removed	Observation	Y
												Observation	Y
SMWSDDS-DLT-PTA-PA-PLN-000042	**Detailed Noise & Vibration Impact Statement (Parramatta)**	**00.01**	**RVW**										
SMWSDDS-DLT-PTA-PA-PLN-000042	**Detailed Noise & Vibration Impact Statement (Parramatta)**	**03.01**	**RVW**										