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ST MARY'S TEMPORARY BUS INTERCHANGE EARLY WORKS DETAILED NOISE & VIBRATION IMPACT STATEMENT (DNVIS)

Report 11.00323R-03

prepared for Ward Civil Engineering Pty Ltd
on 24/11/2021

REPORT PREPARED BY

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BASIS OF REPORT

This report has been prepared by **Acoustics Consultants Australia (ACA)** with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with the Client. Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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DOCUMENT CONTROL

REFERENCE	DATE	PREPARED	REVIEWED	AUTHORISED
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Report 11.00323R-03

1. INTRODUCTION

Acoustics Consultants Australia (ACA) has been engaged by Ward Civil & Engineering Pty Ltd (Ward) to prepare a Detailed Noise and Vibration Impact Statement (DNVIS) for the Advanced and Enabling Works (AEW) in relation to the St Marys Temporary Bus Interchange (TBI), which form part of the Sydney Metro Western Sydney Airport (SMWSA) Project (SSI 10051).

Primarily, this document has been prepared to fulfil the requirements of the Critical State Significant Infrastructure (CSSI) Approval Condition E47 that requires a DNVIS and Condition C13 that requires a Construction Noise and Vibration Monitoring Program. This DNVIS forms part of the Construction Environmental Management Plan (CEMP), or equivalent document, in accordance with the Sydney Metro Construction Environmental Management Framework (CEMF).

The included assessments have been undertaken in accordance with the provisions of the NSW Interim Construction Noise Guideline – (ICNG), the Sydney Metro – Western Sydney Airport Construction Noise & Vibration Strategy (Ver 4.2, 8 September 2020) – (CNVS) and relevant Conditions of Approval as set out in the Department of Planning, Industry and Environment's Critical State Significant Infrastructure Approval for Sydney Metro – Western Sydney Airport (SSI 10051).

The AEW – St Marys TBI scope s not subject to an Environment Protection Licence (EPL).

The AEW – St Marys TBI works are proposed to generally occur within standard construction hours, however, the planning approval allows for alternate working hours for the works that cannot be completed during standard hours, provided the works are managed appropriately.

This document details Noise Management Level (NML) exceedances and mitigation requirements for the standard hours works and the proposed out-of-hours works. The extent of works undertaken outside of standard hours would be dependent on relevant approvals and be subject to specific negotiated respite measures, as permissible under the CSSI Approval.

The main objectives of this DNVIS are to minimise unreasonable noise and vibration impacts on residents and businesses, and to avoid structural damage to buildings or heritage items as a result of construction vibration.

This DNVIS aims to support active community communication and maintain positive, cooperative relationships with local residents, businesses and building owners. The mitigation measures proposed in this DNVIS have been determined in consultation with the potentially affected members of the community.

It is noted that ongoing community engagement and management of such relationships is primarily managed via the Sydney Metro – Western Sydney Airport Community Communications Strategy.

A copy of this DNVIS must be provided to the ER before commencement of the works.

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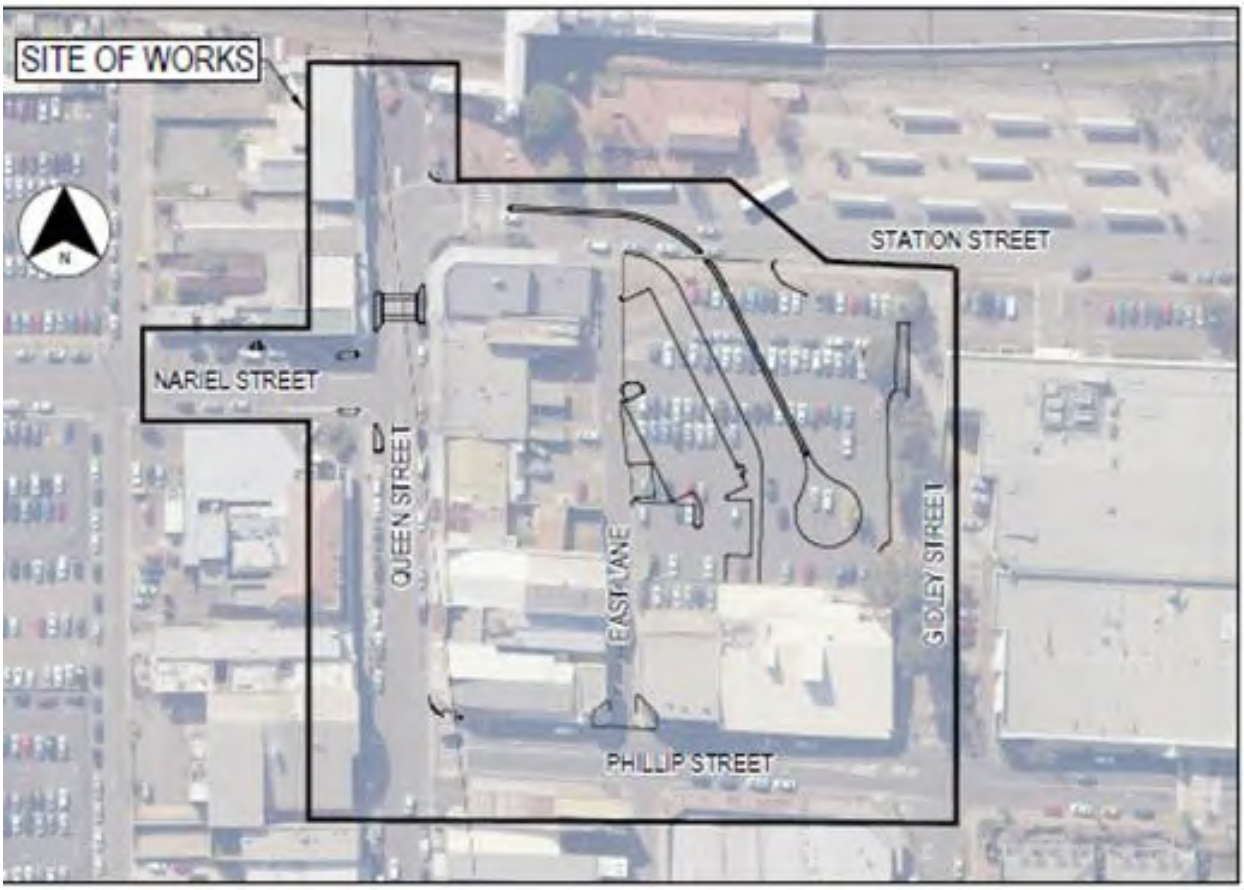
2. SITE DESCRIPTION

The primary works area is currently a council managed public car park (Station Street). The primary work area is primarily an existing hard stand area, with a grass nature strip and pedestrian path adjacent to Station Street. The car park provides limited duration public parking. The remaining work areas are located on surrounding local roads.

The site is located within the Penrith City Council LGA and is zoned B4 Mixed Use with the surrounding area a combination of R4 (high density residential), R2 (low density residential), R3 (medium density residential) and SP2 (Infrastructure Railway) immediately to the north to site.

St Marys Station is located immediately to the north on the opposite side of Station Street

Figure 2-1 St Mary's Bus Exchange Early Works – Overview



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3. PROJECT DESCRIPTION

The key features of Ward's scope of works are to complete the AEW – St Marys TBI which is being constructed off Station Street within an existing car parking facility. The works will involve:

- Establishment of an ancillary facility in a vacant parcel of land off Station Street, St Marys;
- Construct the permanent and temporary pavements for the St Marys TBI;
- Mill and place asphalt overlay to the existing pavement on Station Street to match existing levels and carpark to required levels;
- Raised pedestrian crossings on Queen Street and at grade pedestrian crossing on Nariel Street and pram ramps;
- Bus stops on Phillip Street;
- Reconfiguration of existing carpark on East Lane;
- Utility relocations;
- Drainage installation;
- Install road furniture;
- Install CCTV Surveillance;
- Install wayfinding signage;
- Relocate bus shelters for customers and shades for kiss-and-ride passengers;
- Install street lighting;
- Lane resurfacing on Phillip Street/ Queen Street and Nariel Street; and
- Construction of dedicated driver facility (DDF) unit in the temporary bus interchange.

This Scope of works is depicted in **Figures 3-1** and **3-2**.

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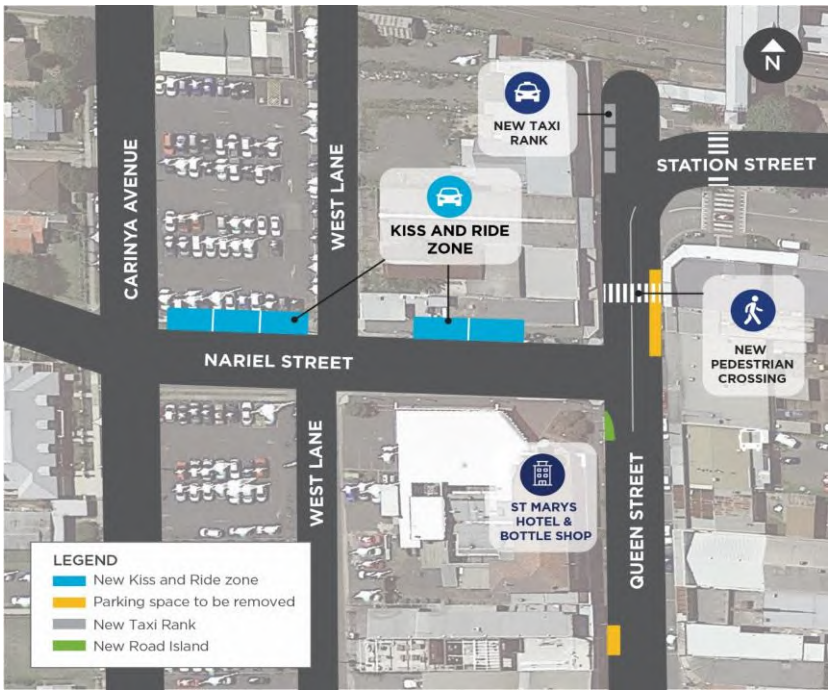
Figure 3-1 Key Features for the St Marys TBI Works

Figure 3-2 Key features for the Nariel St Scope of Works



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4. RELEVANT CONDITIONS OF APPROVAL

The Sydney Metro Western Sydney Airport Approval includes several Conditions that relate to noise and vibration. These Conditions are interrelated with the requirements of the DNVIS and accordingly have been considered by this assessment.

The specific requirements of the DNVIS are set out under Condition E47, as follows:

E47 - 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 E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. 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 ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.*

Table 4-1 summarises the DNVIS requirements set out in the CNVS and **Table 4-2** summarises the various noise and vibration Approval Conditions and where reference to these is made by this DNVIS.

Table 4-1 DNVIS Requirements per CNVS

DNVIS Requirements	Where Addressed
Identify all Noise and Vibration Sensitive Receivers (NSRs) which may be affected by the project.	Section 6
Conduct background noise monitoring at representative NSRs to determine the rating background noise levels (RBLs) in accordance with the procedures presented in the EPA's Noise Policy for Industry, where RBLs have not been established in previous project stages.	Section 7
Determine the appropriate noise and vibration management levels of each NSR.	Section 8 / 9
Determine the source noise levels (Sound Power Levels) of each noise generating plant and equipment item required to undertake the construction scenario. Note: Sound Power Levels for each plant and equipment would be less than the maximum allowable levels found in Table 13 and Table 14.	Section 8
Clearly indicate which mitigation measures identified in Section 4 have been/are to be incorporated into the noise assessment. Noise mitigation measures to be implemented will vary for reasons such as safety and space constraints, these are to be identified and the calculations adjusted accordingly.	Section 8

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DNVIS Requirements	Where Addressed
For location specific construction scenarios and where applicable for generic scenarios, include the effects of noise shielding provided by site offices, residential fences, noise barriers or natural topographic features.	Section 8
Where applicable include the effects of noise reflections and ground attenuation.	Section 8
Calculate the LAeq noise or range of levels from construction scenarios at sensitive receiver groups, with the use of noise contour maps where appropriate and/or at 10 m, 25 m, 50 m, 75 m,100 m and 200 m for more general construction activities.	Section 8 Appendix D Appendix E
Compare these against the goals identified for each NSR and identify predicted exceedances.	Appendix D
For night-time activities, calculate exceedances over the: *o LAeq,15min 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and* *o LAFmax 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.* *Where exceedances are predicted to occur, undertake a detailed maximum noise level event assessment in accordance with the Noise Policy for Industry (EPA, 2017).*	Appendix D
On completion of all DNVIS reports for the subjective classification of the noise impact is to be evaluated and documented as: *o Low Impact* *o Moderate Impact* *o High Impact*	Section 11
As a result of noise classification and/or the noise level exceedances at sensitive receivers provided by the DNVIS reports, appropriate reasonable and feasible noise mitigation is to be adopted and implemented. For sites where works are predicted to significantly exceed noise goals and impact on receivers for a significant period of time, additional reasonable and feasible noise mitigation measures such as those outlined in Section 5 would be considered if practical to reduce the noise levels and impact on sensitive receivers.	Section 11 Appendix D

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Table 4-2 Approval Conditions Relating to Noise and Vibration

Approval Conditions	Where Addressed
E37 - Land Use Survey *A detailed land use survey must be undertaken to confirm sensitive land use(s) (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 Detailed Noise and Vibration Impact Statements required under Condition E47.*	Section 6
E38 - Construction Hours *Work must only be undertaken during the following hours:* *(a) 7:00am to 6:00pm Mondays to Fridays, inclusive;* *(b) 8:00am to 1:00pm Saturdays; and* *(c) at no time on Sundays or public holidays.*	Section 5
E39 - Highly Noise Intensive Work *Except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42, highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:* *(a) between the hours of 8:00 am to 6:00 pm Monday to Friday;* *(b) between the hours of 8:00 am to 1:00 pm Saturday; and* *(c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour.* *For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.*	Section 8

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Approval Conditions	Where Addressed
E41- Variation to Work Hours *Notwithstanding Conditions E38 and E39 work may be undertaken outside the hours specified in the following circumstances:* *(a) Safety and Emergencies, including:* *(i) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or* *(ii) where it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm; or* *(b) Low impact, including:* *(i) construction that causes LAeq(15 minute) noise levels:* *• no more than 5 dB(A) above the rating background level at any residence in accordance with the ICNG, and* *• no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s); and* *(ii) construction that causes:* *• continuous or impulsive vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), or* *• intermittent vibration values measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or* *(c) By Approval, including:* *(i) where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or* *(ii) works which are not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by Condition E42; or* *(iii) negotiated agreements with directly affected residents and sensitive land user(s);*	Section 5

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Approval Conditions	Where Addressed
E42 - Out-of-Hours Work Protocol – Work not subject to an EPL *An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of work (not subject to an EPL) that is outside the hours defined in Conditions E38 and E39. The Protocol must be approved by the Planning Secretary before commencement of the out-of-hours work. The Protocol must be prepared in consultation with the ER. The Protocol must provide:* *(a) justification for why out-of-hours work need to occur;* *(b) identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where:* *(i) the ER reviews all proposed out-of-hours activities and confirms their risk levels;* *(ii) low risk activities that can be approved by the ER; and* *(iii) high risk activities that are approved by the Planning Secretary;* *(c) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria;* *(d) a process for selecting and implementing mitigation measures for residual impacts in consultation with the community at each affected location, including respite periods consistent with the requirements of Condition E56. The measures must take into account the predicted noise levels and the likely frequency and duration of the out-of-hours works that sensitive land user(s) would be exposed to, including the number of noise awakening events;* *(e) procedures to facilitate the coordination of out-of-hours work including those approved by an EPL or undertaken by a third party, to ensure appropriate respite is provided; and* *(f) notification arrangements for affected receivers for all approved out-of-hours works and notification to the Planning Secretary of approved low risk out-of-hours works.* *This condition does not apply if the requirements of Condition E41 are met.* *Note: Out-of-hours work is any work that occurs outside the construction hours identified in Condition E38 and E39.*	Section 5 Section 8

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Approval Conditions	Where Addressed
E43 - Construction Noise Management Levels and Vibration Criteria *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) preferred 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).* *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 that in accordance with the Sydney Metro Staging Plan, a noise and vibration sub-plan is not required for this scope of works. Noise and vibration impacts will be managed under the Project CEMP and relevant management procedures.* *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 8
***E44** - 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 E42.*	Section 9 Section 11

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Approval Conditions	Where Addressed
E45 *- 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.*	Section 6 Section 8
E46 - Construction Noise and Vibration Mitigation and Management *Industry best practice construction methods must be implemented where reasonably practicable to ensure that noise and vibration levels are minimised around sensitive land use(s). Practices may include, but are not limited to:* *(a) use of regularly serviced low sound power equipment;* *(b) at source control, temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting;* *(c) use of non-tonal reversing alarms; and* *(d) use of alternative construction and demolition techniques.*	Section 11
E47 *- 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 E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. 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 ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.*	Throughout
E48 *- 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 must 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 Sub-plan*	Section 9

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Approval Conditions	Where Addressed
E49 *- Where sensitive land use(s) are identified in Appendix B as exceeding the highly noise affected criteria during typical case construction, mitigation measures must be implemented with the objective of reducing typical case construction noise below the highly noise affected criteria at each relevant sensitive landuse(s). Activities that would exceed highly noise affected criteria during typical case construction must not commerce until the measures identified in this condition have been implemented, unless otherwise agreed with the Planning Secretary.* *Note: Mitigation measures may include path barrier controls such as acoustic sheds and/or noise walls, at-property treatment, or a combination of path and at-property treatment.*	Section 8
E50 *- For all construction sites where acoustic sheds are installed, the sheds must be designed, constructed and operated to minimise noise emissions. This would include the following considerations:* *(a) all significant noise producing equipment that would be used during the night-time would be inside the sheds, where feasible and reasonable;* *(b) noise generating ventilation systems such as compressors, scrubbers, etc, would be located inside the sheds and external air intake/discharge ports would be appropriately acoustically treated; and* *(c) the doors of acoustic sheds would be kept closed during the night-time period. Where night-time vehicle access is required at sites with nearby residences, the shed entrances would be designed and constructed to minimise noise breakout.*	n/a
E51 *- Where Condition E49 determines that at-property treatment (temporary or permanent) is the appropriate measure to reduce noise impacts, this at-property treatment must be offered to landowners of residential properties for habitable living spaces, unless other mitigation or management measures are agreed to by the landowner.* *Landowners must be advised of the range of options that can be installed at or in their property and given a choice as to which of these they agree to have installed.* *A copy of all guidelines and procedures that will be used to determine at-property treatment at their residence must be provided to the landowner.*	n/a
E52 *- Any offer for at-property treatment or the application of other noise mitigation measures in accordance with Condition E51, does not expire until the noise impacts specified in Condition E49, affecting that property are completed, even if the landowner initially refuses the offer.* *Note: If an offer has been made but is not accepted, this does not preclude the commencement of construction under Condition E49.*	n/a

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Approval Conditions	Where Addressed
E53 *- The implementation of at-property treatment does not preclude the application of other noise and vibration mitigation and management measures including temporary and long-term accommodation.*	Section 8
E54 - Construction Vibration Mitigation – Heritage Items *Vibration testing must be conducted during vibration generating activities that have the potential to impact on Heritage items to verify 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 9
E55 *- 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 9
E56 - Utility Coordination and Respite *All work undertaken for the delivery of the CSSI, including those undertaken by third parties (such as utility relocations), must be coordinated to ensure respite periods are provided. The Proponent must:* *(a) reschedule any work to provide respite to impacted noise sensitive land use(s) so that the respite is achieved in accordance with Condition E57; or* *(b) consider the provision of alternative respite or mitigation to impacted noise sensitive land use(s); and* *(c) provide documentary evidence to the ER in support of any decision made by the Proponent in relation to respite or mitigation.* *The consideration of respite must also include all other approved Critical SSI, SSI and SSD projects which may cause cumulative and / or consecutive impacts at receivers affected by the delivery of the CSSI.*	Section 8

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Approval Conditions	Where Addressed
E57 – Out-of-Hours Works – Community Consultation on Respite *In order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work must be identified in consultation with the community at each affected location on a regular basis. This consultation must include (but not be limited to) providing the community with:* *(a) a progressive schedule for periods no less than three (3) months, of likely out-of-hours work;* *(b) a description of the potential work, location and duration of the out-of-hours work;* *(c) the noise characteristics and likely noise levels of the work; and* *(d) likely mitigation and management measures which aim to achieve the relevant NMLs under Condition E43 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers).* *The outcomes of the community consultation, the identified respite periods and the scheduling of the likely out-of-hour work must be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.* *Note: Respite periods can be any combination of days or hours where out-of-hours work would not be more than 5 dB(A) above the RBL at any residence.*	Section 8

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5. DESCRIPTION OF PROPOSED CONSTRUCTION WORKS

The St Marys Bus Interchange Enabling Works Project involves predominantly standard hours works within the carpark. Additionally, some works within standard hours and out of hours periods on some road intersections surrounding the car park will be required. The works outside of standard hours are required to be undertaken at these times to limit any conflicts with traffic on the road network.

Staging Plans provided by Ward outlining the works are included in **Appendix B**. These form the basis of this assessment.

5.1. Proposed Works Schedule

The staging plans identify numerous sub-stages. For the purposes of assessment, construction noise predictions have been undertaken for 19 key sub-stages. A summary of the works to be undertaken and the representative 19 key sub-stages considered by this assessment are set out in **Table 8-5**.

5.2. Proposed Construction Hours

Works would predominantly be completed within standard hours, with some extensions as permissible under the CSSI Approval.

The construction hours for the Project are defined by the CSSI planning approval. The standard construction hours of work are defined by Condition E38, consistent with the CNVS, are:

(a) 7:00am to 6:00pm Mondays to Fridays, inclusive;

(b) 8:00am to 1:00pm Saturdays; and

(c) at no time on Sundays or public holidays.

5.3. Out of Hours Works

The CNVS notes the nature of infrastructure projects means evening and night works are likely to be required throughout construction due to various considerations including avoiding sensitive periods for sensitive receivers, delivery of oversized plant or structures, emergency works, or other activities that require the temporary closure of roads.

All out of hours works (except in emergency situations) will be managed under the Sydney Metro Out of Hours Works Protocol as required under CSSI Condition E42, which applies to out of hours work not subject to an EPL. Note that this Protocol was still in development during the development of this DNVIS.

Where works are proposed to be undertaken outside of the standard hours, specific respites and management measures for those works have been considered in consultation with the community as required.

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In accordance with the Sydney Metro Out of Hours Work Protocol, an out of hours application will be submitted to Sydney Metro, and independent Environmental Representative for relevant endorsements and approval when out of hours works are planned.

The Community Communication Strategy will also support Ward's application for commencing out of hours work. It will detail how the community will be notified in advance of planned activities, kept informed of works progress and how potential noise impacts will be managed.

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6. SENSITIVE RECEIVERS

In accordance with Condition E37, Ward has undertaken a land use survey of the area surrounding the works. The land use survey was undertaken on 7 September 2021. This survey was undertaken to inform this DNVIS. This has identified a mix of commercial and residential uses in the immediate areas surrounding the works areas. No critical working areas such as operating theatres and precision laboratories have been identified.

Figure 6-1 shows the representative residential receivers surrounding the works areas considered by this assessment and **Figure 6-2** shows the representative non-residential (commercial) receivers surrounding the works areas. Receiver addresses are summarised in **Appendix D**.

Figure 6-1 Representative Residential Receivers Surrounding the Works

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Figure 6-2 Representative Non-Residential Receivers Surrounding the Works

Note: Receiver C10 is the St Mary's Hotel which includes a residential component on the first floor. For the purposes of assessment, the first floor has been considered a residential use. Receiver C26 is a Childcare Centre located within the Station Plaza building – this has a semi-enclosed play area to the east of the building.

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7. EXISTING NOISE ENVIRONMENT

The noise and vibration assessment undertaken as part of the Sydney Metro - Western Sydney Airport Environmental Impact Statement (EIS) is documented in the EIS Technical Paper 2 (*Sydney Metro - Western Sydney Airport Technical Paper 2: Noise and Vibration*).

The EIS study defined Noise Catchment Areas (NCAs) for the wider project. The sensitive receivers potentially affected by the St May's Bus Exchange Early Works are located with NCA3.

Table 7-1 sets out the existing ambient and background noise levels considered by this assessment. The levels for the Day, Evening and Night periods are consistent with the survey results identified by the EIS.

Table 7-1 Summary of NCA3 Unattended Noise Monitoring Results – Determined by EIS

Location	Rating Background Level - RBL (L_{A90} dBA)			Ambient Noise Level (L_{Aeq} dBA)		
	Day	Evening	Night	Day	Evening	Night
NM02	37	37	36	55	59	51

Time periods defined as follows – Day: 7.00am to 6.00pm Monday to Saturday, 8.00am to 6.00pm Sunday; Evening: 6.00pm to 10.00pm; and Night: 10.00pm to 7.00am Monday to Saturday, 10.00pm to 8.00am Sunday.

Consistent with the EIS study, the Rating Background Noise Levels (RBLs) shown have been considered in determining the construction noise criteria, as discussed in **Section 8**.

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8. AIRBORNE CONSTRUCTION NOISE

8.1. Airborne Construction Noise Criteria

8.1.1. NSW Interim Construction Noise Guideline (ICNG)

The CNVS notes that Construction Noise Management Levels (NMLs) for all Sydney Metro projects should be determined in accordance with the procedures nominated in the DECCW's "*Interim Construction Noise Guideline*" dated July 2009 (ICNG).

The noise criteria set out in the ICNG have been considered in the assessment of potential impacts from the project works. **Table 8-1** summarises the construction noise criteria recommended by the ICNG for residential receivers and **Table 8-2** summarises the criteria for non-residential receivers. **Table 8 2** additionally includes the construction noise criteria for relevant special use receivers (other sensitive land uses) not identified by the ICNG.

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Table 8-1 ICNG Airborne Construction Noise Criteria – Noise at Residences[1]

Time of Day	Management Level $L_{Aeq,15min}$	How to Apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq,15min}$ is greater than the noise affected level, the proponent would apply all feasible and reasonable work practices to minimise noise. The proponent would 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 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent would consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent would communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.
Outside recommended standard hours	Noise affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. The proponent would apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent would negotiate with the community. For guidance on negotiating agreements see Section 7.2.2 of the ICNG

Note 1: Adopted from the *ICNG*.
Note 2: Noise levels apply at the property boundary that is most exposed to construction noise (or receiver building façade that is most exposed to construction noise, noting that noise levels may be higher at upper floors of the noise affected receiver buildings). 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.

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Table 8-2 ICNG Airborne Construction Noise Criteria – Other Sensitive Land Uses

Land Use	Management Level $L_{Aeq, 15min}$ (applies when properties are being used)	Reference
Classrooms at schools and other educational	Internal noise level: 45 dBA[1]	ICNG[5]
Hospital wards and operating theatres	Internal noise level: 45 dBA [2]	ICNG[5]
Places of worship	Internal noise level: 45 dBA [3]	ICNG[5]
Active recreation areas	External noise level: 65 dBA	ICNG[5]
Passive recreation areas	External noise level: 60 dBA	ICNG[5]
Commercial premises (offices, etc)	External noise level: 70 dBA	ICNG[5]
Industrial premises	External noise level: 75 dBA	ICNG[5]
Childcare Centres (Sleeping areas)	Internal noise level: 35 dBA [4]	AAAC[6]
Childcare Centres (External areas)	Internal noise level: 55 dBA [4]	AAAC[6]

Notes: 1, 2, 3: External Noise Management Levels (NML) of $L_{Aeq,15min}$ 55 dBA are considered by this assessment, assuming 10dB attenuation achieved by façades with open window(s);
4: Based on visual inspection of the childcare centre on Station Street, external Noise Management Levels (NML) of $L_{Aeq,15min}$ 60 dBA are considered by this assessment, assuming 25 dB attenuation achieved by the building elements with closed/fixed window(s) for the indoor sleeping areas and 5 dB attenuation for the external play area;
5: Management Levels specified by Interim Construction Noise Guideline;
6: Management Level based on Australian Acoustical Consultants (AAAC) Technical Guideline on Child Care Centre Noise Assessments.

With consideration to the out of hours periods identified by the Sydney Metro Construction Noise and Vibration Standard, the resultant project specific NMLs set are out in **Table 8-3**.

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Table 8-3 Airborne Noise Management Levels (External Levels)

Location	Standard Hours (Day)		OOHW (Day)		OOHW (Evening)		OOHW (Night)	
	RBL	NML	RBL	NML	RBL	NML	RBL	NML
Residential	37	47	37	42	37	42	36	41
School (Classrooms)	n/a	55	n/a	55	n/a	55	n/a	55
Commercial (Offices)	n/a	70	n/a	70	n/a	70	n/a	70
Childcare Centre (External Play Areas)	n/a	60	n/a	60	n/a	60	n/a	60
Childcare Centre (External to Sleeping Areas)	n/a	60	n/a	60	n/a	60	n/a	60

Notes: RBL - Rating Background Noise Level; NML - Noise Management Level; Non-residential criteria only apply when receiver building is in use. Noise levels apply at the property boundary that is most exposed to construction noise (or receiver building façade that is most exposed to construction noise). 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. It is anticipated that the recommended internal noise levels would be readily achieved at the Station Street childcare centre if the identified external levels are achieved.

8.1.2. Sydney Metro Construction Noise & Vibration Standard (CNVS)

In addition to the ICNG, the noise criteria set out in the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (CNVS) have been considered.

The CNVS recognises that works requiring the use of heavy machinery can generate high noise and vibration levels and in urban areas there is often limited setback distance between these noise sources and nearby buildings and receivers. Under such circumstances, typically there is limited opportunity to practicably mitigate the noise and vibration effects in a cost-effective manner. Therefore, potential disturbance impacts are usually minimised as much as practicable through management techniques. For residential receivers, depending on how far the predicted airborne construction noise level is above RBL, the CNVS recommends the adoption of the management measures set out in **Table 8-4**. Full definitions of the identified management measures are set out in the CNVS.

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Table 8-4 Additional Airborne Noise Management Measures (Residential)

Time Period		Mitigation Measures			
		Predicted $L_{Aeq,15min}$ Noise Level Above NML			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard Hours	Mon-Fri (7.00am - 6.00pm)	LB	LB, M	LB, M, SN	LB, M, SN
	Sat (8.00am - 1.00pm)				
	Sun/Pub Hol (Nil)				
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)	LB, M	LB, M, SN	LB, M, SN, RO	LB, M, SN, IB, PC, RO, SN
	Sat (1.00pm - 10.00pm)				
	Sun/Pub Hol (8.00am - 6.00pm)				
OOH (Night)	Mon-Fri (10.00pm - 7.00am)	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, SN, AA
	Sat (10.00pm - 8.00am)				
	Sun/Pub Hol (6.00pm - 7.00am)				

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020).

8.1.3. Highly Noise Intensive Work

Condition E39 requires the following regarding highly noise intensive work:

Except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42, highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:

(a) between the hours of 8:00 am to 6:00 pm Monday to Friday;

(b) between the hours of 8:00 am to 1:00 pm Saturday; and

(c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour.

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For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.

8.1.4. Sleep Disturbance at Residences

Section 4.3 of the ICNG provides the following with respect to sleep disturbance at residences:

Where construction works are planned to extend over more than two consecutive nights, and a quantitative assessment method is used, the analysis should cover the maximum noise level, and the extent and the number of times that the maximum noise level exceeds the RBL. Some guidance indicating the potential for sleep disturbance is in the NSW Environmental Criteria for Road Traffic Noise (EPA 1999) (ECRTN).

Section 2.9 of the CNVS sets out the Sydney Metro sleep disturbance and maximum noise event requirements, as follows:

Maximum noise level events from construction activities during the night-time period can trigger both awakenings and disturbance to sleep stages. The approach to managing events that cause sleep disturbance shall be consistent with the Noise Policy for Industry (EPA, 2017). Where night-time noise levels at a residential location exceed the:

• $L_{Aeq,15min}$ *40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, or the*

• L_{AFmax} *52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*

a detailed maximum noise level event assessment is to be undertaken.

The detailed assessment will cover the maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the number of times this happens during the night-time period.

Maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response. The detailed assessment will consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels for night-time activities.

ACA notes that the EPA has conducted an independent and comprehensive review of the most recent research on sleep disturbance and maximum noise levels and a synopsis of this research is included in the *NSW Road Noise Policy* (RNP) and previously in the ECRTN. The EPA concluded that from the research on sleep disturbance to date:

- *Maximum internal noise levels below 50-55dBA are unlikely to awaken people from sleep;*
- *One or two noise events per night with maximum internal noise levels of 65-70dBA are not likely to affect health and wellbeing significantly.*

The 55 dBA maximum noise level may be considered to be equivalent to an external maximum noise level of 65 dBA, considering the 10 dB attenuation typically achieved through partially open windows.

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Based on the above, this DNVIS considers the external screening level of L_{AFmax} 52 dBA in accordance with the CNVS and additionally considers the external noise criterion of L_{AFmax} 65 dBA referenced by the *RNP*.

8.2. Airborne Construction Noise Assessment

At any particular location, the potential impacts can vary greatly depending on factors such as the relative proximity of sensitive receivers, the overall duration of the construction works, the intensity of the works, the time at which the construction works are undertaken and the character of the emissions.

8.2.1. Construction Stages

Assessment of airborne noise impacts from the construction activities have been determined by modelling the noise sources, receiver locations, topographical features and buildings.

Key details regarding the construction site layouts, the likely plant and equipment and hours of operation were informed by the Design and Construction Teams. This information is presented in **Appendix B** and forms the basis for all modelling assumptions used in this assessment.

Table 8-5 provides a summary of the works to be undertaken and the timeframes at which the works would occur. As shown in **Table 8-5** predominantly the main car park area works would be undertaken during standard hours, with the one exception being potholing that would also be undertaken out-of-hours. It is anticipated that the out-of-hours component of this activity would be completed within two to three night-shifts.

The external works on Nariel, Queen, Phillip and Station Streets would need to be undertaken during the night-time period, however, each of the identified external work sub-stages would be completed within one or two night-shifts and therefore any noise and vibration effects arising from these activities would not be prolonged.

Table 8-5 Key Works Stages and Timeframes

Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night
	Main Car Park Area Works					
01	SE – Site Establishment	Setup Environmental Controls/Tree Protection Install ATF Fencing	Yes	No	No	No
02	1A	Potholing	Yes	Yes	Yes	Yes
03	1A	Demo Car Park - Removal of asphalt and curb removal	Yes	No	No	No

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Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night
04	1B	Pavement Box Out	Yes	No	No	No
05	1B	Pavement Box Out Service Installation - Stormwater	Yes	No	No	No
-	1B	Pavement Box Out Service Installation - Electrical Services	Yes	No	No	No
06	2A	Sub base installation Pavement works	Yes	No	No	No
-	2A	Kerb Construction	Yes	No	No	No
-	2B	Pavement Final Trim	Yes	No	No	No
-	2B	Landscape Prep Works	Yes	No	No	No
-	2B	AC Prep Works	Yes	No	No	No
-	2B	Driver Facility Installation	Yes	No	No	No
-	2B	Bus Shelter Installation	Yes	No	No	No
07	2B	Asphalt Works - Mill and Correct in Car Park	Yes	No	No	No
08	3	Stamped Asphalt	Yes	No	No	No
-	3A	Line Marking	Yes	No	No	No
-	3A	Signage Installation	Yes	No	No	No
	External Works					
-	1A - Nariel and Queen St	Set up ATF Fencing/Satellite Site Compounds	No	No	No	Yes
09	1A - Nariel and Queen St	Potholing	No	No	No	Yes
10	1A - Nariel and Queen St	Remove Parking Lanes	No	No	No	Yes
11	1A - Nariel and Queen St	Kerb Demolition	No	No	No	Yes

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Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night
12	1A - Nariel and Queen St	Kerb/Pram Ramp Construction	No	No	No	Yes
13	1A - Nariel and Queen St	Raised Crossing Construction	No	No	No	Yes
14	1A - Nariel and Queen St	Tree Removal	No	No	No	Yes
15	1B - Nariel and Phillip St	Excavate/Box out and Re-instate Footpath Corners	No	No	No	Yes
15	1B - Nariel and Phillip St	Asphalt Works to Corners	No	No	No	Yes
16	2A - Nariel and Phillip St	Line Marking	No	No	No	Yes
17	2C - Nariel and Phillip St	Service Installation - Electrical Services	Yes	No	No	No
18	2C - Nariel and Phillip St	Asphalt Works	Yes	No	No	No
19	3 - Main Car Park and Station St	Main Compound- F Type Barrier Installation, Median on Station St & Stamped Asphalt along East Lane & Main Car Park	Yes	No	No	Yes

8.2.2. Construction Equipment

For the purposes of this assessment, the construction equipment and sound power levels set out in **Appendix C** have been considered across the identified works areas as shown in the Staging Plans provided in **Appendix B** and as summarised in **Table 8-5**. The sound power levels in **Appendix C** have been determined by measurements undertaken by ACA on other similar projects, or have been adopted from other similar CSSI projects. A summary of the construction plant sound power levels is provided in **Table 8-6**.

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Table 8-6 Construction Equipment and Sound Power Levels

Construction Equipment	Sound Power Level - SWL (L_{Aeq} dBA)
5t Excavator with Bucket	95
5t Excavator with Hammer	115
7-8t Excavator with Bucket	100
7-8t Excavator with Hammer	115
14t Excavator with Bucket / Ripper	105
14t Excavator with Hammer	118
20t Excavator with Bucket	105
20t Franna	98
2t Tipper	105
8t Smooth Drum Roller	107
All Terrain Forklift	96
CC10 Steam Roller*	109
CC10 Vibratory Roller*	109
Chainsaw*	114
Circular Saw/Grinder*	105
Concrete Agitator	109
Concrete Saw	118
Core Drill	118
Delivery / Hiab / Rigid Truck / Semi / Bogie	105
Dry Vac	103
Hand Tools / Form Work Tools	90
Jackhammer	113
Jumping Jack / Compactor	106
Kerb Placing Machine	109
Line Marking Gernie	90
Line Marking Truck	108
Milling Machine / Profiler	117
Paver	114
Plate Compactor	109
Positrack	90

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Construction Equipment	Sound Power Level - SWL (L_{Aeq} dBA)
Traffic Control Utes	90
Water Blaster*	110
Watercart	107
Wet Vac	103

Note: Sources marked with an asterisk (e.g. concrete saws, grinders, hydraulic hammers, profilers, vibratory rollers) can emit noise with special audible (annoying) characteristics. In accordance with the ICNG and the CNVS, predicted noise levels for these stages incur a +5 dB penalty to for account for the additional annoyance that could arise. This penalty has been applied to the predicted levels.

8.2.3. Construction Noise Modelling

Construction noise emissions from the works have been modelled using the SoundPLAN (Version 8-2) environmental noise prediction software. This program is used and recognised internationally and is also recognised by NSW regulatory authorities as a preferred computer noise model. Factors that are addressed in the noise modelling are:

- Construction equipment sound power levels;
- Location of construction equipment;
- Screening from existing structures;
- Receiver locations, including multiple storey receivers;
- Ground topography;
- Noise attenuation due to geometric spreading;
- Ground absorption; and
- Atmospheric absorption.

8.2.4. Construction Noise Predictions

The predicted worst-case construction noise levels at the identified representative receivers for the 19 representative construction sub stages modelled are set out in a series of tables in **Appendix D**. Additionally, the Additional Mitigation Measures that are required to be considered by the CNVS are identified in **Appendix D**.

A series of predicted noise contours is provided in **Appendix E**.

The predictions represent the typical-worst case noise levels that may be expected to arise at the external facades of the receiver buildings when groups of noise sources operate simultaneously. It should be noted that construction noise levels would frequently be lower than the worst-case levels

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considered for significant periods of time. This would be apparent as works move around the sites and are therefore more distant/more shielded from receivers and when less noisy activities are being undertaken.

The results show the airborne noise NLMs have potential to be exceeded at various localities and times depending on the works schedule. Given the likelihood of exceedances, the Sydney Metro standard mitigation measures will be applied throughout all of the identified work stages.

8.2.5. CNVS Additional Mitigation Measures – Airborne Construction Noise

Table 8-4 (based on Table 17 of the CNVS) sets out the Additional Mitigation Measures (AMMs) to be considered in the case of exceedances of the airborne noise criteria.

The airborne noise predictions indicate that at the closest residential and non-residential receivers some monitoring, and letterbox drop notifications are required.

Figure 8-1 indicates the area over which the NMLs may be exceeded at various times during the works. All residents and commercial receivers within the area identified will be provided with regular letterbox drop notifications regarding the works, as required by the CNVS.

For the works undertaken within the car park area the modelling indicates the potential for the daytime NML to be exceeded by >10 dB at the closest residential receivers located at:

- R11 - 34-36 Phillip St,
- R22 - 2 Gidley St and 4 Gidley St (Nado),
- R26 - 3 Station St,
- R27 - 2 Station St, 1 Station St, and
- C10 - St Mary's Hotel, 37 Queen St.

In accordance with the CVNS, noise monitoring will be undertaken at these locations to confirm construction noise levels periodically during the car parks works.

Additionally, for the works undertaken on Nariel St and Queen St, the modelling indicates the potential for the daytime NML to be exceeded by >10 dB at the closest residential receivers located on Carinya Avenue, Carmira St, Nariel St and Merinda St. To confirm construction noise levels during the external works, noise monitoring will be undertaken at the potentially worst affected locations, these being:

- R02 - 67 Carinya Avenue,
- R01 - 69 Carinya Avenue, and
- C10 - St Mary's Hotel, 37 Queen St

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The nominated monitoring locations are shown on **Figure 8-1**. As noted above noise levels at any particular location would vary according to the location of the works and the work activity. It will not be necessary to monitor at all the identified locations at for all activities. Monitoring will be undertaken at the locations identified on a case-by-case basis, with a focus on the most noise-affected locations, based on on-site subjective evaluation.

The results of the noise monitoring at the identified locations would be reviewed as the works proceed and would be compared against the NML. Where necessary the results would be used to inform the construction team of any notable exceedances, over the levels set out in **Appendix D** and would be used to identify any recommended modifications to work methods or to identify the requirements for additional specific amelioration measures.

Figure 8-1 NML Exceedance Letterbox Drop Area and Nominated Noise Monitoring Locations

The highlighted Additional Mitigation Measure (AMM) triggers shown in tables set out in **Appendix D** are based on the exceedance of the $L_{Aeq,15min}$ NMLs. The tables identify some AMM triggers of Respite Offer and Alternative Accommodation (AA). To determine whether it is justified to provide the identified RO and AA measures, consideration must also be given to the duration of the works, i.e. how long the impact will last.

Given the scheduling of the works, it would be expected that the identified impacts would occur for typically only one or two nights at any one location before they are completed, and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO and AA are not justified.

It should be noted that the non-residential Additional Mitigation Measures are only applicable when the receiver building is in use.

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Ward has and will continue to consult with the potentially affected receivers identified by this assessment, in particular the C10 (St Mary's Hotel) and R11 (34-36 Phillip St) prior to the works to determine if any particular concerns regarding noise impacts may be addresses during the scheduling.

8.2.1. Highly Noise Affected Receivers

The modelling indicates the potential for some relatively high noise levels during the works. The highest levels are anticipated at C10 (St Mary's Hotel at 37 Queen St), R11 (34-36 Phillip St), R22 (2 Gidley St and 4 Gidley St (Nado)), R26 (3 Station St), R27 (2 Station St, 1 Station St), R02 (67 Carinya Avenue), R01 (69 Carinya Avenue). These receivers may be expected to be highly noise affected at times during the works, that is, noise levels may be expected to exceed the NML by > 20 dB externally to these receivers. However, as discussed above, the durations of these high noise levels would be only for relatively short durations, of typically one or two nights in any one location.

During the development of the DNVIS Ward has consulted with the most potentially affected receivers and will continue to consult with the community during the works and consider any community feedback during the works scheduling.

Details of the focussed community consultation undertaken is provided in a Community Consultation report provided in **Appendix H**. Notably, the community consultation report has identified very few community concerns have been raised by the local residents consulted.

The report has, however, identified two concerns as follows:

- One resident at Unit 12, 3-5 Nariel Street raised concerns over noise interfering with a baby's sleep. Ward's community engagement consultants will undertake regular follow ups with this resident, prior to and during works that may result in high noise levels at the property and will consider the resident's feedback during programming.

- One resident at Unit 2/2 Station St has reported hearing issues (finds sharp and loud noises distressing). Ward's community engagement consultants will undertake regular follow ups with this resident, prior to and during works that may result in high noise levels at the property and will consider the resident's feedback during programming. Additionally, an offer to provide noise-cancelling /white noise earphones to the resident will be made if required.

Additionally, the community consultation has identified that the potentially most affected receivers are understanding with respect to the potential for increased noise levels during the works. It identifies that almost all receivers consulted accepted that construction was taking place and did not object to nightworks, understanding that the works are necessary.

As permissible under Condition 39, highly noise intensive work that results in an exceedance of the applicable NML at the same receiver must be approved in accordance with the Out-of-Hours Works Protocol required by Condition E42.Receiver Consultation in Accordance with E57.

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In accordance with Conditions E57, in order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work must be identified in consultation with the community at each affected location on a regular basis.

As identified above, Ward has undertaken consultation with the potentially most impacted receivers. This consultation has included provision of the following information regarding the works:

- schedule for periods of likely out-of-hours work;
- description of the potential work, location and duration of the out-of-hours work;
- the noise characteristics and likely noise levels of the work; and
- mitigation and management measures that will be implemented to minimise noise impacts.

The Community Consultation report provided in **Appendix H** has identified very few community concerns regarding noise and in accordance with E57, Ward will consider the outcomes of the community consultation during scheduling.

The outcomes of this community consultation including any identified respite periods will be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.

8.3. Sleep Disturbance

Maximum noise level events from construction activities during the night-time period can trigger both awakenings and disturbance to sleep stages. The CNVS approach to managing events that cause sleep disturbance is consistent with the Noise Policy for Industry (EPA, 2017). A detailed maximum noise level event assessment is to be undertaken where night-time noise levels at a residential location exceed the:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, or the
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.

The CNVS notes the maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response. The detailed assessment will consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels for night-time activities.

To assess the likelihood of sleep disturbance, **Table D-11** (**Appendix D**) sets out the predicted maximum noise levels for each stage and identifies where exceedances may occur during works undertaken in the night period.

It is noted that the CNVS AMMs are based on the degree to which the $L_{Aeq,15min}$ level exceeds the RBL and not the L_{Amax} level. The AMMs based on the $L_{Aeq,15min}$ assessment, as discussed in **Section 8.2.5** would be expected to adequately address potential sleep disturbance impacts.

As discussed in Section 8.1.4. this DNVIS considers the external screening level of L_{AFmax} 52 dBA in accordance with the CNVS and additionally considers the external noise criterion of L_{AFmax} 65 dBA

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referenced by the RNP.

The results in **Table D-11** conservatively consider the use of concrete saws, in the event that a saw cut may be required for contingency during the night works. As discussed, Ward generally proposes to restrict saw use to prior to 10.00pm and therefore the maximum levels identified are unlikely to, or at least would very rarely occur. Typically, the maximum noise levels experienced by receivers would be expected to be at least 5-10 dB less than those reported.

During the out of hours night works within the primary works car park area (potholing works), the greatest potential sleep disturbance impacts may be expected to occur at C10 (St Mary's Hotel at 37 Queen St), R11 (34-36 Phillip St), R22 (2 Gidley St and 4 Gidley St (Nado)), R26 (3 Station St). It is noted, however, that with windows closed, internal noise levels would not be expected to exceed the internal noise levels identified by the RNP at these locations.

During the out of hours night works on Nariel Street, Queen Street, Phillip Street and Station Street, the greatest potential sleep disturbance impacts may be expected to occur at C10 (St Mary's Hotel), Carinya Avenue receivers R01-R05, R10 (14 Nariel Street), Phillip Street receivers R11-R13 / R21, R22 (2 Gidley St and 4 Gidley St (Nado)) and Station Street receivers R26/R27. With windows closed, internal noise levels would not be expected to exceed the internal noise levels identified by the RNP at these locations.

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9. GROUNDBORNE CONSTRUCTION NOISE & VIBRATION

9.1. Construction Vibration Criteria

The effects of vibration in buildings can be divided into three main categories; those in which the occupants or users of the building are inconvenienced or possibly disturbed (human comfort), those where the building contents may be affected (effects on building contents) and those in which the integrity of the building or the structure itself may be prejudiced (structural damage).

9.1.1. Human Comfort

The DECCW's "*Assessing Vibration: a technical guideline*" (AVTG) dated February 2006 (DEC, 2006) recommends the use of BS 6472-1992 for the purpose of assessing vibration in relation to human comfort.

British Standard 6472-1992 "*Guide to evaluation of human exposure to vibration in building*" nominates guideline values for various categories of disturbance, the most stringent of which are the levels of building vibration associated with a "low probability of adverse comment" from occupants.

BS 6472-1992 provides guideline values for continuous, transient and intermittent events that are based on a Vibration Dose Value (VDV), rather than a continuous vibration level. The vibration dose value is dependent upon the level and duration of the short-term vibration event, as well as the number of events occurring during the daytime or night-time period.

The vibration dose values recommended in BS 6472-1992 for which various levels of adverse comment from occupants may be expected are presented in **Table 9 -1** (based on CNVS Table 4).

Table 9-1 Vibration Dose Values re Expected Adverse Comment in Residential Buildings

Place and Time	Low Probability of Adverse Comment ($m/s^{1.75}$)	Adverse Comment Possible ($m/s^{1.75}$)	Adverse Comment Probable ($m/s^{1.75}$)
Residential buildings 16 hr day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8 hr night	0.13	0.26	0.51

With respect to VDV, ACA notes that there can be practical difficulties in the prediction and measurement of this parameter, particularly given the limited available measured data. ACA considers the Peak Particle Velocity (PPV) levels as recognised by AVTG is an acceptable substitution (as per table C1.1 of the AVTG – i.e. Residential Daytime: 0.28 to 0.56 mm/s PPV; Residential Night: 0.2 to 0.4 mm/s PPV; Commercial: 0.56 to 1.1 mm/s PPV).

This is a common approach in the industry and allows alignment with structural damage vibration guide values and provides an opportunity for the same vibration equipment to measure for comfort and damage.

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9.1.2. Effects on Building Contents

People can perceive floor vibration at levels well below those likely to cause damage to building contents or affect the operation of typical equipment found in most buildings that is not particularly vibration sensitive.

For most receivers, the controlling vibration criterion is the human comfort criterion, and it is therefore not normally required to set separate criteria in relation to the effect of construction vibration on typical building contents.

Where appropriate, objectives for the satisfactory operation of vibration sensitive critical instruments or manufacturing processes should be sourced from manufacturer's data and/or other published objectives.

9.1.3. Structural Damage

Most commonly specified 'safe' structural vibration limits are designed to minimise the risk of threshold or cosmetic surface cracks and are set well below the levels that have potential to cause damage to the main structure.

There are currently no Australian Standards or guidelines to provide guidance on assessing the potential for building damage from vibration. It is common practice to derive goal levels from international standards. British Standard BS7385:1993 and German Standard DIN4150:1999 both provide goal levels, below which vibration is considered insufficient to cause building damage.

It is noted that the CNVS references the British Standard BS7385:1993, however, the Conditions of Approval also specifies German Standard DIN 4150-3: *Structural vibration – Effects of vibration on structures* (DIN 4150). Of these, DIN4150 is the more stringent and has therefore been considered by this DNVIS.

Table 9-2 summarises the recommended limits outlined in DIN 4150 to ensure minimal risk of cosmetic damage to residential and industrial buildings. Achieving the DIN 4150 vibration levels would also result in compliance with the British Standard BS7385:1993.

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Table 9-2 Recommended Vibration Limits for Minimal Risk of Cosmetic Damage

Type of Building	Guideline Values for Velocity, vi, in mm/s Vibration at the Foundation at a Frequency of			Plane of Floor of Uppermost Storey
	1 Hz to 10 Hz	10 Hz to 50Hz	50 Hz to 100 Hz	Frequency Mixture
Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20 - 40	40 - 50	40
Dwellings and buildings of similar design and/or occupancy	5	5 - 15	15 - 20	15
Structures that, because of their particular sensitivity to vibration, cannot be classified and are of great intrinsic value (e.g. listed buildings under preservation order)	3	3 - 8	8 - 10	8

On this basis, conservative general vibration screening levels (Peak Particle Velocity (PPV)) are provided for intermittent vibration sources as follows:

- reinforced or framed structures: 20 mm/s
- unreinforced or light framed structures 5 mm/s.

At locations where the predicted and/or measured vibration levels are greater than shown above, monitoring should be performed during construction. A more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure would also be performed to determine the applicable safe vibration level.

Additionally, Condition E84 requires that before commencement of construction, all buildings identified as being at risk of damage must be inspected and a building condition survey undertaken by a suitably qualified and experienced person.

Due to the current difficulties in conducting internal building inspections due to Covid-19 restrictions, Ward generally proposes to minimise any building inspection requirements by minimising the potential for cosmetic damage effects. This is discussed further in **Section 9-3**.

9.1.4. Guidelines for Heritage Structures

Heritage buildings and structures would be assessed as per the screening criteria as they should not be assumed to be more sensitive to vibration unless they are found to be structurally unsound. If a heritage building or structure is found to be structurally unsound (following inspection) the more conservative cosmetic damage criteria of 2.5 mm/s peak component particle velocity (from DIN 4150) would be considered.

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Table 9-3 outlines the heritage listed items within the vicinity of the project, none of which have been assessed as being structurally unsound.

Table 9-3 Heritage Items

Heritage Item / Location	Register Listings	Significance	Location
St Marys Railway Station	State Heritage Register and State Rail S170 register under the Heritage Act	State	North of Site
St Marys Railway Station Parcel Office	Penrith City Council LEP (01249)	Local	North of Site

9.1.5. Guidelines for Sensitive Scientific & Medical Equipment

Some scientific equipment (e.g. electron microscopes and microelectronics manufacturing equipment) can require more stringent objectives than those applicable to human comfort.

Where it has been identified that vibration sensitive scientific and/or medical instruments are likely to be in use inside the premises of an identified vibration sensitive receiver, objectives for the satisfactory operation of the instrument would be sourced from manufacturer's data.

Where manufacturer's data is not available, generic vibration criterion (VC) curves as published by the Society of Photo-Optical Instrumentation Engineers (Colin G. Gordon - 28 September 1999) may be adopted as vibration goals. These generic VC curves are presented in Table 6 and Figure 3 of the CNVS.

The land use survey undertaken by ward has not identified any uses that may be expected to include sensitive scientific or medical equipment.

9.1.6. Other Vibration Sensitive Structures & Utilities

Where structures and utilities are encountered which may be considered to be particularly sensitive to vibration, a vibration goal which is more stringent than structural damage goals may need to be adopted. Examples of such structures and utilities include:

- Tunnels
- Gas pipelines
- Fibre optic cables

Specific vibration goals would be determined on a case-by-case basis with the structure or utility's owner in order to determine acceptable vibration levels.

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In lieu of specific vibration criteria being provided by the asset owner, screening criteria would be adopted from guidance provided in DIN 4150-3 for buried pipework. The screening criteria is outlined in **Table 9-4**.

Table 9-4 Guideline Values for Vibration Velocity to be used when Evaluating the Effects of Vibration on Buried Pipework

Pipe Material	Guideline Values for Velocity Measured on the Pipe, vi, in mm/s
Steel (including welded pipes)	100
Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80
Masonry, plastic	50

9.1.7. CNVS Additional Mitigation Measures – Groundborne Construction Vibration

In addition to the vibration criteria discussed above, the CNVS requires the consideration of Additional Mitigation Measures, in the case of appreciable levels of vibration occurring at sensitive receivers.

Table 9-5 (based on Table 17 of the CNVS) sets out the Additional Mitigation Measures (AMMs) to be applied in the case of exceedances of the groundborne vibration management levels.

Table 9-5 Additional Mitigation Measures - Ground-Borne Vibration

Time Period		Mitigation Measures
		Predicted Vibration Levels Exceed Maximum Levels
Standard Hours	Mon-Fri (7.00am - 6.00pm)	LB, M, RO
	Sat (8.00am - 1.00pm)	
	Sun/Pub Hol (Nil)	
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)	LB, M, IB, PC, RO, SN
	Sat (1.00pm - 10.00pm)	
	Sun/Pub Hol (8.00am - 6.00pm)	
OOH (Night)	Mon-Fri (10.00pm - 7.00am)	LB, M, IB, PC, RO, SN, AA
	Sat (10.00pm - 8.00am)	
	Sun/Pub Hol (6.00pm - 7.00am)	

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020). The 'maximum' vibration value is taken as the 'Maximum Peak Velocity (mm/s)' value identified in Table C1.1 in the Assessing Vibration: A technical guideline (DEC 2006).

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9.2. Groundborne Construction Noise Criteria

9.2.1. ICNG Groundborne Construction Noise Criteria

Groundborne (regenerated) noise is noise generated by vibration transmitted through the ground into a structure. Groundborne noise caused, for example by underground works such as tunnelling, can be more noticeable than airborne noise. The following groundborne noise levels for residences are nominated in the ICNG and indicate when management actions would be implemented. These levels recognise the temporary nature of construction and are only applicable when groundborne noise levels are higher than airborne noise levels.

The groundborne noise management levels considered by this assessment are shown in **Table 9-6**.

Table 9-6 Ground-Borne Noise Management Levels

Receiver Type	Standard Hours (Day)	OOHW (Day)	OOHW (Evening)	OOHW (Night)
	$L_{Aeq,15min}$ dBA	$L_{Aeq,15min}$ dBA	$L_{Aeq,15min}$ dBA	$L_{Aeq,15min}$ dBA
Residential	45	40	40	35
Commercial	50 when in use			
Childcare	40 when in use			
School	45 when in use			

Note: The Groundborne Noise Management Levels for non-residential uses only apply when the building is in use.

The daytime criteria are applicable to both residential and commercial receivers, whereas the evening and night-time criteria are only applicable to residential receivers. The Groundborne Noise Management Levels for non-residential uses only apply when the receiver building is in use.

The internal noise levels are to be assessed at the centre of the most-affected habitable room.

With respect to groundborne noise, Condition E44 requires the following:

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 $L_{Aeq(15\ minute)}$: 40 dB(A); and

(b) night (10:00 pm to 7:00 am) — internal $L_{Aeq(15\ minute)}$: 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 E42.

9.2.2. CNVS Additional Mitigation Measures – Groundborne Construction Noise

Table 9-7 (based on Table 15 of the CNVS) sets out the AAMs to be applied in the case of exceedances of the groundborne noise management levels.

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Table 9-7 Additional Groundborne Noise Management Measures (Residential)

Time Period		Mitigation Measures			
		Predicted $L_{Aeq,15min}$ Noise Level Above NML			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard Hours	Mon-Fri (7.00am - 6.00pm)	LB	LB, M	LB, M, SN	LB, M, SN
	Sat (8.00am - 1.00pm)				
	Sun/Pub Hol (Nil)				
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)	LB, M	LB, M, SN	LB, M, SN, RO	LB, M, SN, IB, PC, RO, SN
	Sat (1.00pm - 10.00pm)				
	Sun/Pub Hol (8.00am - 6.00pm)				
OOH (Night)	Mon-Fri (10.00pm - 7.00am)	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, SN, AA
	Sat (10.00pm - 8.00am)				
	Sun/Pub Hol (6.00pm - 7.00am)				

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020).

9.3. Groundborne Construction Noise & Vibration Assessment

Certain construction activities require the use of vibration intensive equipment that have potential to adversely impact the closest sensitive receivers.

With respect to groundborne noise, ACA notes that for the proposed surface works airborne noise levels would dominate over groundborne noise. It is considered that management of airborne noise impacts in addition to management of vibration impacts would satisfactorily manage any groundborne noise effects. Accordingly, this assessment does not consider groundborne noise effects any further.

Minimum working distances to sensitive receivers for cosmetic building damage and human response have been identified for vibration generating plant that may be used during the works. If equipment operates closer to a sensitive receiver, vibration from construction works may potentially exceed the vibration guidelines provided in **Sections 9.1.3** and **9.1.1**. It should be noted, however, the minimum working distances are conservative and indicative. Actual distances may be expected to vary depending on the activity/operator, equipment particularities, local ground conditions and receiver conditions (e.g. building footings).

Table 9-8 shows the vibration generating plant that would be used and the associated minimum working distances. The setback distances are noted to be generally consistent with those recognised by TfNSW. The TfNSW guidelines do not include reference distances for plate compactors or jumping

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jacks. The distances identified for these items are based on measurements undertaken by the University of Western Australia which are consistent with ACA's experience.

Vibration monitoring trials would be undertaken on site at the commencement of the works to confirm vibration levels and safe working distances for all vibration generating equipment.

Table 9-8 Recommended Minimum Working Distances for Vibration Intensive Equipment

Plant Item	Minimum Distance – Cosmetic Damage (BS 7385)	Cosmetic damage (DIN 4150) Heritage and other Sensitive Structures	Minimum Distance – Human Response (OE&H Vibration Guideline)
5t Excavator with Small (300kg) Hydraulic Hammer	2	5	7
14t Excavator with Medium (900kg) Hydraulic Hammer	7	19	23
Vibratory Roller (7 tonne)	15	41	100
CC10 Vibratory Roller (2 tonne)	5	14	15 to 20
60kg Plate Compactor	2	4	7
Jumping Jack	2	4	7
Jackhammer	1 m (nominal)	2	3

Note 1: Hydraulic hammer & vibratory roller distances are consistent with the TfNSW Construction Noise and Vibration Strategy (V 4.1).
Note 2: Plate compactor distances are based on measurements undertaken by University of Western Australia.

As previously discussed, due to the current difficulties in undertaking internal building inspections / dilapidation surveys owing to current Covid-19 restrictions, Ward proposes to minimise internal building inspections as far as is practicable. For this purpose, it is proposed to limit the use of all vibration generating plant to outside of the minimum working distances for cosmetic damage indicated by **Table 9-8**. In particular the following controls will be implemented.

Vibratory Rollers - Cosmetic Damage

Within the carpark, the minimum safe working distance for cosmetic damage for vibratory rolling will be verified by measurements and this distance will be maintained between the plant and all surrounding buildings. At the southernmost part of the car park area, static rolling methods will be used in lieu of vibratory methods within the critical safe distance, as required.

For the asphalted areas on Phillip Street, Queen Street and Station Street that require rolling, only static rollers would be used.

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Vibratory Rollers – Human Comfort

The vibratory roller used within the carpark would operate within the within the minimum human response working distance identified by **Table 9-8**, with the closest residential receivers at 34-36 Phillip Street located approximately 60 m away from the southern boundary of the car park.

The identified human response distances are considered to be quite conservative. Based on vibration measurements undertaken for a 10-tonne vibratory roller, ACA estimates a VDV at the closest residence of <0.2 $m/s^{1.75}$, which is below the Low Probability of Adverse Comment threshold identified in **Table 9-1.** On this basis it is considered that there would be minimal risk of human comfort vibration impacts on residents from the use of vibratory rolling within the car park area.

The CNVS does not specify VDV ranges to be considered for offices, however the AVTG notes that there would be a Low Probability of Adverse Comment when VDV remains below 0.4 to 0.8 $m/s^{1.75}$ in offices. Given the roller is a mobile source that would move around the site, it is estimated that the upper range VDV (0.8 $m/s^{1.75}$) would be generally met when a distance of approximately 15-20 m is maintained between the vibratory roller and the surrounding buildings. Within this distance it is proposed to use static rolling methods.

Vibration monitoring trials would be undertaken on the car park site at the commencement of the works to confirm vibration levels and safe working distances for the vibratory roller.

Hydraulic Hammers

During the service installation works on Station Street a 5-tonne excavator with small hydraulic hammer would be used. The construction footprint shows that these hammering works would not occur within approximately 7 m from the closest commercial building (91 Station Street, which is currently vacant) or within approximately 20 m from the St Marys Railway Station Parcel Office (Heritage Receiver). At these distances vibration levels from a small hydraulic hammer are predicted to not exceed 1 mm/s PPV. Therefore, no material risk of exceedance of the screening criteria for cosmetic building damage for commercial or heritage receivers is predicted for the identified hydraulic hammering works.

Additionally, it is considered there would be no material risk of human comfort vibration exceedances from the identified hammering works.

9.3.1. CNVS Additional Mitigation Measures – Groundborne Noise & Vibration

Given Ward's proposed vibration controls, further specific additional mitigation measures relating to groundborne noise or vibration are not considered necessary, beyond the standard measures defined by the CNVS. Application of the standard measures (outlined in **Section 11**) in addition to the controls discussed above would be expected to be sufficient to ensure vibration effects on the occupants of nearby buildings are satisfactorily managed.

Based on the use of a 7-tonne vibratory roller within the car park area, Ward has provided notifications to the receivers that fall within the potential building damage setback distance recognised by TfNSW, as indicated by **Figure 9-1**.

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Figure 9-1 Vibratory Roller Building Damage Risk – Yellow Line Indicates 15 m Buffer for Commercial Buildings; Pink Line Indicates 41 m Buffer for Heritage Items

Note: The Heritage distance buffer has been calculated based off the distance required to meet the respective vibration level for standard buildings. This is provided for information purposes only. As discussed in Section 9.1.5 the identified heritage structures have not been assessed as being structurally unsound and therefore are not considered particularly vibration sensitive on account of their heritage classifications. Anticipated vibration levels are significantly lower than any threshold or criteria for commercial buildings. As such, no specific vibration risk for the heritage items has been identified.

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The receivers identified by **Figure 9-1** have been notified by Ward regarding potential vibration effects and have been provided offers of dilapidation surveys in accordance with Condition E84. These receivers are:

- 47-49 Phillip Street (Centrelink)
- 51A Phillip Street (Bridging the Gap)
- 53 Phillip Street (Commercial)
- 36-38 Queen Street (Commercial)
- 34 Queen Street (Commercial)
- 30-32 Queen Street (Commercial)
- 24-26 Queen Street (Commercial)
- 4 Queen Street (Commercial)
- 8 Station Street (Coles Supermarket)

Additionally, whilst not considered to be at any particular risk of damage, the St Marys Railway Station Group has been notified regarding the potential for vibration effects on the St Marys Railway Station Parcel Office, as this Heritage building falls within the 41 m buffer calculated for potential heritage building damage.

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10. CONSTRUCTION ROAD TRAFFIC NOISE

10.1. Construction Road Traffic Noise Guidelines

Criteria for off-site road traffic noise applicable to existing residences affected by additional traffic on existing local roads generated by land use developments are specified in the NSW Road Noise Policy (RNP). Whilst these criteria do not specifically apply to construction traffic movements, they have been conservatively considered and are summarised in **Table 10-1**.

Table 10-1 RNP Criteria for Road Traffic Noise

Type of Development	Daytime (07:00-22:00)	Night (22:00-07:00)
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq,15\ hour}$ 60 (external)	$L_{Aeq,9\ hour}$ 55 (external)
Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq,1\ hour}$ 55 (external)	$L_{Aeq,1\ hour}$ 50 (external)

Note: The identified criteria do not apply to vehicle movements within the Project Site. For the purpose of assessment, any noise generated by on-site vehicle movements is considered as construction noise and assessed holistically with on-site mobile plant in accordance with the ICNG.

As required by the RNP, an initial screening test should first be applied by evaluating whether noise levels would increase by more than 2 dB (an increase in the number vehicles of approximately 60%) due to construction traffic or a temporary reroute due to a road closure.

Where noise levels increase by more than 2 dB further assessment is required using the criteria presented in the RNP, as shown in **Table 10-1**. A 2 dB increase is typically considered not noticeable.

10.2. Construction Road Traffic Assessment

Ward estimates that a maximum of 10 heavy vehicle movements per hour would be required during the peak construction phase.

Considering the high existing volume of traffic on the adjacent roads, the noise impact generated by construction delivery vehicles arriving and leaving the site would be expected to result in an increase in road traffic noise levels of significantly less than 2 dB which is in compliance with the established criteria.

On this basis, no material construction traffic noise impacts are expected.

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11. CONSTRUCTION NOISE & VIBRATION MITIGATION MEASURES

11.1. CNVS Additional Mitigation Measures

The CNVS sets out standard construction noise and vibration mitigation measures to be implemented on all Sydney Metro projects by default in order to minimise the potential noise and vibration impacts at the surrounding Noise Sensitive Receivers. These will be implemented by Ward where feasible and reasonable and are summarised in **Table 11-1**. A summary of roles and responsibilities is provided in **Table 11-2**.

Table 11-1 Standard Mitigation Measures to Reduce Construction Noise and Vibration

Action Required	Applies To	Details
Management Measures		
Implementation of any project specific mitigation measures required	Airborne noise Ground-borne noise and vibration	In addition to the measures set out in this table, any project specific mitigation measures identified in the environmental assessment documentation (e.g. EA, REF, submissions or representations report) or approval or licence conditions must be implemented.
Implement community consultation measures	Airborne noise Ground-borne noise and vibration	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
Site Inductions	Airborne noise Ground-borne noise and vibration	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

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Behavioural practices	Airborne noise	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.
Monitoring	Airborne noise Ground-borne noise and vibration	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	Ground-borne vibration	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.
Source Controls		
Construction hours and scheduling	Airborne noise Ground-borne noise and vibration	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.
Construction respite period	Ground-borne noise and vibration Airborne noise	High noise and vibration generating activities[2] may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block3.
Equipment selection	Airborne noise Ground-borne noise and vibration	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.
Maximum noise levels	Airborne-noise	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	Airborne-noise	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).

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Plan worksites and activities to minimise noise and vibration	Airborne noise Ground-borne vibration	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Non-tonal reversing alarms	Airborne noise	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	Airborne-noise	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	Airborne-noise	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	Airborne-noise	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.

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Table 11-2 Roles and Responsibilities

Role	Definition and Responsibilities
Project Environment Manager	• Oversee the implementation of all noise and vibration management initiatives including coordinating responses to noise and vibration complaints. • Manage review and continual improvement of the DNVIS/CNVMP. • Ensure that sufficient resources are allocated for the implementation of the DNVIS/CNVMP. • Consider and advise senior management on compliance obligations regarding noise and vibration. • Ensure that the outcomes of compliance monitoring / incident reporting are systematically evaluated as part of ongoing management of construction activities. • Ensure all appropriate noise and vibration mitigation measures are implemented.
Site Supervisor	• Ensure that all requirements of the DNVIS/CNVMP are effectively implemented. • Ensure all appropriate noise and vibration mitigation measures are implemented.
EHS Coordinators	• Assist the Project Environment Manager and Construction Managers in implementing the DNVIS/CNVMP. • Oversee noise and vibration training including inductions, toolbox talks and specific technical training on monitoring equipment. • Ensure all appropriate noise and vibration mitigation measures are implemented. • Monitoring and reporting on compliance.
Site Engineers	• Assist the Construction Manager in implementing the DNVIS/CNVMP.
Project Noise and Vibration Consultant	• Provide Ward with specialist noise and vibration input and advice including development of the CNVMP, DNVIS and discussions regarding progressive construction works. • Undertaking noise and vibration monitoring when required. • Assisting in community consultation when required.
Construction Manager	• Manage the delivery of the construction process, in relation to noise and vibration management across the site together with the Environment Manager. • Ensure that all requirements of the DNVIS/CNVMP are effectively implemented, including all subcontractors
Stakeholder and Community Relations Manager	• Manage notifications and consultation for noise and vibration and liaise with the Environment Manager about management of noise and vibration complaints. • Assist in coordinating responses to noise and vibration complaints.

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11.2. CNVS Additional Mitigation Measures

Based on the predictions, all reasonable and feasible mitigation measures to minimise noise and vibration from construction will be implemented. This includes the Standard Mitigation Measures (SMM) set out in **Table 11-1** and the Additional Mitigation Measures (AMM) required by the CNVS, as set out in **Section 8.2.5** and **Appendix D**.

11.3. Construction Noise & Vibration Monitoring Program

Conditions C13 - C15 specify in detail requirements for monitoring. These matters are addressed in the Construction Noise & Vibration Monitoring Program provided in **Appendix F**.

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12. NOISE IMPACT SUBJECTIVE CLASSIFICATION

Standard Hours Works within Primary Works Area (Main Carpark)

With respect to the standard hours works within the main carpark area, residential receivers are generally well removed and shielded from the works and the residential NML exceedances are generally less than 10-20 dB. There is potential for the NML to be exceeded by >20 dB at R11 (34-36 Phillip Street), but the construction noise at this receiver would be expected to be no greater than the traffic levels from existing vehicle movements on Phillip Street.

The closest commercial receiver NML exceedances are less than 10-20 dB and these levels may be expected to arise at the rear building facades only, which from inspection may be expected to be less noise sensitive than their street facing facades.

The potentially affected receivers have been consulted regarding the forthcoming works, with Ward's community engagements consultants undertaking door knocking and briefings at the most affected addresses. The community consultation report (included in Appendix H) summarises the receiver notifications. This identifies that no particular concerns regarding noise from the early works were received from the potentially most affected local residents.

Considering the above, the standard hours works within the main carpark area are generally considered **low impact**.

Notwithstanding this, the standard and additional mitigation measures identified by this DNVIS will be provided.

Out-of-Hours Works within Primary Works Area (Main Carpark)

Within the main carpark area, the only works to be undertaken outside standard hours is potholing. This is predicted to have potential for exceedances above the NML by >20 dB at R11 (34-36 Phillip Street), R22 (2 Gidley Street) and C10 (St Marys Hotel) but the construction noise at these receivers would be expected to be no greater than occasional traffic noise levels from existing vehicle movements on the local roads. At these receivers predicted maximum construction noise levels may also exceed the sleep disturbance levels, however similar levels may be expected from occasional traffic noise levels from existing vehicle movements on the local roads. To mitigate the potential impacts, the use of concrete saws will be limited to prior to 10.00pm.

The closest commercial receivers would not be expected to be operational during the potholing works.

The potentially most affected receivers have been consulted regarding the forthcoming works, with Ward's community engagements consultants undertaking door knocking and briefings at the most affected addresses. The community consultation report (included in Appendix H) summarises the receiver notifications. This identifies that no particular concerns regarding noise from the early works was received from the potentially most affected local residents.

Considering the above, the out of hours works within the main carpark area are generally considered **low impact**.

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The standard and additional mitigation measures identified by this DNVIS will be provided.

Standard Hours Works – External Works Areas

With respect to the standard hours works on Nariel Street, Queen Street, Phillip Street and Station Street, the residential NML exceedances are generally less than 10-20 dB. There is potential for the NML to be exceeded by >20 dB at times at R2 (65-67 Carinya Avenue), R11 (34-36 Phillip Street), R12 (36A Phillip Street), R22 (2 Gidley Street) and C10 (St Marys Hotel). However, the construction noise levels would naturally fluctuate during the works being undertaken, the works would not be prolonged and for most of the time the levels would be significantly lower than reported.

The closest commercial receivers would also experience elevated noise levels as the works progress, however, given the nature of the works, the impacts would not be prolonged and for most of the time the levels would be significantly lower than reported.

The potentially affected receivers have been consulted regarding the forthcoming works, with Ward's community engagements consultants undertaking door knocking and briefings at the most affected addresses. The community consultation report (included in Appendix H) summarises the receiver notifications. This identifies that no particular concerns regarding noise from the early works was received from the potentially most affected local residents.

Considering the above, the standard hours works within the main carpark area are generally considered **low impact**.

The standard and additional mitigation measures identified by this DNVIS will be provided.

Out-of-Hours Works – External Works Areas

The out of hours works on Nariel Street, Queen Street, Phillip Street and Station Street, may be expected to result in residential NML exceedances at times >20dB at R1 (69 Carinya Avenue), R2 (65-67 Carinya Avenue), R3 (59 Carinya Avenue), R11 (34-36 Phillip Street), R12 (36A Phillip Street), R22 (2 Gidley Street), R26 (3 Station Street) and C10 (St Marys Hotel). However, the construction noise levels would naturally fluctuate during the works being undertaken, the works would not be prolonged and for most of the time the levels would be significantly lower than reported.

At these receivers predicted maximum construction noise levels may also exceed the sleep disturbance levels. To mitigate the potential impacts, the use of concrete saws will be limited to prior to 10.00pm. Additionally, the standard and additional mitigation measures identified by this DNVIS will be provided.

The closest commercial receivers would also experience elevated noise levels as the works progress, however, most of the commercial receivers, with the exception of the St Marys Hotel, would not be operational during the out of hours works.

The potentially affected receivers have been consulted regarding the forthcoming works, with Ward's community engagements consultants undertaking door knocking and briefings at the most affected

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addresses. The community consultation report (included in Appendix H) summarises the receiver notifications. This identifies that no particular concerns regarding noise from the early works was received from the potentially most affected local residents.

Considering the above, the standard hours works within the main carpark area are generally considered **moderate impact**.

The standard and additional mitigation measures identified by this DNVIS will be provided.

As a result of noise classification and/or the noise level exceedances at sensitive receivers provided by this DNVIS, appropriate reasonable and feasible noise mitigation is to be adopted and implemented during the works. For sites where works are predicted to significantly exceed noise goals and impact on receivers for a significant period of time, additional reasonable and feasible noise mitigation measures such as those outlined in Appendix D would be implemented to reduce the noise levels and impact on sensitive receivers.

The following key controls will be implemented:

- High noise works will be restricted to daytime hours as far as practicable.
- Where concrete sawing is required to be undertaken out-of-hours, this activity will be restricted to prior to 10.00pm.
- As far as practicable and safe to do so, sound curtains will be used around works sites to reduce construction noise emissions.
- Noise monitoring will be undertaken throughout the works to verify construction noise levels and inform the construction team where, if necessary, construction methods require modification to reduce noise levels.
- Vibration monitoring will be undertaken at the commencement of work involving vibration generating equipment to confirm safe working distances and compliance with German Standard DIN4150:1999.
- Static rollers will be used in lieu of vibratory rollers on the external roads to minimise any vibration impacts.
- Periodic letterbox notifications will be provided to update local residents and business owners regarding the progress of the works
- Community Consultation in accordance with the CNVS and the Out of Hours Works Protocol (SM-21-00306108) will be undertaken at potentially affected receivers and feedback from the receivers will be considered during scheduling of the works.

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13. CONCLUSION

Acoustics Consultants Australia (ACA) has prepared on behalf of Ward Civil & Engineering Pty Ltd (Ward) this Detailed Noise and Vibration Impact Statement (DNVIS) for the St Mary's Bus Exchange Early Works (SMBE-EW), which form part of the Sydney Metro Western Sydney Airport (SMWSA) Project (SSI 10051).

Primarily, this document has been prepared to fulfil the requirements of the Critical State Significant Infrastructure (CSSI) Approval Condition E47(a) that requires a DNVIS and Condition C13(a) that requires a Construction Noise and Vibration Monitoring Program. This DNVIS forms part of the Construction Environmental Management Plan (CEMP), or equivalent document, in accordance with the Sydney Metro Construction Environmental Management Framework (CEMF).

The included assessments have been undertaken in accordance with the provisions of the NSW Interim Construction Noise Guideline – (ICNG), the Sydney Metro – Western Sydney Airport Construction Noise & Vibration Strategy (Ver 4.2, 8 September 2020) – (CNVS) and relevant Conditions of Approval as set out in the Department of Planning, Industry and Environment's Critical State Significant Infrastructure Approval for Sydney Metro – Western Sydney Airport (SSI 10051).

The SMBE-EW is not subject to an Environment Protection Licence (EPL).

The SMBE-EW works are proposed to generally occur within standard construction hours, however, the planning approval allows for alternate working hours for the works that cannot be completed during standard hours, provided the works are managed appropriately.

This document details Noise Management Level (NML) exceedances and mitigation requirements for the standard hours works and the proposed out-of-hours works. The extent of works undertaken outside of standard hours would be dependent on relevant approvals and be subject to specific negotiated respite measures, as permissible under the CSSI Approval.

The main objectives of this DNVIS are to minimise unreasonable noise and vibration impacts on residents and businesses, and to avoid structural damage to buildings or heritage items as a result of construction vibration. This DNVIS aims to support active community communication and maintain positive, cooperative relationships with local residents, businesses and building owners. It is noted that ongoing community engagement and management of such relationships is primarily managed via the Sydney Metro – Western Sydney Airport Community Communications Strategy.

During the development of the DNVIS Ward has undertaken focussed community consultation with the most potentially affected receivers and has considered their feedback. Notably, as identified by the community consultation report, no notable concerns have been raised by the local residents consulted. The community consultation has identified that the potentially most affected receivers are understanding with respect to the potential for increased noise levels during the works.

It is expected that noise and vibration impacts can be effectively managed though the adoption of the measures identified by this DNVIS.

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The key conclusions are as follows:

- Construction traffic noise is expected to be no more than 2 dB above current traffic noise levels.
- With the incorporation of specific controls, construction vibration is expected to comply with human comfort values nominated in this assessment and on this basis the risk of building damage (even cosmetic) is negligible to all building structures including heritage.
- Given Ward's proposed vibration controls, no specific additional mitigation measures relating to groundborne noise or vibration are considered necessary, beyond the standard measures defined by the CNVS. Application of the measures outlined by this DNVIS would be expected to be sufficient to ensure vibration effects on the occupants of nearby buildings are satisfactorily managed.
- Airborne noise levels may be expected to exceed criteria at times at several receivers. These exceedances may be effectively managed through a combination of standard mitigation measures and additional mitigation measures required by the CNVS, principally through letterbox notifications, and verification monitoring. The following key controls will be implemented:
    - High noise works will be restricted to daytime hours as far as practicable.
    - Where concrete sawing is required to be undertaken out-of-hours, this activity will be restricted to prior to 10.00pm.
    - As far as practicable and safe to do so, sound curtains will be used around works sites to reduce construction noise emissions.
    - Noise monitoring will be undertaken throughout the works to verify construction noise levels and inform the construction team where, if necessary, construction methods require modification to reduce noise levels.
    - Vibration monitoring will be undertaken at the commencement of work involving vibration generating equipment to confirm safe working distances and compliance with German Standard DIN4150:1999.
    - Static rollers will be used in lieu of vibratory rollers on the external roads to minimise any vibration impacts.
    - Periodic letterbox notifications will be provided to update local residents and business owners regarding the progress of the works
    - Community Consultation in accordance with the CNVS and the Out of Hours Works Protocol (SM-21-00306108) will be undertaken at potentially affected receivers and feedback from the receivers will be considered during scheduling of the works.

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APPENDIX A: Glossary of Noise & Vibration Terms

1 Sound Level (or Noise Level)

Sound may be defined as any pressure variation that the human ear can detect. The human ear responds to a wide range of changes in sound pressure. As the greatest sound pressures to which the human ear responds are 10,000,000 times greater than the lowest, the decibel (dB) scale, by the use of logarithms is used to express sound pressure levels more conveniently.

The standard reference sound pressure used to define a Sound Pressure Level is 2×10^{-5} Pascals (Pa).

The decibel is defined as ten times the logarithmic ratio of two pressures. The smallest perceptible change is approximately 1 dB.

Sound Pressure Level is typically abbreviated as SPL, L_P, or L.

2 "A" Weighted Sound Pressure Level

The most common frequency rating is 'A-Weighting'. The A-weighting frequency response curve is designed to approximate the sensitivity of the human ear. The symbol L_A represents A-weighted Sound Pressure Level - The overall broadband level of a sound/noise is typically expressed as a dB(A) level.

Human hearing is most sensitive mid frequencies sounds (500 Hz to 4000 Hz), and less sensitive at higher and lower frequencies. Therefore, the level expressed in dB(A) correlates strongly with the perceived loudness of the sound/noise.

A change in sound pressure level of 1-2 dB is barely noticeable to most people, whilst a 3-5 dB change is perceived as a small but noticeable change in loudness. A 10 dB change is perceived as an approximate doubling or halving in loudness. The table below present the sound pressure levels of some common sources.

Sound Pressure Level dB(A)	Noise Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely loud
110	Grinding on steel	
100	Loud car horn at 3 m	Very loud
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

In addition to A-weighting, other less commonly applied frequency weightings include B, C and D weightings. Unweighted or Linear levels are sound levels measured without any weighting. These are expressed as simply dB, or dB(lin) or dB(Z).

3 Sound Power Level

The rate at which a noise source emits acoustic energy is defined by its Sound Power Level. Sound Power Levels are also expressed in decibel units (dB or dB(A)). Sound Power is typically identified as SWL or LW. The standard reference sound power used to define a Sound Power Level is 1×10^{-12} Watts (W).

4 Statistical Noise Levels

Environmental noise levels from various sources in the environment will vary in level over time. Statistical exceedance levels are typically expressed as L_{AN} levels (i.e. the A-weighted sound pressure level exceeded for N% of a specific measurement period.

The most commonly used statistical noise levels are as follows:

L_{Amax} Maximum noise level over a sample period (typically measured on fast time-weighting response).

L_{A1} Noise level exceeded for 1% of a sample period (typically 15-minute interval).

L_{A10} Noise level exceeded for 10% of a sample period (typically 15-minute interval).

L_{A90} Noise level exceeded for 90% of a sample period. This noise level is commonly used to describe the background noise level (in the absence of the source under investigation).

L_{Aeq} A-weighted equivalent noise level. This is equivalent to the steady sound level containing the same amount of acoustical energy as the time-varying sound. Often referred to as the average noise level.

ABL Assessment Background Level. This is the single figure background level representing each assessment period (day, evening and night) for each day. It is determined by calculating the lowest 10th percentile background noise level (LA90) for each period.

RBL Rating Background Level. This is the median value of the ABL values for each period (day, evening, night), determined over several days of measurements.

Common Vibration Terms

Hertz (Hz) – Units in which frequency is expressed. Synonymous with cycles per second.

Decibel – Ratios of identical quantities are expressed in decibel or dB units. The number of dB is “ratio” against some standard or reference value in terms of the base 10 logarithm of that ratio. In measuring acoustic or vibration power (as in PSD or ASD of random vibration), the number of dB = 10 Log10 (P/Po). Po, the reference level, equals 0 dB. In measuring the more common voltage-like quantities such as acceleration, the number of dB = 20 Log10 (E/Eo) Eo, the reference level, equals 0 dB.-

Displacement – A vector quantity that specifies the change of position of a body or particle with respect to a reference frame.

Velocity – A vector quantity that specifies the time derivative of displacement.

Acceleration – Acceleration is rate of change of velocity with time usually along a specified axis, usually expressed in m/s2

Peak – Extreme value of a varying quantity, measured from the zero or mean value. Also, a maximum spectral value.

Peak-to-peak value – The algebraic difference between extreme values (as D = 2X).

Duration of a shock pulse is how long it lasts. Time is usually measured between instants when the amplitude is greater than 10% of the peak value.

Amplitude – The magnitude of variation (in a changing quantity) from its zero value. Always modify it with an adjective such as **peak, RMS, average**, etc. May refer to displacement, velocity, acceleration.

Crest factor – Of an oscillating quantity. The ratio of the peak value to the r.m.s. value.

VDV – The Vibration Dose Value is the accumulation of energy measured over a given time period, proportional to the root mean quad of acceleration. This is usually measured in each of the three axes of motion. In most cases, vibration tends to be higher in the Z (vertical) axis. This is measured with units of m/s1.75.

PPV – Peak Particle Velocity is the instantaneous peak of the resultant vector sum of all three axes of motion. Results are expressed in terms of velocity normally mm/s.

Peak Acceleration – This is the peak acceleration level measured in each of the three axes of motion. In some cases, this can also be combined in a vector sum. This is measured in m/s2.

Accelerometer – A sensor or transducer or pickup for converting acceleration to an electrical signal. Two common types are piezoresistive and piezoelectric.

Charge amplifier – An amplifier which converts a charge input signal (as from an accelerometer) into an output voltage; a charge-to-voltage converter.

Geophone – A sensor or transducer or pickup for converting velocity to an electrical signal.

acoustics consultants
AUSTRALIA

APPENDIX B

St Mary's Bus Exchange Early Works Staging Plans (Provided by Ward Civil Engineering Pty Ltd)

Stage 1A Main Car park- work area- Day shift

Last saved by: MICHAEL.PANCITO(2021-05-26) Last Plotted: 2021-05-26

QUEEN STREET

ADJOINS SHT-RD-001201

EXCEPTED TAXIS AND BUSES

BUS LANE

PROTECT EXISTING DRAINAGE PIT AND LINTEL

RECONSTRUCT EXISTING KERB RAMP TO SUIT MODIFIED KERB RETURN

PROTECT EXISTING DRAINAGE PIT AND LINTEL

NEW BUS STOP WITH EXISTING AWNING RETAINED; REFER TO SHT-GE-000502 FOR DETAILS.

EXISTING PEDESTRIAN CROSSING TO BE RETAINED

RAISED CONCRETE MEDIAN WITH TfNSW TYPE 2 PEDESTRIAN FENCE TO RMS STD DRG R0800-18; COLOUR GREEN

REINFORCED CONCRETE DISH DRAIN PER PCC STD SD1003/2

LOT 1 / DP32982

LOT 1 / DP1014963

LOT C / DP406472

LOT A / DP377645

LOT CP / SP53485

LOT 1 / DP635528

LOT 2 / DP635528

LOT 3 / DP635528

LOT CP / SP19805

LOT CP / SP19805

LOT 2 / DP456317

LOT 1 / DP456317

2.3 3.3 3.4 3.0

NEW BENCH. DETAIL AND LOCATION TO BE CONFIRMED WITH PCC.

(3) 1P PARKING REMOVED

CONTINUOUS FOOTPATH TREATMENT. SUBJECT TO APPROVAL BY TfNSW, COUNCIL AND LOCAL TRAFFIC COMMITTEE. REFER TO SHT-GE-000505 FOR DETAIL.

NEW PAVEMENT DOTS. REFER TO SHT-RF-001102

SEE NOTE 1

B GE-51

SHARED ZONE TREATMENT WITH STENCIL PATTERN ON EXISTING ASPHALT (BNP STREETPRINT, OR APPROVED EQUAL) SUBJECT TO APPROVAL BY TfNSW, COUNCIL LOCAL TRAFFIC COMMITTEE

DEMOLISH EXISTING ABANDONED LIGHTPOLE BASE

A GE-51

EAST LANE

10.0 2.4

3.5 1.2 4.5 4.7 3.0

STATION STREET

NEW LIGHTPOLE; REFER TO SHT-EL-000003 (TYP.)

LOT 16 / DP238867

Demo existing, Site clearance and Potholing

(4) 1/2P PARKING REMOVED

3.0 3.3 3.3 2.4

EXISTING VEHICLE CROSSING

PHILLIP STREET

DEMOLISH EXISTING ABANDONED LIGHTPOLE BASE

NEW BUS STOP WITH EXISTING AWNING RETAINED; REFER TO SHT-GE-000502 FOR DETAILS.

NEW BENCH. DETAIL AND LOCATION TO BE CONFIRMED WITH PCC.

NEW RUBBER KERB (SAFEROADS SEPARATION KERB, OR APPROVED EQUAL) WITH 500mm BREAK IN KERB EVERY 3m MAX.

NEW SAFETY BARRIER WITH TERMINAL ANCHORS (INGAL CIVIL PRODUCTS EZY-GUARD SMART OR APPROVED EQUAL)

REMOVE EXISTING TREE

DEMOLISH EXISTING ABANDONED LIGHTPOLE BASE

LOT 9 / DP840717

EXISTING FOOTPATH ACCESS TO GIDLEY ST TO BE CLOSED; REFER TO SHT-RF-001005

REMOVE EXISITNG HANDRAIL AND INSTALL NEW SECURITY FENCE

NEW PRECAST CONCRETE TYPE F BARRIER ANCHORED TO PAVEMENT

EXTEND LANDSCAPING AND INSTALL NEW TREE (SPECIES AND LOCATION TO BE CONFIRMED WITH COUNCIL)

LOT 8 / DP734738

EXISTING BUS DROP-OFF TO BE RETAINED

NEW PEDESTRIAN FENCE (TfNSW TYPE 2 TO RMS STD DRG R0800-17; COLOUR GREEN); PROVIDE MINIMUM 1.2m GAP BETWEEN PEDESTRIAN FENCE AND HOARDING FENCE

REFER TO SHT-GE-000501 FOR BUS STOP LAYOUT DETAILS

LOCATE FENCE POST AWAY FROM UNDERGROUND SERVICES

NEW PRECAST CONCRETE TYPE F FREESTANDING BARRIER ANCHORED TO PAVEMENT; PROVIDE MINIMUM 1.2m GAP BETWEEN BARRIER AND HOARDING FENCE

REINFORCED CONCRETE DISH DRAIN AS PER PCC STD SD1003/2

NEW PRECAST CONCRETE TYPE F BARRIER ANCHORED TO PAVEMENT

NEW PREFABRICATED 8.4m x 3.0m DRIVERS FACILITY. REFER TO DRAWINGS 180620A BY ATCO.

INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE/HOARDING AREA; SYDNEY METRO TO INSTALL CONSTRUCTION FENCE

EXISTING TREE TO BE RETAINED AND PROTECTED; EXTENTS OF CONSTRUCTION WORK AROUND THE TREE TO BE DETERMINED IN CONSULTATION WITH THE CONTRACTOR'S ARBORIST

1m WIDE CONCRETE CHANNEL

LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
- NEW PROPERTY FENCE
- NEW PEDESTRIAN FENCE
- NEW GUARDRAIL
- F01 F01 NEW PRECAST CONCRETE TYPE F BARRIER
- NEW BUS LANE
- NEW KISS AND RIDE PARKING
- NEW LANDSCAPE
- TEMPORARY BUS DROP OFF
- TEMPORARY BUS PICK UP
- TEMPORARY BUS LAYOVER
- TEMPORARY PEDESTRIAN AREA
- PARKING SPACE TO BE REMOVED
- EXISTING PAVEMENT
- NEW DRIVERS FACILITY
- NEW BUS SHELTER

Stage 1 work area

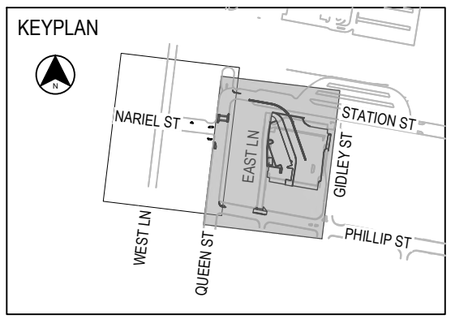
Fencing & new temp layback for construction of Entry & Exit.

Potholing for services

NOTES

1. PENRITH CIT… THE RETAINI… TEMPORARI… AREA IS ONL… BUS INTERCI… APPROXIMATELY MAR 2022 AND MAR 2027)

KEYPLAN



CHECK PRINT

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

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EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	13.11.20	ISSUED FOR STRATEGIC DESIGN		S. CHAVA
	1	03.03.21	ISSUED FOR 80% DETAILED DESIGN		S. CHAVA
	2	22.04.21	IFT		S. CHAVA

REVISION IN PROGRESS

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CO-ORDINATE SYSTEM: GDA 94 MGA ZONE 56 | HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: -

CHECK PRINT

	PRELIM. INITIAL	FINAL DATE
DISCIPLINE M. PANCITO		22.04.21
DISCIPLINE V. ECCLES		22.04.21
DISCIPLINE S. ANDREWS		22.04.21
DISCIPLINE V. ECCLES		22.04.21
BACKDRAFTED/CORRECTED C. VAVOULAS		22.04.21
CONFIRMED S. CHAVA		22.04.21

PREPARED FOR GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT

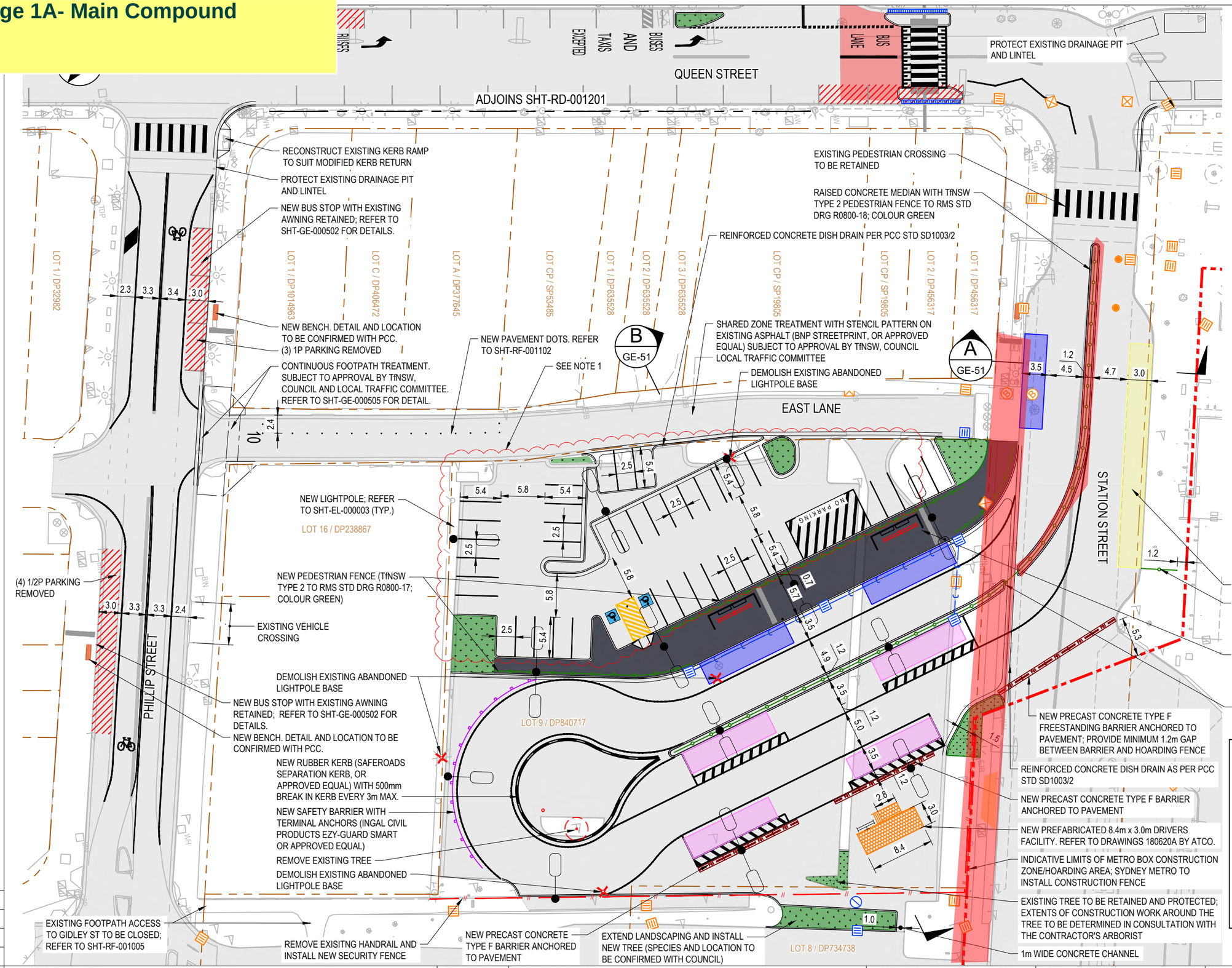
PENRITH CITY COUNCIL
STATION STREET ST MARYS

CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION
GENERAL ARRANGEMENT PLAN

SHEET 2 OF 2

TfNSW REGISTRATION No.			PART
DS2021/000076			1
ISSUE STATUS	EDMS No.	SHEET No.	ISSUE
DETAILED DESIGN	-	SHT-RD-001202	2

Stage 1A- Main Compound



LEGEND

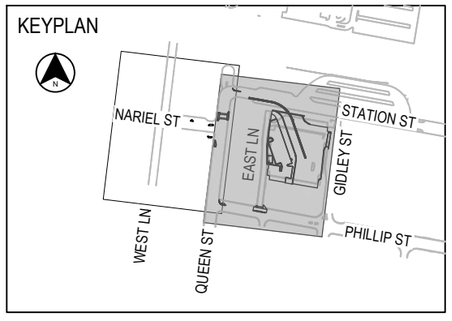
- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
- NEW PROPERTY FENCE
- NEW PEDESTRIAN FENCE
- NEW GUARDRAIL
- F01 F01 NEW PRECAST CONCRETE TYPE F BARRIER
- NEW BUS LANE
- NEW KISS AND RIDE PARKING
- NEW LANDSCAPE
- TEMPORARY BUS DROP OFF
- TEMPORARY BUS PICK UP
- TEMPORARY BUS LAYOVER
- TEMPORARY PEDESTRIAN AREA
- PARKING SPACE TO BE REMOVED
- EXISTING PAVEMENT
- NEW DRIVERS FACILITY
- NEW BUS SHELTER

Potholing for services

NOTES

1. PENRITH CITY COUNCIL MAY MANAGE AND USE THE RETAINED VENESS PLACE CAR PARK AREA TEMPORARILY FOR PUBLIC CAR PARKING. THIS AREA IS ONLY AVAILABLE WHILE THE TEMPORARY BUS INTERCHANGE IS IN OPERATION (BETWEEN APPROXIMATELY MAR 2022 AND MAR 2027)

KEYPLAN



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50mm ON A3 SIZE ORIGINAL

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EXTERNAL REFERENCE FILES	
DESIGN LOT CODE	
DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	-
PLOT DATE / TIME	26-May-21 / 9:34:36 PM
PLOT BY	MICHAEL.PANCITO
CLIENT	NSW GOVERNMENT Transport for NSW
PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION GENERAL ARRANGEMENT PLAN	A3 SHEET 2 OF 2

REV	DATE	AMENDMENT / REVISION DESCRIPTION
0	13.11.20	ISSUED FOR STRATEGIC DESIGN
1	03.03.21	ISSUED FOR 80% DETAILED DESIGN
2	22.04.21	IFT

REVISION IN PROGRESS

WVR No.	APPROVAL
	S. CHAVA
	S. CHAVA
	S. CHAVA

SCALES ON A3 SIZE DRAWING: 2.5 0 2.5 5 7.5m — 1 : 500 FULL SIZE A3

DRAWINGS / DESIGN PREPARED BY: -

CHECK PRINT	PRELIM. INITIAL	FINAL DATE
DISCIPLINE	M. PANCITO	22.04.21
DISCIPLINE	V. ECCLES	22.04.21
DISCIPLINE	S. ANDREWS	22.04.21
DISCIPLINE	V. ECCLES	22.04.21
BACKDRAFTED/CORRECTED	C. VAVOULAS	22.04.21
CONFIRMED	S. CHAVA	22.04.21

CO-ORDINATE SYSTEM	GDA 94 MGA ZONE 56
HEIGHT DATUM	AHD

PREPARED FOR GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT

TfNSW REGISTRATION No.	DS2021/000076	PART	1
ISSUE STATUS	DETAILED DESIGN	EDMS No.	-
SHEET No.	SHT-RD-001202	ISSUE	2

Stage 1B Main Compound - Pavement Box out - Day works

Box out for pavement

QUEEN STREET

ADJOINS SHT-PV-001001

EAST LANE

PHILLIP STREET

GIDLEY STREET

STATION STREET

EXCEPTED TAXIS AND BUSES

BUS LANE

NO PARKING

STAMPED ASPHALT TO BE REINSTATED AS PER EXISTING

STAMPED ASPHALT SHARED ZONE MATERIAL (STREETPRINT COATING OR EQUAL) AS APPROVED BY PENRITH CITY COUNCIL AND TfNSW

REFER SHT-GE-000505 FOR CONTINUOUS FOOTPATH TREATMENT DETAILS

NEW TRENCH GATE AND FRAME. REFER TO GUTTER BRIDGE DETAIL ON SHT-GE-000503

REINSTATE EXCAVATIONS FOR UTILITIES WITH PAVEMENT TYPE F2. PAVING TO BE MIN 1.2.

EXISTING TREE TO BE RETAINED AND PROTECTED; EXTENTS OF PAVING WORK (INCLUDING M&C) AROUND THE TREE TO BE DETERMINED IN CONSULTATION WITH THE CONTRACTOR'S ARBORIST

SEE NOTE 10

LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- M&C, MI, F1, F1b, F2, FP3, BS
- FP1, FP2, DW, TF, STENCIL, RP
- XXXX — PAVEMENT TAG
- I-1 OR E-1 — INTERFACE OR EDGE DETAILS
- EXISTING STORMWATER PIT
- NEW STORMWATER PIT
- PIPE CONNECTION TO EXISTING PIT
- ADJUST / MODIFY EXISTING PIT INLET
- NEW HAUNCHED PIT
- SUBSURFACE DRAINAGE
- NEW DRIVERS FACILITY

NOTES

1. ALL DIMENSIONS SHOWN IN METRES UNLESS NOTED OTHERWISE.
2. REFER TO SHT-GE-000021 AND SHT-GE-000024 FOR GENERAL NOTES.
3. REFER TO SHT-PV-000501 AND SHT-PV-000502 FOR PAVEMENT PROFILE DETAILS.
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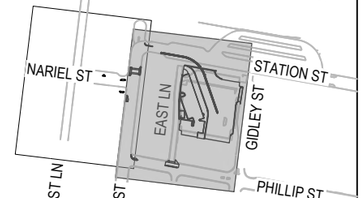
6. MINIMUM PAVING WIDTH SHALL BE 1.2 m TO ENABLE MACHINE COMPACTION.
7. REFER TO SHT-RD SERIES FOR KERB TYPES AND SET OUT DETAILS.
8. SUBSURFACE DRAINS SHALL BE CONNECTED EITHER TO EXISTING PITS OR PROPOSED PITS U.N.O.
9. FOR SUBSURFACE DRAINS AGAINST GRADE, MINIMUM GRADE SHALL BE 0.5%.
10. PROVIDE JOINT P7D TO TIE PAVEMENT TYPE RP TO EXISTING RIGID PAVEMENT. REFER TO TFNSW DRAWINGS DS2012/001191 FOR DETAILS.

KEYPLAN



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50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: PW:/P0054029-SHT-PV-001002.DWG	DESIGN LOT CODE: -	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING: -	PLOT DATE / TIME: 26-May-21 / 9:31:59 PM; PLOT BY: MICHAEL.PANCITO
EXTERNAL REFERENCE FILES:		SCALES ON A3 SIZE DRAWING: 1 : 500 (2.5 0 2.5 5 7.5m) FULL SIZE A3	DRAWINGS / DESIGN PREPARED BY: -
CO-ORDINATE SYSTEM: GDA 94 MGA ZONE 56	HEIGHT DATUM: AHD		

REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
0	03.03.21	ISSUED FOR 80% DETAILED DESIGN IFT		S. CHAVA
1	22.04.21	REVISION IN PROGRESS		S. CHAVA

CHECK PRINT	PRELIM. INITIAL	FINAL DATE
DISCIPLINE	M. PANCITO	22.04.21
DISCIPLINE	V. ECCLES	22.04.21
DISCIPLINE	F. RASHID	22.04.21
DISCIPLINE	C. NAVARRO	22.04.21
BACKDRAFTED/CORRECTED	C. VAVOULAS	22.04.21
CONFIRMED	S. CHAVA	22.04.21

CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR: GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT

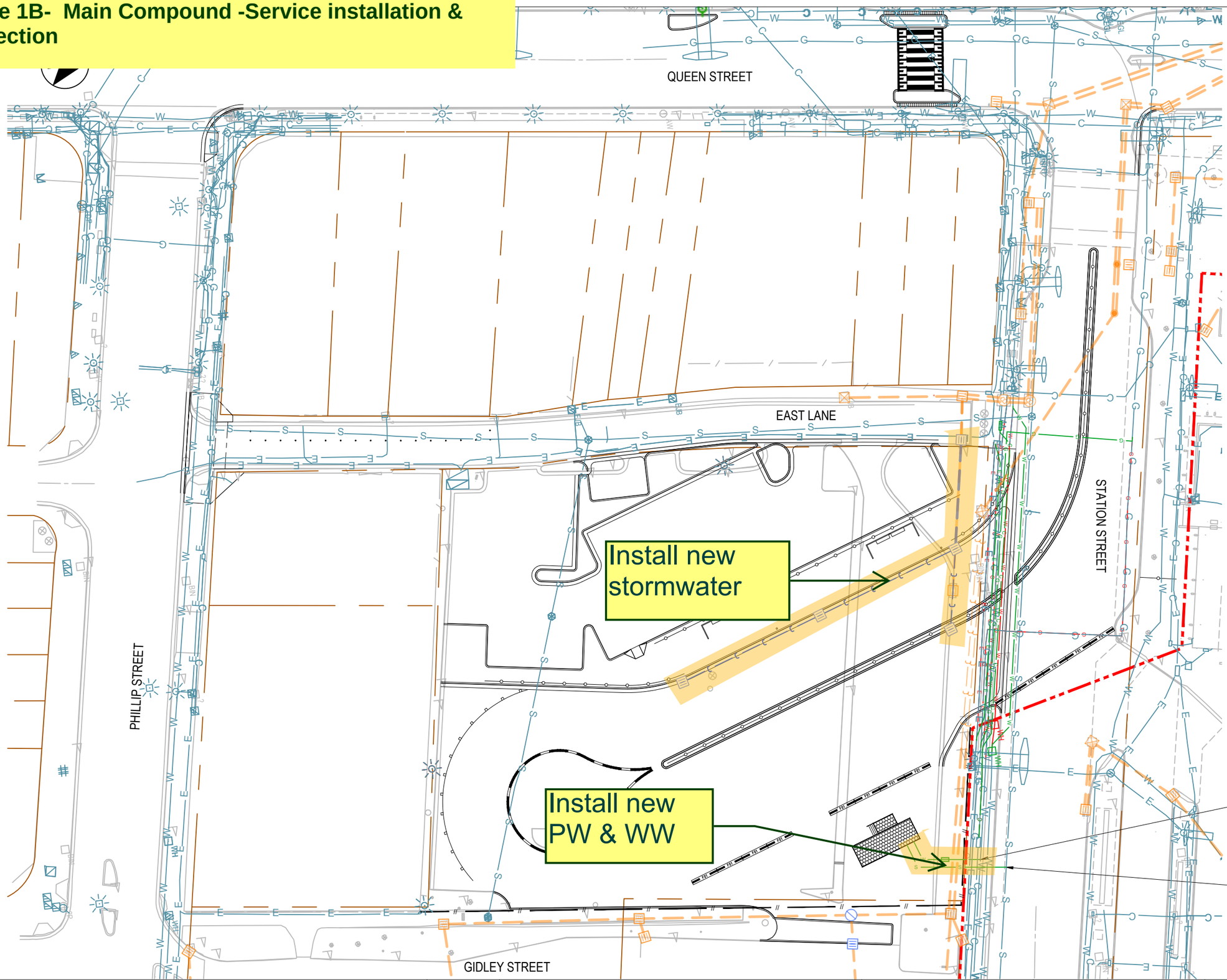
PENRITH CITY COUNCIL
STATION STREET ST MARYS
CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION
PAVEMENT PLAN
SHEET 2 OF 2

A3

TfNSW REGISTRATION No. DS2021/000076 — PART 1

ISSUE STATUS: DETAILED DESIGN | EDMS No.: - | SHEET No.: SHT-PV-001002 | ISSUE: 1

Stage 1B- Main Compound -Service installation & Protection



LEGEND

- EXISTING PROPERTY BOUNDARY
- INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
- EXISTING RETAINED
- ABANDON / REMOVED
- NEW DESIGN
- NEW WORKS COMPLETED BY OTHERS
- NEW SANITARY SEWER SERVICE
- NEW WATER SERVICE
- NEW WATER METER
- UTILITY PROTECTION
- EXISTING STORMWATER PIT AND PIPE
- NEW STORMWATER PIT AND PIPE
- CONCRETE ENCASE NEW PIPE
- CONCRETE ENCASE EXISTING PIPE
- DRIVERS FACILITY

NOTES

1. CONTRACTOR TO UNDERTAKE THEIR OWN DBYD AND POTHOLING INVESTIGATION PRIOR TO CONSTRUCTION ACTIVITIES.
2. PRIVATE SEWER MAIN AND FITTINGS SHALL BE PVC-U, MINIMUM SN8, SERIES 1, COLOUR GREY, AND IN ACCORDANCE WITH AS1260 AND WSA02-2002.
3. PRIVATE WATER MAIN AND FITTINGS SHALL BE POLYETHYLENE PE100 PIPE, MINIMUM PN 16, SERIES 1, COLOUR BLACK WITH BLUE STRIPES, AND IN ACCORDANCE WITH AS4130 AND WSA03-2011.
4. REFER TO SHT-EL-000003 FOR ELECTRICAL SERVICE TO DRIVERS FACILITY AND TEMPORARY BUS INTERCHANGE AREA.
5. CONNECTIONS SHOWN ARE INDICATIVE ONLY. CONTRACTOR TO FILE NECESSARY APPLICATIONS TO RELEVANT AUTHORITIES.

PROVIDE NEW 25mm WATER SUPPLY WITH 600mm MINIMUM COVER. SEE NOTE 3. CONNECT TO EXISTING SYDNEY WATER WATER MAIN WITH SYDNEY WATER APPROVED WATER METER. SEE NOTE 5.

PROVIDE NEW 150mm SEWER MAIN AT 1.65% MINIMUM WITH 600mm MINIMUM COVER. SEE NOTE 2. CONNECT TO EXISTING SYDNEY WATER SEWER MAIN. UTILITY RELOCATIONS MAY BE REQUIRED TO INSTALL NEW SEWER SERVICE. SEE NOTE 5.

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EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL	SCALES ON A3 SIZE DRAWING	DRAWINGS / DESIGN PREPARED BY	CHECK PRINT (PRELIM. INITIAL / FINAL DATE)
	0	03.03.21	ISSUED FOR 80% DETAILED DESIGN		S. CHAVA	2.5 0 2.5 5 7.5m		DISCIPLINE M. PANCITO 22.04.21
	1	22.04.21	IFT		S. CHAVA	1 : 500 FULL SIZE A3		DISCIPLINE V. ECCLES 22.04.21
			REVISION IN PROGRESS			CO-ORDINATE SYSTEM: GDA 94 MGA ZONE 56	HEIGHT DATUM: AHD	DISCIPLINE C. ZHAO 22.04.21
							-	DISCIPLINE V. ECCLES 22.04.21
								BACKDRAFTED/CORRECTED G. VAVOULAS 22.04.21
								CONFIRMED S. CHAVA 22.04.21

CLIENT: NSW GOVERNMENT Transport for NSW

PENRITH CITY COUNCIL
STATION STREET ST MARYS
CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION
HYDRAULIC SERVICES PLAN
SHEET 1 OF 1

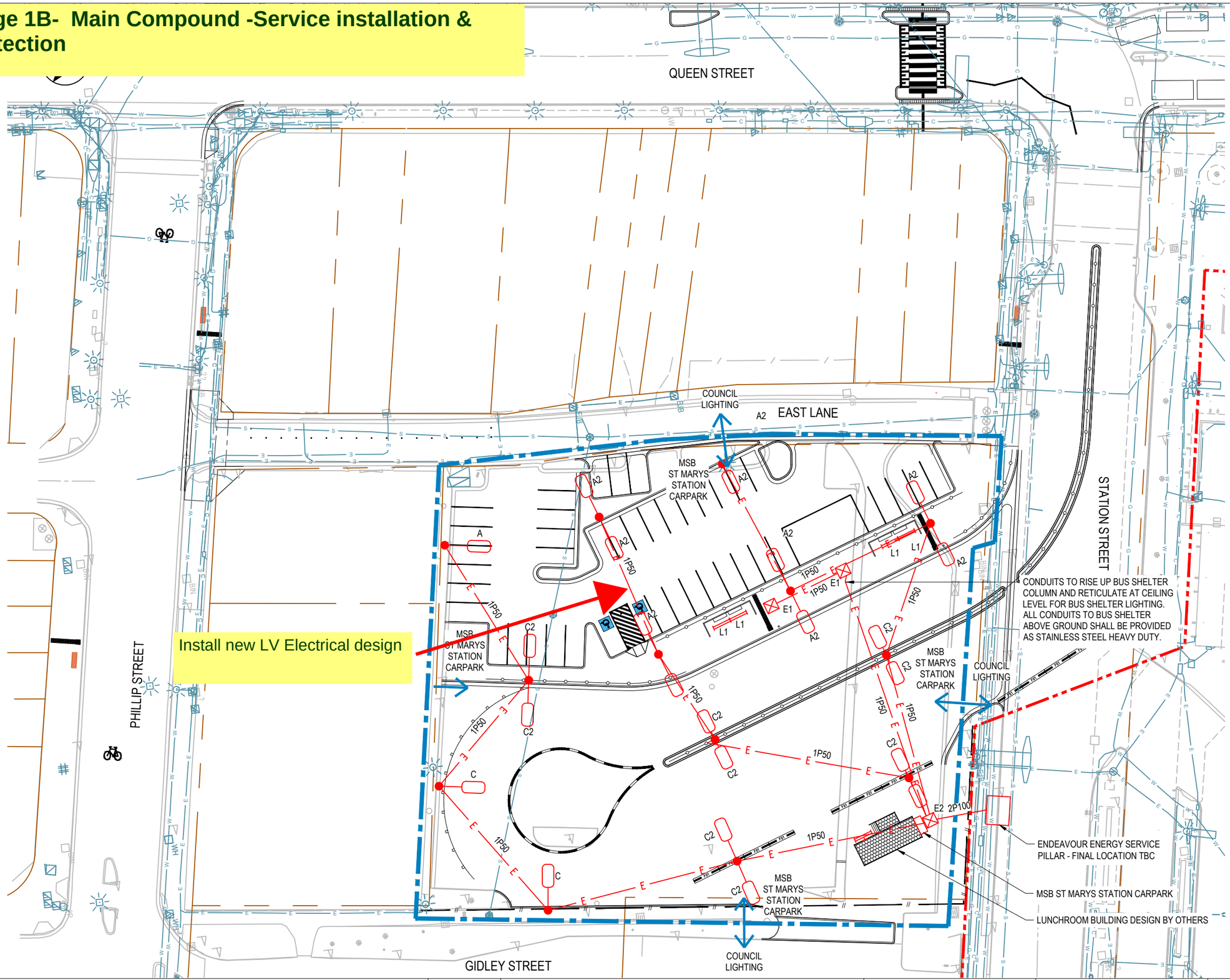
A3

PREPARED FOR: GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT

TfNSW REGISTRATION No. DS2021/000076 PART 1

ISSUE STATUS: FOR INFORMATION ONLY | EDMS No.: - | SHEET No.: SHT-HY-001001 | ISSUE: 1

Stage 1B- Main Compound -Service installation & Protection



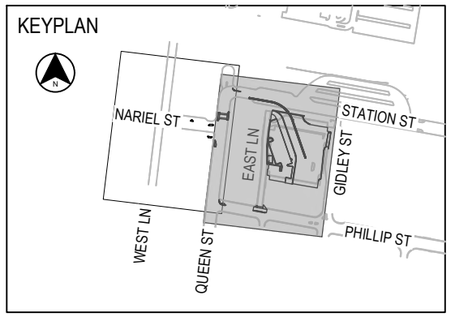
LEGEND

- INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- W — EXISTING UTILITIES RETAINED
- E — NEW LOW VOLTAGE ELECTRICAL CABLE INSTALLED IN HDUPVC ORANGE CONDUITS
- MSB — MAIN SWITCHBOARD
- DISTRIBUTION BOARD
- SERVICES BOARD BY OTHER TRADES FCXXXX DENOTES FIELD CABINET XXXX
- SP — SERVICE PILLAR
- E1 — CABLE PIT - 300x300x600, CLASS C TYPE
- E2 — CABLE PIT - 600x600x900, CLASS C TYPE

NOTE ON CABLE PITS:
INTERNAL DIMENSIONS (DxWxL mm)
TO AS 3996:209

NOTES

KEYPLAN



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EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL	SCALES ON A3 SIZE DRAWING	DRAWINGS / DESIGN PREPARED BY	CHECK PRINT	PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION ELECTRICAL SITE PLAN SHEET 1 OF 1 — A3
	0	03.03.21	ISSUED FOR 80% DETAILED DESIGN IFT		S. CHAVA	2.5 0 2.5 5 7.5m 1 : 500 FULL SIZE A3	-	PRELIM. INITIAL / FINAL DATE	
	1	22.04.21	REVISION IN PROGRESS		S. CHAVA	CO-ORDINATE SYSTEM: GDA 94 MGA ZONE 56 HEIGHT DATUM: AHD		DISCIPLINE #VALUE!	PREPARED FOR: GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT
								DISCIPLINE #VALUE!	TINSW REGISTRATION No.: DS2021/000076 — PART 1
								DISCIPLINE #VALUE!	ISSUE STATUS: FOR INFORMATION ONLY — EDMS No.: - — SHEET No.: SHT-EL-000003 — ISSUE 1
								BACKDRAFTED/CORRELATED #VALUE!	
								CONFIRMED #VALUE!	

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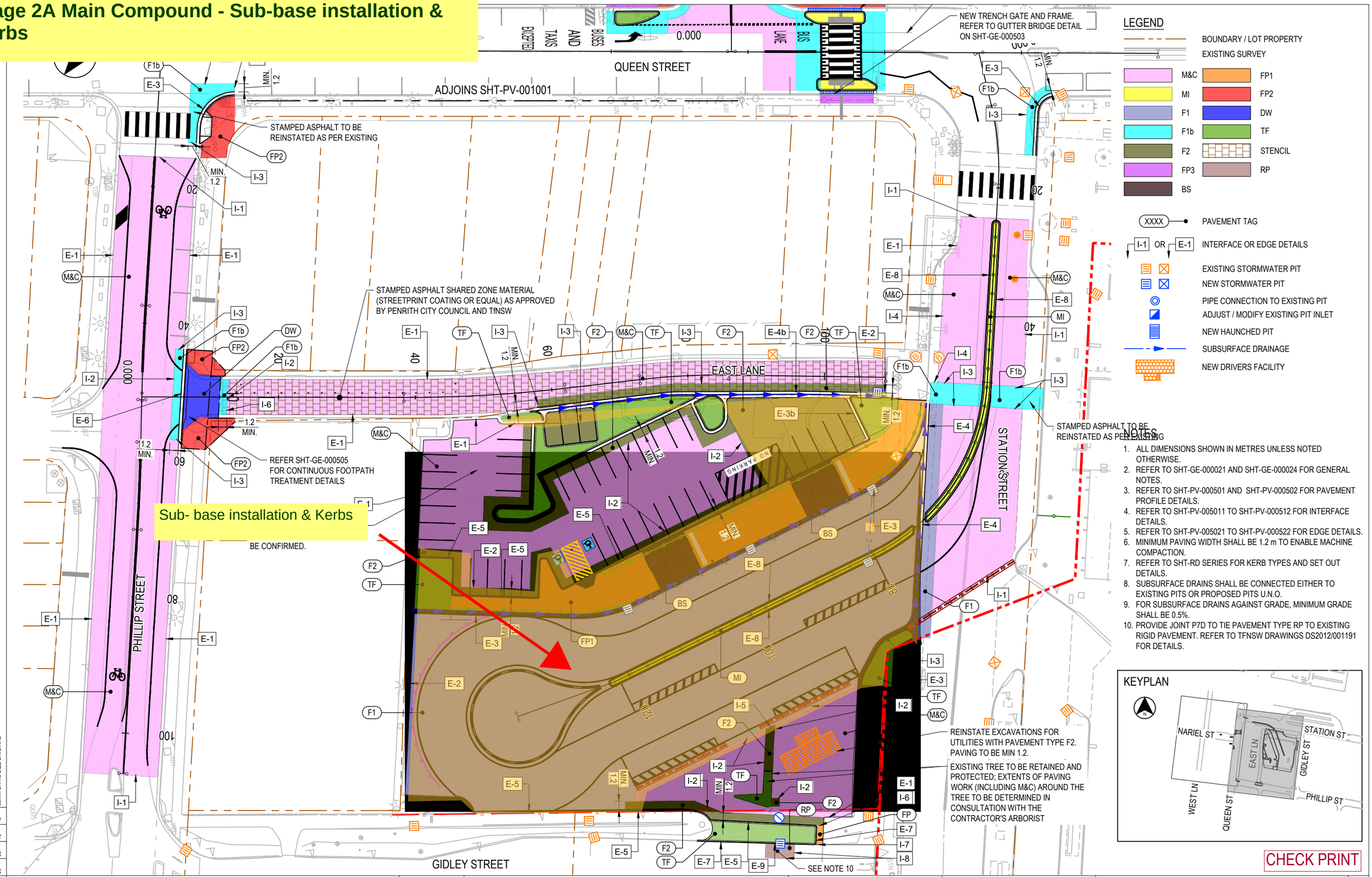
Stage 2A Main Compound - Sub-base installation & Kerbs



LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- M&C, MI, F1, F1b, F2, FP3, BS
- FP1, DW, TF, STENCIL, RP
- XXXX — PAVEMENT TAG
- I-1 OR E-1 — INTERFACE OR EDGE DETAILS
- EXISTING STORMWATER PIT
- NEW STORMWATER PIT
- PIPE CONNECTION TO EXISTING PIT
- ADJUST / MODIFY EXISTING PIT INLET
- NEW HAUNCHED PIT
- SUBSURFACE DRAINAGE
- NEW DRIVERS FACILITY

NOTES

1. ALL DIMENSIONS SHOWN IN METRES UNLESS NOTED OTHERWISE.
2. REFER TO SHT-GE-000021 AND SHT-GE-000024 FOR GENERAL NOTES.
3. REFER TO SHT-PV-000501 AND SHT-PV-000502 FOR PAVEMENT PROFILE DETAILS.
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10. PROVIDE JOINT P7D TO TIE PAVEMENT TYPE RP TO EXISTING RIGID PAVEMENT. REFER TO TFNSW DRAWINGS DS2012/001191 FOR DETAILS.

KEYPLAN

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CLIENT: Transport for NSW	PENRITH CITY COUNCIL STATION STREET ST MARYS CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION PAVEMENT PLAN SHEET 2 OF 2		A3

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	03.03.21	ISSUED FOR 80% DETAILED DESIGN		S. CHAVA
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REVISION IN PROGRESS

SCALES ON A3 SIZE DRAWING: 2.5 0 2.5 5 7.5m; 1 : 500 FULL SIZE A3

CO-ORDINATE SYSTEM: GDA 94 MGA ZONE 56 | HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: -

CHECK PRINT		PRELIM. INITIAL	FINAL DATE
DISCIPLINE	M. PANCITO		22.04.21
DISCIPLINE	V. ECCLES		22.04.21
DISCIPLINE	F. RASHID		22.04.21
DISCIPLINE	C. NAVARRO		22.04.21
BACKDRAFTED/CORRECTED	C. VAVOULAS		22.04.21
CONFIRMED	S. CHAVA		22.04.21

PREPARED FOR: GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT

TfNSW REGISTRATION No.: DS2021/000076 | PART: 1

ISSUE STATUS: DETAILED DESIGN | EDMS No.: - | SHEET No.: SHT-PV-001002 | ISSUE: 1

Stage 2B Main Compound - Pavement/Footpath final trim & landscape prep- Drivers Facility installation - Day works

Fill F1/F2 & F1b/BS & prep for AC & Conc.

Mill (M&C) area in carpark & Driver facility.

Box out TF areas only

Landscaping

Driver facility installation

Bus shelters installation

QUEEN STREET

ADJOINS SHT-PV-001001

EAST LANE

STATION STREET

PHILLIP STREET

GIDLEY STREET

STAMPED ASPHALT TO BE REINSTATED AS PER EXISTING

STAMPED ASPHALT SHARED ZONE MATERIAL (STREETPRINT COATING OR EQUAL) AS APPROVED BY PENRITH CITY COUNCIL AND TfNSW

NEW TRENCH GATE AND FRAME. REFER TO GUTTER BRIDGE DETAIL ON SHT-GE-000503

REINSTATE EXCAVATIONS FOR UTILITIES WITH PAVEMENT TYPE F2. PAVING TO BE MIN 1.2.

EXISTING TREE TO BE RETAINED AND PROTECTED; EXTENTS OF PAVING WORK (INCLUDING M&C) AROUND THE TREE TO BE DETERMINED IN CONSULTATION WITH THE CONTRACTOR'S ARBORIST

SEE NOTE 10

LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- M&C, MI, F1, F1b, F2, FP3, BS
- FP1, FP2, DW, TF, STENCIL, RP
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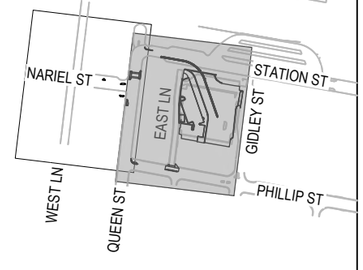
KEYPLAN



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CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR: GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT

PENRITH CITY COUNCIL
STATION STREET ST MARYS
CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION PAVEMENT PLAN

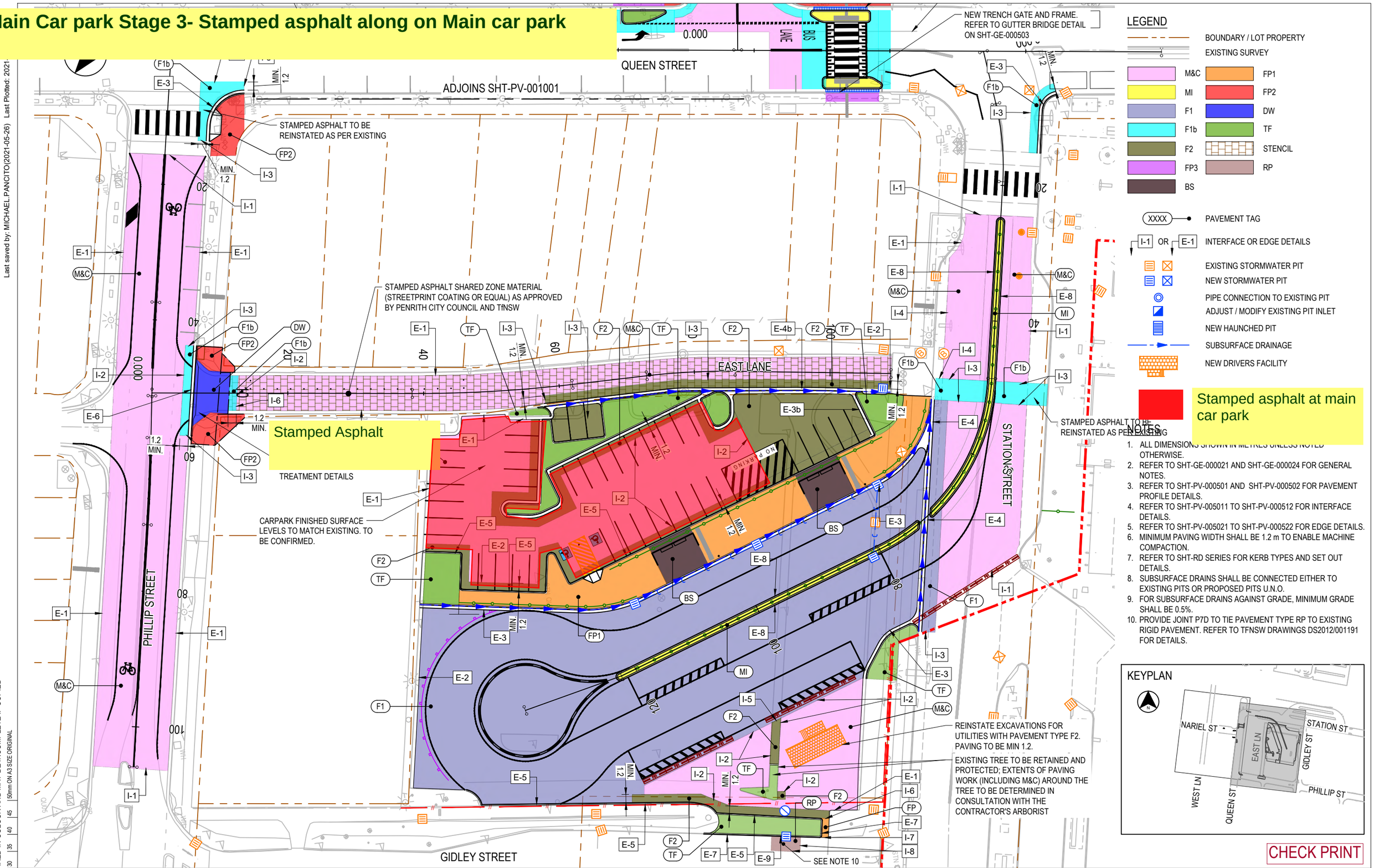
A3

SHEET 2 OF 2

TfNSW REGISTRATION No. DS2021/000076 — PART 1

ISSUE STATUS	EDMS No.	SHEET No.	ISSUE
DETAILED DESIGN	-	SHT-PV-001002	1

Main Car park Stage 3- Stamped asphalt along on Main car park



LEGEND

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KEYPLAN

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DRAWING FILE LOCATION / NAME	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME	PLOT BY	CLIENT
PW:/P0054029-SHT-PV-001002.DWG	-	-	26-May-21 / 9:31:59 PM	MICHAEL.PANCITO	NSW GOVERNMENT Transport for NSW

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	03.03.21	ISSUED FOR 80% DETAILED DESIGN		S. CHAVA
	1	22.04.21	IFT		S. CHAVA

REVISION IN PROGRESS

SCALES ON A3 SIZE DRAWING: 2.5 0 2.5 5 7.5m — 1 : 500 — FULL SIZE A3

CO-ORDINATE SYSTEM	HEIGHT DATUM	DRAWINGS / DESIGN PREPARED BY
GDA 94 MGA ZONE 56	AHD	-

CHECK PRINT	PRELIM.	FINAL	INITIAL	DATE
DISCIPLINE	M. PANCITO			22.04.21
DISCIPLINE	V. ECCLES			22.04.21
DISCIPLINE	F. RASHID			22.04.21
DISCIPLINE	C. NAVARRO			22.04.21
BACKDRAFTED/CORRECTED	C. VAVOULAS			22.04.21
CONFIRMED	S. CHAVA			22.04.21

PREPARED FOR GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT

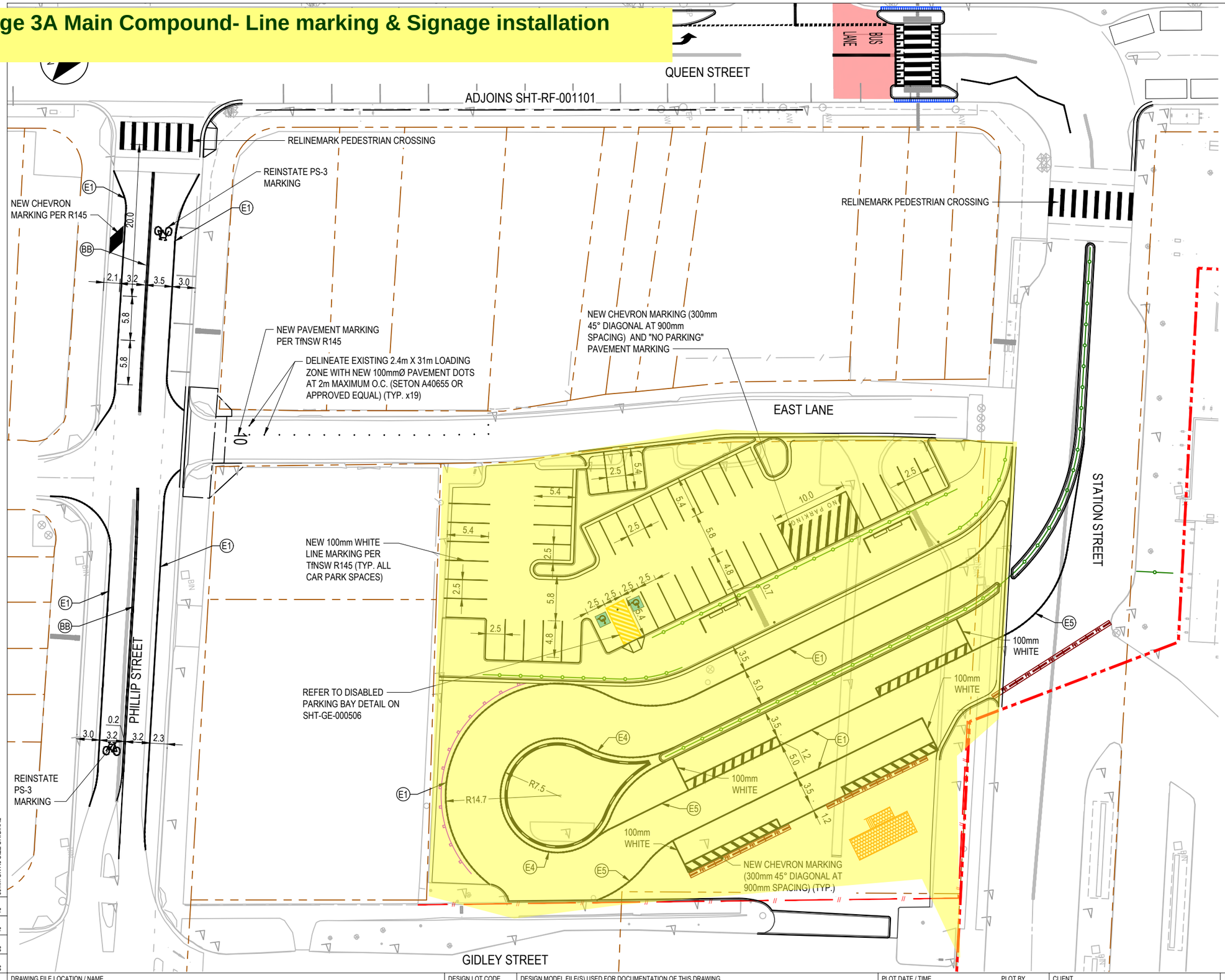
PENRITH CITY COUNCIL
STATION STREET ST MARYS
CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION PAVEMENT PLAN

A3 — SHEET 2 OF 2

TfNSW REGISTRATION No.	PART
DS2021/000076	1

ISSUE STATUS	EDMS No.	SHEET No.	ISSUE
DETAILED DESIGN	-	SHT-PV-001002	1

Stage 3A Main Compound- Line marking & Signage installation



LEGEND

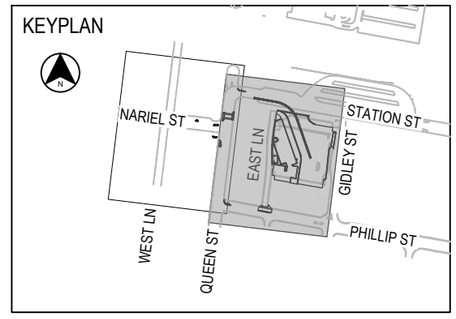
- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
- NEW PROPERTY FENCE
- NEW PEDESTRIAN FENCE
- NEW GUARDRAIL
- NEW PRECAST CONCRETE TYPE F BARRIER
- LINEMARKING TAG
- PAVEMENT ARROW TAG
- NEW BUS SHELTER
- NEW DRIVERS FACILITY
- EXISTING TCS POSTS & MAST ARMS (TO BE MAINTAINED)

NOTES

1. ALL REGULATORY SIGNPOSTING AND LINEMARKING SHOWN ON THESE DRAWINGS WILL NEED TO BE APPROVED BY WRITTEN AUTHORISATION FROM AN OFFICER AUTHORISED UNDER SECTION 5.9 OF THE TfNSW DELEGATIONS MANUAL.

Line marking on D/S

KEYPLAN



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DRAWING FILE LOCATION / NAME: PW:/P0054029-SHT-RF-001102.DWG	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING: -	PLOT DATE / TIME: 26-May-21 / 9:36:51 PM; PLOT BY: MICHAEL.PANCITO
EXTERNAL REFERENCE FILES			

REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
0	03.03.21	ISSUED FOR 80% DETAILED DESIGN		S. CHAVA
1	22.04.21	IFT		S. CHAVA

REVISION IN PROGRESS

SCALES ON A3 SIZE DRAWING: 2.5 0 2.5 5 7.5m; 1 : 500 FULL SIZE A3

CO-ORDINATE SYSTEM: GDA 94 MGA ZONE 56 | HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: -

CHECK PRINT

		PRELIM. INITIAL	FINAL DATE
DISCIPLINE	M. PANCITO		22.04.21
DISCIPLINE	V. ECCLES		22.04.21
DISCIPLINE	S. ANDREWS		22.04.21
DISCIPLINE	V. ECCLES		22.04.21
BACKDRAFTED/CORRECTED	C. VAVOULAS		22.04.21
CONFIRMED	S. CHAVA		22.04.21

CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR: GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT

PENRITH CITY COUNCIL
STATION STREET ST MARYS
CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION
LINEMARKING PLAN
SHEET 2 OF 2

A3

TfNSW REGISTRATION No.: DS2021/000076 | PART: 1

ISSUE STATUS: DETAILED DESIGN | EDMS No.: - | SHEET No.: SHT-RF-001102 | ISSUE: 1

External Work- Stage 1A Nariel St & Queen St

Last saved by: MICHAEL.PANCITO(2021-05-26) Last Plotted: 2021-05-26

CARINYA AVENUE

LOT 185 / DP26908 | LOT 184 / DP26908 | LOT 183 / DP26908 | LOT 182 / DP26908 | LOT 181 / DP26908 | LOT 180 / DP26908

LOT 179 / DP26908 | LOT 178 / DP26908 | LOT 177 / DP26908 | LOT 176 / DP26908

WEST LANE

WEST LANE

NARIEL STREET

LOT 2 / DP588155 | LOT B / DP379018 | LOT A / DP379018

LOT 7 / DP18072 | LOT 6 / DP18072 | LOT 5 / DP18072 | LOT 4 / DP18072 | LOT CP / SP12965

-Remove Parking

-Prep for Line marking

Maintain 1.5m wide footpath

CONVERT (4) 1P PARKING SPACES TO (4) KISS-N-RIDE

NEW SHADE STRUCTURE (DETAIL AND LOCATION TO BE CONFIRMED WITH COUNCIL)

RETAIN EXISTING VEHICLE CROSSING

NEW AT-GRADE ZEBRA CROSSING; SUBJECT TO FURTHER COORDINATION AND APPROVAL BY COUNCIL AND LOCAL TRAFFIC COMMITTEE. REFER TO SHT-GE-000504 FOR DETAILS.

NEW KERB RAMP TO PCC STD DRG SD 1002

EXISTING KERB RAMP TO BE REMOVED. KERB AND GUTTER TO BE REINSTATED TO PCC STD DRG SD 1003.

NEW LIGHT POLE

NEW LANDSCAPE ISLAND

(1) 1P PARKING SPACE REMOVED

-Remove Parking

-Set up fencing

-Demo kerb & FRP to new pram ramp

-Tree removal

-Utility prep/PH

1.50 m

50 m

6.0

-Set up fencing & Baririers

-FRP to Raised crossing both sides of Queen Street

-FRP ramp on N/S

PROPOSED RELOCATED TAXI STAND (5 SPACES)

BUS LANE

EXCEPT TAXIS AND BUSES

EXCEPT TAXIS AND BUSES

RECONSTRUCT KERB RETURN

QUEEN STREET

ADJOINS SHT-RD-001202

(3) 1P PARKING SPACES REMOVED

-Demo & FRP kerb & pram ramps on N/S

-FRP raised ramp on N/S

LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- INDICATIVE LIMITS OF METRO BOX CONSTRUCTION ZONE
- NEW PROPERTY FENCE
- NEW PEDESTRIAN FENCE
- NEW GUARDRAIL
- NEW PRECAST CONCRETE TYPE F BARRIER (F01 — F01)
- NEW BUS LANE
- NEW KISS AND RIDE PARKING
- NEW LANDSCAPE
- TEMPORARY BUS DROP OFF
- TEMPORARY BUS PICK UP
- TEMPORARY BUS LAYOVER
- TEMPORARY PEDESTRIAN AREA
- PARKING SPACE TO BE REMOVED
- EXISTING PAVEMENT
- NEW DRIVERS FACILITY
- NEW BUS SHELTER

NOTES

1. PENRITH CITY COUNCIL MAY MANAGE AND USE THE RETAINED VENESS PLACE CAR PARK AREA TEMPORARILY FOR PUBLIC CAR PARKING. THIS AREA IS ONLY AVAILABLE WHILE THE TEMPORARY BUS INTERCHANGE IS IN OPERATION (BETWEEN APPROXIMATELY MAR 2022 AND MAR 2027)

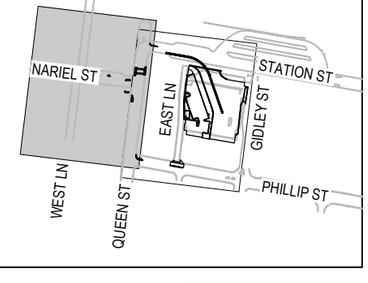
Parking removal

Work compound set up 24hrs

Pedestrian walkway (1.5m)

N/S areas

KEYPLAN



CHECK PRINT

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DRAWING FILE LOCATION / NAME	PW:/P0054029-SHT-RD-001201.DWG
EXTERNAL REFERENCE FILES	
DESIGN LOT CODE	-
DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	-
PLOT DATE / TIME	26-May-21 / 9:34:20 PM
PLOT BY	MICHAEL.PANCITO
CLIENT	NSW GOVERNMENT Transport for NSW

REV	DATE	WVR No.	APPROVAL
0	13.11.20		S. CHAVA
1	03.03.21		S. CHAVA
2	22.04.21		S. CHAVA

SCALES ON A3 SIZE DRAWING: 1 : 500 (2.5 0 2.5 5 7.5m) FULL SIZE A3

CO-ORDINATE SYSTEM	HEIGHT DATUM
GDA 94 MGA ZONE 56	AHD

DRAWINGS / DESIGN PREPARED BY: -

CHECK PRINT — PRELIM. ☐ FINAL ☐

	INITIAL	DATE
DISCIPLINE	M. PANCITO	22.04.21
DISCIPLINE	V. ECCLES	22.04.21
DISCIPLINE	S. ANDREWS	22.04.21
DISCIPLINE	V. ECCLES	22.04.21
BACKDRAFTED/CORRECTED	C. VAVOULAS	22.04.21
CONFIRMED	S. CHAVA	22.04.21

PENRITH CITY COUNCIL
STATION STREET ST MARYS
CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION
GENERAL ARRANGEMENT PLAN

A3

SHEET 1 OF 2

PREPARED FOR
GREATER SYDNEY DIVISION
ON BEHALF OF
SYDNEY METRO WEST. SYDNEY AIRPORT

TINSW REGISTRATION No. DS2021/000076 | PART 1

ISSUE STATUS	EDMS No.	SHEET No.	ISSUE
DETAILED DESIGN	-	SHT-RD-001201	2

EW Stage 1B- Nariel & Philip Street- Night works

-Boxout and place AC details to corners

-Box out Footpath details & reinstate

-Water blast line marking Philip street

ADJOINS SHT-PV-001001

QUEEN STREET

EXCEPTED TAXIS AND BUSES

BUS LANE

EAST LANE

PHILLIP STREET

GIDLEY STREET

STATION STREET

NEW TRENCH GATE AND FRAME. REFER TO GUTTER BRIDGE DETAIL ON SHT-GE-000503

STAMPED ASPHALT TO BE REINSTATED AS PER EXISTING

STAMPED ASPHALT SHARED ZONE MATERIAL (STREETPRINT COATING OR EQUAL) AS APPROVE BY PENRITH CITY COUNCIL AND TfNSW

REFER SHT-GE-000505 FOR CONTINUOUS FOOTPATH TREATMENT DETAILS

CARPARK FINISHED SURFACE LEVELS TO MATCH EXISTING. TO BE CONFIRMED.

REINSTATE EXCAVATIONS FOR UTILITIES WITH PAVEMENT TYPE F2. PAVING TO BE MIN 1.2.

EXISTING TREE TO BE RETAINED AND PROTECTED; EXTENTS OF PAVING WORK (INCLUDING M&C) AROUND THE TREE TO BE DETERMINED IN CONSULTATION WITH THE CONTRACTOR'S ARBORIST

NO PARKING

SEE NOTE 10

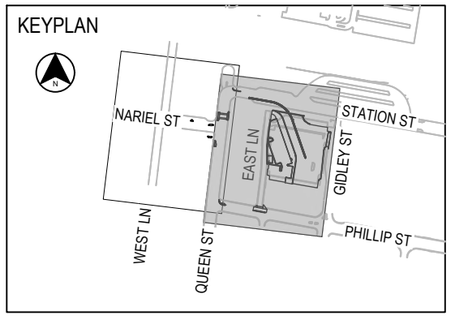
LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- M&C, MI, F1, F1b, F2, FP3, BS
- FP1, FP2, DW, TF, STENCIL, RP
- XXXX — PAVEMENT TAG
- I-1 OR E-1 — INTERFACE OR EDGE DETAILS
- EXISTING STORMWATER PIT
- NEW STORMWATER PIT
- PIPE CONNECTION TO EXISTING PIT
- ADJUST / MODIFY EXISTING PIT INLET
- NEW HAUNCHED PIT
- SUBSURFACE DRAINAGE
- NEW DRIVERS FACILITY
- N/S areas

NOTES

1. ALL DIMENSIONS SHOWN IN METRES UNLESS NOTED OTHERWISE.
2. REFER TO SHT-GE-000021 AND SHT-GE-000024 FOR GENERAL NOTES.
3. REFER TO SHT-PV-000501 AND SHT-PV-000502 FOR PAVEMENT PROFILE DETAILS.
4. REFER TO SHT-PV-005011 TO SHT-PV-000512 FOR INTERFACE DETAILS.
5. REFER TO SHT-PV-005021 TO SHT-PV-000522 FOR EDGE DETAILS.
6. MINIMUM PAVING WIDTH SHALL BE 1.2 m TO ENABLE MACHINE COMPACTION.
7. REFER TO SHT-RD SERIES FOR KERB TYPES AND SET OUT DETAILS.
8. SUBSURFACE DRAINS SHALL BE CONNECTED EITHER TO EXISTING PITS OR PROPOSED PITS U.N.O.
9. FOR SUBSURFACE DRAINS AGAINST GRADE, MINIMUM GRADE SHALL BE 0.5%.
10. PROVIDE JOINT P7D TO TIE PAVEMENT TYPE RP TO EXISTING RIGID PAVEMENT. REFER TO TFNSW DRAWINGS DS2012/001191 FOR DETAILS.

KEYPLAN



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PLOT BY	MICHAEL.PANCITO

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	1	22.04.21	IFT		S. CHAVA

REVISION IN PROGRESS

SCALES ON A3 SIZE DRAWING: 2.5 0 2.5 5 7.5m — 1 : 500 FULL SIZE A3

CO-ORDINATE SYSTEM	HEIGHT DATUM
GDA 94 MGA ZONE 56	AHD

DRAWINGS / DESIGN PREPARED BY: -

CHECK PRINT

	PRELIM. INITIAL	FINAL DATE
DISCIPLINE M. PANCITO		22.04.21
DISCIPLINE V. ECCLES		22.04.21
DISCIPLINE F. RASHID		22.04.21
DISCIPLINE C. NAVARRO		22.04.21
BACKDRAFTED/CORRECTED C. VAVOULAS		22.04.21
CONFIRMED S. CHAVA		22.04.21

CLIENT: NSW GOVERNMENT Transport for NSW

PENRITH CITY COUNCIL
STATION STREET ST MARYS
CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION PAVEMENT PLAN

A3

SHEET 2 OF 2

PREPARED FOR: GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT

TfNSW REGISTRATION No. DS2021/000076 — PART 1

ISSUE STATUS	EDMS No.	SHEET No.	ISSUE
DETAILED DESIGN	-	SHT-PV-001002	1

EW Stage 2A Nariel & Philip Street - Night works

- Nariel & Philip street
- Line marking

CARINYA AVENUE

WEST LANE

NARIEL STREET

QUEEN STREET

ADJOINS SHT-PV-001002

REMOVE EXISTING MARKING BY WATERBLASTING

REMOVE EXISTING MARKING BY WATERBLASTING (TYP.)

NEW TRENCH GATE AND FRAME. REFER TO GUTTER BRIDGE DETAIL ON SHT-GE-000503

REFER SHT-GE-000503 FOR RAISED PEDESTRIAN CROSSING DETAILS

EXCEPTED TAXIS AND BUSES

BUS LANE

MIN. 1.2

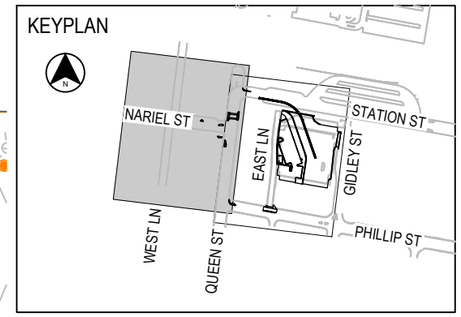
LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- M&C, MI, F1, F1b, F2, FP3, BS
- FP1, FP2, DW, TF, STENCIL, RP
- XXXX — PAVEMENT TAG
- I-1 OR E-1 — INTERFACE OR EDGE DETAILS
- EXISTING STORMWATER PIT
- NEW STORMWATER PIT
- PIPE CONNECTION TO EXISTING PIT
- ADJUST / MODIFY EXISTING PIT INLET
- NEW HAUNCHED PIT
- SUBSURFACE DRAINAGE
- NEW DRIVERS FACILITY
- N/S areas

NOTES

1. ALL DIMENSIONS SHOWN IN METRES UNLESS NOTED OTHERWISE.
2. REFER TO SHT-GE-000021 AND SHT-GE-000024 FOR GENERAL NOTES.
3. REFER TO SHT-PV-000501 AND SHT-PV-000502 FOR PAVEMENT PROFILE DETAILS.
4. REFER TO SHT-PV-005011 TO SHT-PV-000512 FOR INTERFACE DETAILS.
5. REFER TO SHT-PV-005021 TO SHT-PV-000522 FOR EDGE DETAILS.
6. MINIMUM PAVING WIDTH SHALL BE 1.2 m TO ENABLE MACHINE COMPACTION.
7. REFER TO SHT-RD SERIES FOR KERB TYPES AND SET OUT DETAILS.
8. SUBSURFACE DRAINS SHALL BE CONNECTED EITHER TO EXISTING PITS OR PROPOSED PITS U.N.O.
9. FOR SUBSURFACE DRAINS AGAINST GRADE, MINIMUM GRADE SHALL BE 0.5%.
10. PROVIDE JOINT P7D TO TIE PAVEMENT TYPE RP TO EXISTING RIGID PAVEMENT. REFER TO TFNSW DRAWINGS DS2012/001191 FOR DETAILS.

KEYPLAN



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DRAWING FILE LOCATION / NAME	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME	PLOT BY
PW:/P0054029-SHT-PV-001001.DWG	-	-	26-May-21 / 9:31:46 PM	MICHAEL.PANCITO

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	03.03.21	ISSUED FOR 80% DETAILED DESIGN		S. CHAVA
	1	22.04.21	IFT		S. CHAVA

REVISION IN PROGRESS

SCALES ON A3 SIZE DRAWING: 2.5 0 2.5 5 7.5m — 1 : 500 FULL SIZE A3

CO-ORDINATE SYSTEM	HEIGHT DATUM
GDA 94 MGA ZONE 56	AHD

DRAWINGS / DESIGN PREPARED BY: -

CHECK PRINT PRELIM. ☐ FINAL ☐

	INITIAL	DATE
DISCIPLINE	M. PANCITO	22.04.21
DISCIPLINE	V. ECCLES	22.04.21
DISCIPLINE	F. RASHID	22.04.21
DISCIPLINE	C. NAVARRO	22.04.21
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CONFIRMED	S. CHAVA	22.04.21

CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR: GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT

PENRITH CITY COUNCIL
STATION STREET ST MARYS
CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION
PAVEMENT PLAN

A3

SHEET 1 OF 2

TfNSW REGISTRATION No.	PART
DS2021/000076	1

ISSUE STATUS	EDMS No.	SHEET No.	ISSUE
DETAILED DESIGN	-	SHT-PV-001001	1

EW Stage 2B Nariel & Philip Street - Night works

- Nariel & Philip street Asphalt works
- Line marking

-Night shift area

ADJOINS SHT-PV-001001

QUEEN STREET

EAST LANE

STATION STREET

PHILLIP STREET

GIDLEY STREET

STAMPED ASPHALT TO BE REINSTATED AS PER EXISTING

STAMPED ASPHALT SHARED ZONE MATERIAL (STREETPRINT COATING OR EQUAL) AS APPROVED BY PENRITH CITY COUNCIL AND TfNSW

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REINSTATE EXCAVATIONS FOR UTILITIES WITH PAVEMENT TYPE F2. PAVING TO BE MIN 1.2.

EXISTING TREE TO BE RETAINED AND PROTECTED; EXTENTS OF PAVING WORK (INCLUDING M&C) AROUND THE TREE TO BE DETERMINED IN CONSULTATION WITH THE CONTRACTOR'S ARBORIST

SEE NOTE 10

LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- M&C, MI, F1, F1b, F2, FP3, BS
- FP1, FP2, DW, TF, STENCIL, RP
- XXXX — PAVEMENT TAG
- I-1 OR E-1 — INTERFACE OR EDGE DETAILS
- EXISTING STORMWATER PIT
- NEW STORMWATER PIT
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- ADJUST / MODIFY EXISTING PIT INLET
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- SUBSURFACE DRAINAGE
- NEW DRIVERS FACILITY

NOTES

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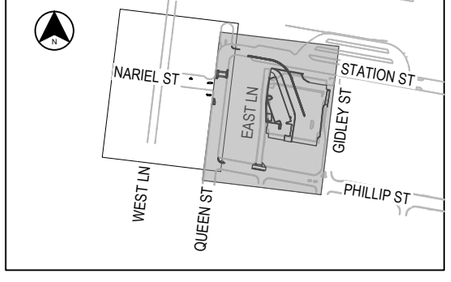
KEYPLAN



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50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: PW:/P0054029-SHT-PV-001002.DWG	DESIGN LOT CODE: -	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING: -	PLOT DATE / TIME: 26-May-21 / 9:31:59 PM; PLOT BY: MICHAEL.PANCITO
EXTERNAL REFERENCE FILES:		SCALES ON A3 SIZE DRAWING: 2.5 0 2.5 5 7.5m; 1 : 500 FULL SIZE A3	DRAWINGS / DESIGN PREPARED BY: -
CO-ORDINATE SYSTEM: GDA 94 MGA ZONE 56	HEIGHT DATUM: AHD		

REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
0	03.03.21	ISSUED FOR 80% DETAILED DESIGN		S. CHAVA
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CLIENT: NSW GOVERNMENT Transport for NSW

PENRITH CITY COUNCIL
STATION STREET ST MARYS
CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION PAVEMENT PLAN

A3

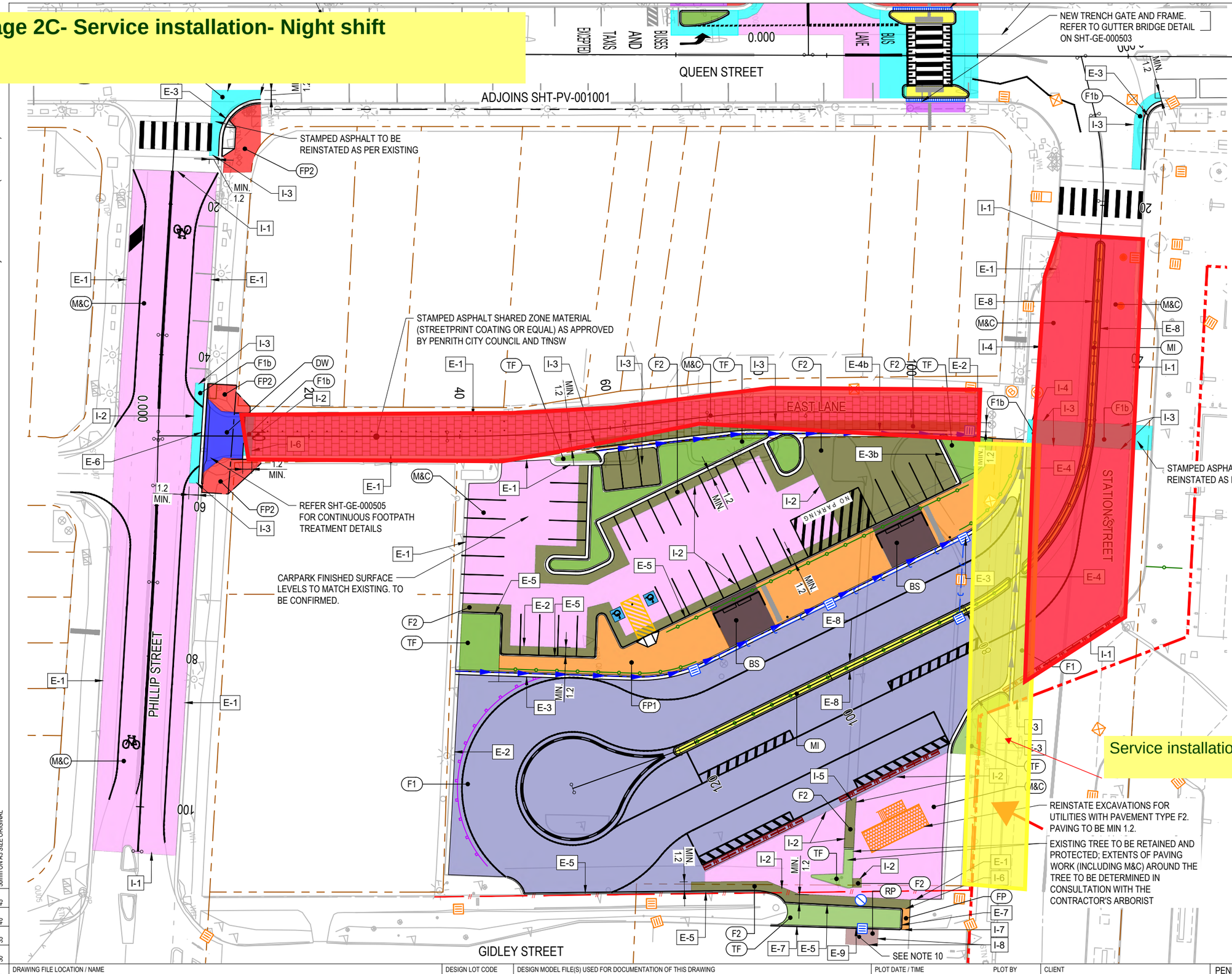
SHEET 2 OF 2

PREPARED FOR: GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT

TfNSW REGISTRATION No. DS2021/000076 PART 1

ISSUE STATUS	EDMS No.	SHEET No.	ISSUE
DETAILED DESIGN	-	SHT-PV-001002	1

Stage 2C- Service installation- Night shift



Last saved by: MICHAEL.PANCITO(2021-05-26) Last Plotted:

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DRAWING FILE LOCATION / NAME: PW:/P0054029-SHT-PV-001002.DWG				DESIGN LOT CODE: -	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING: -	PLOT DATE / TIME: 26-May-21 / 9:31:59 PM	PLOT BY: MICHAEL.PANCITO
EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL	SCALES ON A3 SIZE DRAWING	DRAWINGS / DESIGN PREPARED BY
	0	03.03.21	ISSUED FOR 80% DETAILED DESIGN		S. CHAVA	2.5 0 2.5 5 7.5m; 1 : 500 FULL SIZE A3	
	1	22.04.21	IFT		S. CHAVA	CO-ORDINATE SYSTEM: GDA 94 MGA ZONE 56; HEIGHT DATUM: AHD	-

REVISION IN PROGRESS

CHECK PRINT		PRELIM. INITIAL	FINAL DATE
DISCIPLINE	M. PANCITO		22.04.21
DISCIPLINE	V. ECCLES		22.04.21
DISCIPLINE	F. RASHID		22.04.21
DISCIPLINE	C. NAVARRO		22.04.21
BACKDRAFTED/CORRECTED	C. VAVOULAS		22.04.21
CONFIRMED	S. CHAVA		22.04.21

CLIENT: NSW GOVERNMENT Transport for NSW

PENRITH CITY COUNCIL
STATION STREET ST MARYS
CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION PAVEMENT PLAN
SHEET 2 OF 2

A3

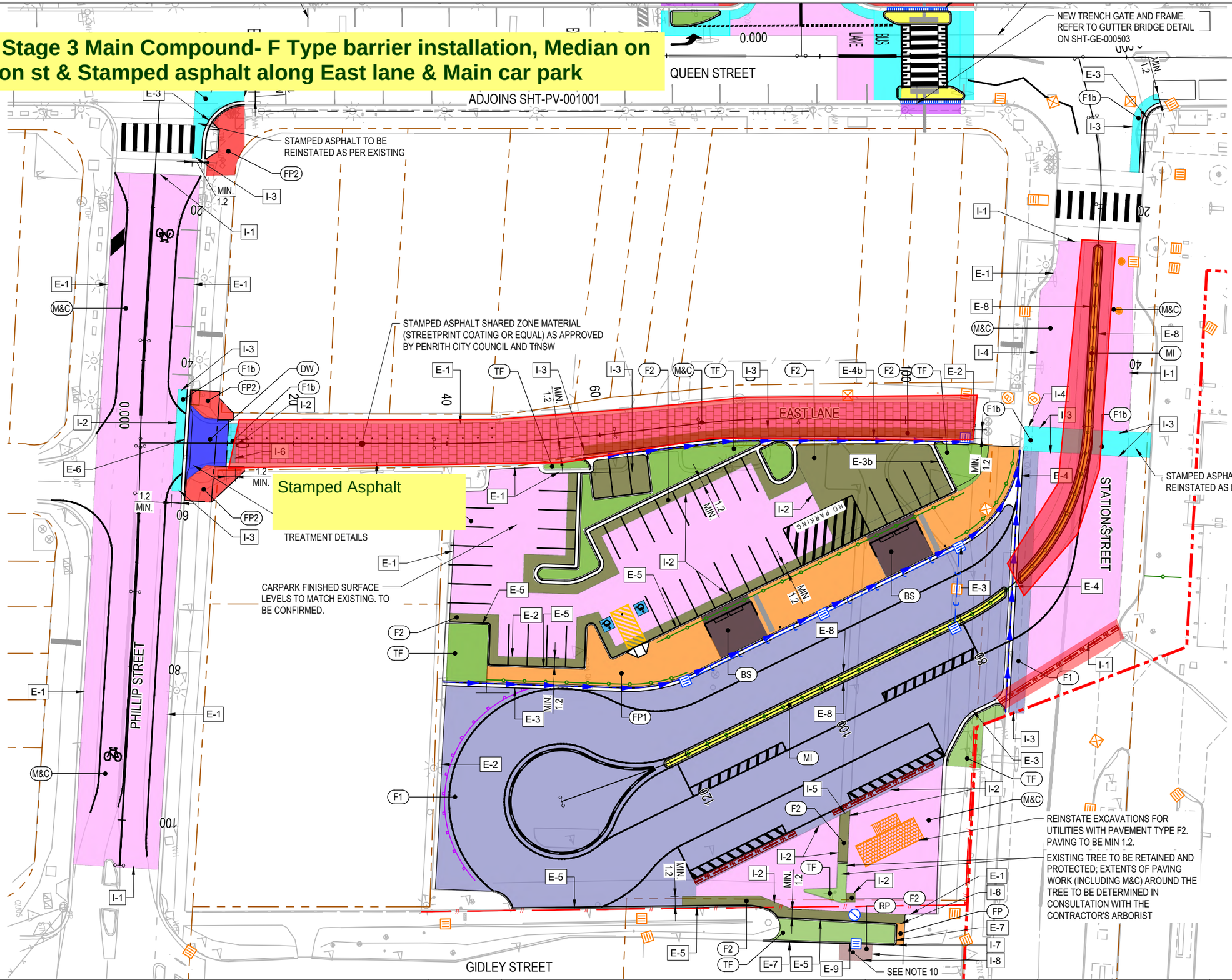
PREPARED FOR: GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT

TfNSW REGISTRATION No. DS2021/000076 | PART 1

ISSUE STATUS	EDMS No.	SHEET No.	ISSUE
DETAILED DESIGN	-	SHT-PV-001002	1

EW- Stage 3 Main Compound- F Type barrier installation, Median on station st & Stamped asphalt along East lane & Main car park

Last saved by: MICHAEL.PANCITO(2021-05-26) Last Plotted



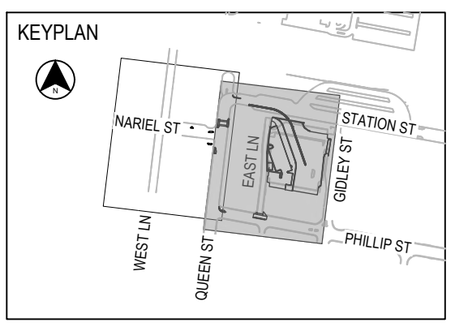
LEGEND

- BOUNDARY / LOT PROPERTY
- EXISTING SURVEY
- M&C, MI, F1, F1b, F2, FP3, BS
- FP1, FP2, DW, TF, STENCIL, RP
- XXXX — PAVEMENT TAG
- I-1 OR E-1 — INTERFACE OR EDGE DETAILS
- EXISTING STORMWATER PIT
- NEW STORMWATER PIT
- PIPE CONNECTION TO EXISTING PIT
- ADJUST / MODIFY EXISTING PIT INLET
- NEW HAUNCHED PIT
- SUBSURFACE DRAINAGE
- NEW DRIVERS FACILITY

NOTES

1. ALL DIMENSION… OTHERWISE.
2. REFER TO SHT-… NOTES.
3. REFER TO SHT-… PROFILE DETAILS.
4. REFER TO SHT-PV-005011 TO SHT-PV-000512 FOR INTERFACE DETAILS.
5. REFER TO SHT-PV-005021 TO SHT-PV-000522 FOR EDGE DETAILS.
6. MINIMUM PAVING WIDTH SHALL BE 1.2 m TO ENABLE MACHINE COMPACTION.
7. REFER TO SHT-RD SERIES FOR KERB TYPES AND SET OUT DETAILS.
8. SUBSURFACE DRAINS SHALL BE CONNECTED EITHER TO EXISTING PITS OR PROPOSED PITS U.N.O.
9. FOR SUBSURFACE DRAINS AGAINST GRADE, MINIMUM GRADE SHALL BE 0.5%.
10. PROVIDE JOINT P7D TO TIE PAVEMENT TYPE RP TO EXISTING RIGID PAVEMENT. REFER TO TFNSW DRAWINGS DS2012/001191 FOR DETAILS.

KEYPLAN



CHECK PRINT

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED 0 5 10 15 20 25 30 35 40 45 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: PW:/P0054029-SHT-PV-001002.DWG	DESIGN LOT CODE: -	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING: -	PLOT DATE / TIME: 26-May-21 / 9:31:59 PM; PLOT BY: MICHAEL.PANCITO

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	03.03.21	ISSUED FOR 80% DETAILED DESIGN		S. CHAVA
	1	22.04.21	IFT		S. CHAVA

REVISION IN PROGRESS

SCALES ON A3 SIZE DRAWING: 2.5 0 2.5 5 7.5m — 1 : 500 FULL SIZE A3

CO-ORDINATE SYSTEM: GDA 94 MGA ZONE 56 | HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: -

CHECK PRINT	PRELIM. / FINAL	INITIAL	DATE
DISCIPLINE	M. PANCITO		22.04.21
DISCIPLINE	V. ECCLES		22.04.21
DISCIPLINE	F. RASHID		22.04.21
DISCIPLINE	C. NAVARRO		22.04.21
BACKDRAFTED/CORRECTED	C. VAVOULAS		22.04.21
CONFIRMED	S. CHAVA		22.04.21

CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR: GREATER SYDNEY DIVISION ON BEHALF OF SYDNEY METRO WEST. SYDNEY AIRPORT

PENRITH CITY COUNCIL
STATION STREET ST MARYS
CONSTRUCTION OF TEMPORARY BUS INTERCHANGE FOR THE DEVELOPMENT OF ST MARYS STATION PAVEMENT PLAN

A3

SHEET 2 OF 2

TfNSW REGISTRATION No.	PART
DS2021/000076	1

ISSUE STATUS	EDMS No.	SHEET No.	ISSUE
DETAILED DESIGN	-	SHT-PV-001002	1

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APPENDIX C

Construction Equipment Schedules and Sound Power Levels

Table B-1 Construction Equipment Schedules and Sound Power Levels

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L_{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL ($L_{Aeq,15min}$ dBA)	Activity SWL ($L_{A1,1min}$ dBA)
SE – Site Establishment	Setup Environmental Controls/Tree Protection Install ATF Fencing (Standard Hours)	Semi/Bogie	105	5	100	107	112
		All Terrain Forklift	96	5	91		
		Delivery / Hiab Truck	105	5	100		
		14t Excavator with Bucket	105	5	105		
		Hand Tools	90	5	85		
1A – Main Car Park	Potholing (Standard Hours and Out-of-Hours)	Wet Vac	103	10	101	115	120
		Dry Vac	103	10	101		
		2t Tipper Truck	105	5	100		
		Plate Compactor	109	5	104		
		Jumping Jack	106	5	101		
		Delivery / Hiab Truck	105	5	100		
		Concrete Saw	118	5	113		
		Jackhammer	113	5	108		
		Hand Tools	90	5	85		
1A – Main Car Park	Demo Car Park AC (Standard Hours)	14t Excavator with Bucket / Ripper	105	5	105	114	120
		14t Excavator with Hammer	118	5	113		
		Rigid Truck / Bogie	105	5	100		
		2t Tipper Truck	105	5	100		
		Concrete Saw	118	5	113		

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L_{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL ($L_{Aeq,15min}$ dBA)	Activity SWL ($L_{A1,1min}$ dBA)
1B - Main Car Park	Pavement Box Out (Standard Hours)	20t Excavator with Bucket	105	5	100	106	115
		Rigid Truck / Bogie	105	5	100		
		Watercart	107	5	102		
1B - Main Car Park	Pavement Box Out Service Installation - Stormwater (Standard Hours)	14t Excavator with Bucket	105	5	100	114	120
		14t Excavator with Hammer	118	5	113		
		Plate Compactor	109	5	104		
		Jumping Jack	106	5	101		
		Rigid Truck / Bogie	105	5	100		
		2t Tipper Truck	105	5	100		
1B - Main Car Park	Pavement Box Out Service Installation - Electrical Services (Standard Hours)	5t Excavator with Bucket	95	5	105	112	117
		5t Excavator with Hammer	115	5	110		
		Plate Compactor	109	5	104		
		Jumping Jack	106	5	101		
		Rigid Truck / Bogie	105	5	100		
		2t Tipper Truck	105	5	100		
2A - Main Car Park	Sub base installation (Pavement works) (Standard Hours)	14t Excavator with Bucket	105	5	100	110	114
		Positrack	90	5	85		
		Watercart	107	5	102		
		8t Smooth Drum Roller	107	10	105		

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L_{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL ($L_{Aeq,15min}$ dBA)	Activity SWL ($L_{A1,1min}$ dBA)
		Rigid Trucks - Bogies/10 Wheelers	105	5	100		
		Concrete Agitator	109	5	104		
		Kerb placing machine	109	5	104		
2A - Main Car Park	Kerb Construction (Standard Hours)	Concrete Agitator	109	5	104	107	114
		Kerb Placing Machine	109	5	104		
		Hand tools	90	5	85		
2B - Main Car Park	Pavement Final Trim Works (Standard Hours)	14t Excavator with Bucket	105	5	100	107	115
		Positrack	90	5	85		
		Watercart	107	5	102		
		CC10 Vibratory Roller*	109	5	104		
2B - Main Car Park	Landscape Prep Works (Standard Hours)	8t Excavator with Bucket	100	5	105	105	115
		Positrack	90	5	85		
2B - Main Car Park	AC Prep Works (Standard Hours)	Milling Machine / Profiler	117	5	112	113	119
		Positrack	90	5	85		
		14t Excavator with Bucket	105	5	100		
		Rigid Trucks - Bogies/10 Wheelers	105	5	100		
2B - Main Car Park	Driver Facility Installation (Standard Hours)	20t Franna	98	15	98	102	110
		Hiab Truck	105	5	100		
2B - Main Car Park	Bus Shelter Installation	20t Franna	98	15	98	102	110
		Hiab Truck	105	5	100		

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L_{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL ($L_{Aeq,15min}$ dBA)	Activity SWL ($L_{A1,1min}$ dBA)
	(Standard Hours)						
2B - Main Car Park	Asphalt Works - Mill and Correct in Car Park (Standard Hours)	Milling Machine / Profiler	117	5	112	113	119
		Positrack	90	5	85		
		Paver	114	10	112		
		Rigid Trucks - Bogies/10 Wheelers	105	5	100		
3 - Main Car Park	Stamped Asphalt (Standard Hours)	Plate Compactor	109	5	104	104	114
		Positrack	90	5	85		
3A - Main Car Park	Line Marking (Standard Hours)	Line Marking Truck	108	10	106	106	110
		Line Marking Gernie	90	5	85		
3A - Main Car Park	Signage Installation (Standard Hours)	Hand Tools	90	5	85	113	120
		Core Drill	118	5	113		
	External Works						
Stage	**Activity**	**Construction Equipment**	**Sound Power Level - SWL (L_{Aeq} dBA)**	**Assumed Operating Time within 15 Minute Period (Minutes)**	**Time Adjusted Source SWL**	**Activity SWL ($L_{Aeq,15min}$ dBA)**	**Activity SWL ($L_{A1,1min}$ dBA)**
1A - External Works - Nariel and Queen Street	Set up ATF Fencing/Satellite Site Compounds (Night Works)	Hand Tools	90	5	85	100	105
		2t Tipper	105	5	100		
	Potholing	Wet Vac	103	10	101	113	120

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L_{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL ($L_{Aeq,15min}$ dBA)	Activity SWL ($L_{A1,1min}$ dBA)
1A - External Works - Nariel and Queen Street	(Night Works)	Dry Vac	103	10	101		
		2t Tipper Truck	105	5	100		
		Plate Compactor	109	5	104		
		Jumping Jack	106	5	101		
		Delivery / Hiab Truck	105	5	100		
		Quick Cut Concrete Saw*	118	3	111		
		Jackhammer	113	5	108		
		Hand Tools	90	5	85		
1A - External Works - Nariel and Queen Street	Remove Parking Lanes (Night Works)	Hand Tools	90	5	85	112	120
		Jackhammer	113	5	108		
		5t Excavator with Bucket	95	5	105		
		2t Tipper Truck	105	5	100		
		Rigid Truck / Bogie	105	5	100		
		Quick Cut Concrete Saw*	118	3	111		
1A - External Works - Nariel and Queen Street	Kerb Demolition (Night Works)	Hand Tools	90	5	85	113	120
		Jackhammer	113	5	108		
		5t Excavator with Bucket	95	5	105		
		2t Tipper Truck	105	5	100		
		Rigid Truck / Bogie	105	5	100		
		Quick Cut Concrete Saw*	118	3	111		
1A - External Works - Nariel and Queen Street	Kerb/Pram Ramp Construction (Night Works)	Concrete Agitator	109	5	104	105	110
		Form Work Tools	90	5	85		
		Circular Saw/Grinder*	105	5	100		

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L_{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL ($L_{Aeq,15min}$ dBA)	Activity SWL ($L_{A1,1min}$ dBA)
1A - External Works - Nariel and Queen Street	Raised Crossing Construction (Night Works)	Concrete Agitator	109	5	104	112	120
		Circular Saw/Grinder*	105	5	100		
		Quick Cut Concrete Saw*	118	3	111		
1A - External Works - Nariel and Queen Street	Tree Removal (Night Works)	Chainsaw*	114	5	109	109	119
		2t Tipper Truck	105	5	100		
1B - External Works - Nariel and Phillip Street	Excavate/Box out and Re-instate Footpath Corners (Night Works)	Hand Tools	90	5	85	110	118
		Jackhammer	113	5	108		
		5t Excavator with Bucket	95	5	105		
		2t Tipper Truck	105	5	100		
		Rigid Truck / Bogie	105	5	100		
1B - External Works - Nariel and Phillip Street	Asphalt Works to Corners (Night Works)	CC10 Vibratory Roller*	109	5	104	113	116
		Positrack	90	5	85		
		Paver	114	10	112		
		Rigid Trucks - Bogies/10 Wheelers	105	5	100		
		5t Excavator with Bucket	95	5	105		
2A - External Works - Nariel and Phillip Street	Line Marking (Night Works)	Line Marking Truck	108	10	106	106	115
		Line Marking Gernie	90	5	85		
		Water Blaster*	110	5	105		
		2t Tipper Truck	105	5	100		
		Traffic Control Utes	90	5	85		

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L_{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL ($L_{Aeq,15min}$ dBA)	Activity SWL ($L_{A1,1min}$ dBA)
2C - External Works - Nariel and Phillip Street	Service Installation - Electrical Services (Standard Hours)	5t Excavator with Bucket	95	5	105	110	120
		5t Excavator with Hammer	115	5	110		
		Plate Compactor	109	5	104		
		Jumping Jack	106	5	101		
		Rigid Truck / Bogie	105	5	100		
		2t Tipper Truck	105	5	100		
2C - External Works - Nariel and Phillip Street	Asphalt Works (Standard Hours)	Milling Machine / Profiler	117	5	112	112	119
		Positrack	90	5	85		
		Paver	114	10	112		
		Rigid Trucks - Bogies/10 Wheelers	105	5	100		
		CC10 Non-VibratorySteam Roller	109	5	104		

Note: Sources marked with an asterisk (e.g. concrete saws, grinders, hydraulic hammers, profilers, vibratory rollers) can emit noise with special audible (annoying) characteristics. In accordance with the ICNG and the CNVS, predicted noise levels for these stages incur a +5 dB penalty to for account for the additional annoyance that could arise. This penalty has been applied to the predicted levels. The activity sound power levels for each stage take account of the potential for the coinciding use of plant items – where certain plant items would operate at the same time adjustments have been calculated. Additionally, semi/bogie trucks would not idle whilst on site. For the car park demolition provision has been made for a medium sized hydraulic hammer (max capacity 900 kg) attachment to be used in conjunction with the 14t excavator. Depending on site conditions, lower capacity plant may potentially be used where practicable. For the Stage 1A tree removal works, the trees to be removed are small and will be transported to compound for chipping during standard hours in 2t tipper/bogie. The predicted levels from the identified works are considered to be conservative. In practice, due to the inherent mobilization and planning/safety protocols involved with these type of works, there would be expected to be lengthy periods during which plant would not operate at the capacities assumed by this assessment, Therefore generally lower levels than predicted would be expected for significant durations during the works.

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APPENDIX D

Construction Noise Prediction Tables and CNVS Additional Mitigation Measures

Table D-1 $L_{Aeq,15min}$ Construction Noise Predictions for Sub-Stages 1-19 – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	51	57	56	48	53	52	55	43	73	72	71	63	65	67	78	61	55	66	58
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	51	57	56	48	55	52	55	42	74	73	73	65	69	70	76	63	50	68	54
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	48	54	53	45	54	49	52	41	70	69	64	56	60	66	71	54	48	60	53
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	42	50	49	40	49	44	48	38	57	56	52	44	50	53	61	44	45	55	48
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	43	50	49	41	48	45	48	37	56	55	51	43	50	51	60	44	45	53	48
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	32	39	38	29	36	33	37	23	40	39	40	32	39	35	49	32	32	38	35
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	33	40	39	30	36	34	38	26	42	41	40	32	38	38	49	32	35	41	37
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	39	45	44	36	46	40	43	33	56	55	49	41	48	52	57	42	43	48	45
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	46	51	50	43	49	47	49	36	57	54	57	49	56	51	57	48	44	54	47
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	48	53	52	45	46	49	51	36	62	61	62	54	52	57	69	52	44	57	47
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	63	70	69	62	70	66	68	46	56	56	46	38	42	44	72	37	64	78	67
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	51	58	57	49	57	53	56	47	52	52	43	35	42	42	63	35	54	68	57
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	40	47	46	37	46	41	45	37	48	48	39	31	36	40	60	31	47	64	50
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	34	41	40	31	40	35	39	29	41	41	35	27	33	36	56	27	44	60	47
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	33	40	39	29	36	33	38	29	41	41	34	26	30	35	54	25	42	57	45
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	32	39	38	29	37	33	37	29	41	40	37	29	33	37	52	27	39	54	42
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	30	36	35	26	32	30	34	26	38	37	37	29	34	34	50	28	36	52	39
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	25	32	31	22	31	26	30	20	38	38	36	28	32	27	48	27	36	53	39
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	30	36	35	25	31	29	34	26	40	40	31	23	29	26	50	23	38	54	41
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	33	40	39	30	37	34	38	29	42	42	34	26	31	34	53	25	42	57	45
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	34	41	40	32	38	36	39	30	39	39	37	29	36	33	58	30	46	62	49
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	56	64	62	55	64	59	61	42	54	54	49	41	46	44	57	40	58	70	63
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	51	58	57	49	60	53	56	37	53	53	49	41	44	45	57	38	53	60	59
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	44	50	49	41	54	45	48	30	49	47	49	41	48	44	52	40	46	52	51
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	37	43	41	33	41	37	40	30	46	46	41	33	38	37	49	33	41	47	44
R26	3 Station St	Residential	37	37	36	47	42	42	41	54	61	59	52	65	56	58	42	47	41	47	39	46	38	45	37	61	59	62
R27	1 Station St	Residential	37	37	36	47	42	42	41	52	58	57	49	61	53	56	45	47	46	47	39	46	34	45	38	57	54	60
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	43	49	48	40	51	44	47	38	44	44	41	33	40	28	41	31	46	37	50
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	39	45	41	34	47	38	40	29	40	40	38	30	33	34	39	28	45	45	47
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	39	46	41	35	48	39	40	25	38	38	36	28	35	32	43	29	46	48	49
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	54	62	61	52	60	56	60	51	86	86	85	77	79	72	94	74	57	80	61

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver.

01 - SE - Site Establishment
02 - 1A - Main Car Park - Potholing
03 - 1A - Main Car Park - Demo Carpark AC
04 - 1B - Main Carpark - Pavement Box Out
05 - 1B - Main Carpark - Service Installation
06 - 2A - Main Carpark - Sub-Base Installation & Kerbs
07 - 2B - Main Car Park - Mill & Correct
08 - 3 - Stamped Asphalt
09 - EW - 1A Nariel St & Queen St - Potholing
10 - EW - 1A Nariel St & Queen St - Remove Parking Lanes
11 - EW - 1A Nariel St & Queen St - Kerb Demolition
12 - EW - 1A Nariel St & Queen St - Kerb-Pram Ramp Construction
13 - EW - 1A Nariel St & Queen St - Raised Crossing Construction
14 - EW - 1A Nariel St & Queen St - Tree Removal
15 - EW - 1B Nariel & Philip St- Night Works
16 - EW - 2A Nariel & Philip St - Night Works
17 - EW - 2C- Nariel and Phillip St - Service Installation
18 - EW - 2C Nariel & Philip St - Ashhalt Works
19 - EW- 3 Main Compound- F Type Barrier Installation, Median on Station St & Stamped Asphalt along East Lane & Main Car Park

Table D-2 $L_{Aeq,15min}$ Construction Noise Predictions for Sub-Stages 1-19 – Non-Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
C01	TBC	Commercial	-	-	-	70	70	70	70	80	88	87	74	78	78	86	82	60	59	59	51	56	56	67	51	78	62	81
C02	TBC	Commercial	-	-	-	70	70	70	70	75	83	82	71	77	75	81	75	60	59	56	48	52	56	77	47	87	76	90
C03	TBC	Commercial	-	-	-	70	70	70	70	73	81	80	71	81	75	79	72	57	55	56	48	55	50	68	49	81	67	84
C04	TBC	Commercial	-	-	-	70	70	70	70	75	83	82	75	87	79	81	71	56	52	56	48	55	49	62	48	88	63	91
C05	TBC	Commercial	-	-	-	70	70	70	70	76	84	83	74	84	78	82	68	60	57	60	52	59	54	66	52	77	71	80
C06	TBC	Commercial	-	-	-	70	70	70	70	72	79	78	70	74	74	77	67	61	59	60	52	58	56	66	52	71	73	74
C07	TBC	Commercial	-	-	-	70	70	70	70	60	68	67	61	72	65	66	52	84	76	83	75	82	60	85	75	75	82	78
C08	TBC	Commercial	-	-	-	70	70	70	70	53	60	59	51	63	55	58	49	94	85	94	86	90	82	92	83	64	89	66
C09	TBC	Commercial	-	-	-	70	70	70	70	53	61	60	51	58	55	59	51	91	90	91	83	81	82	98	78	55	84	58
C10#	TBC	Commercial	-	-	-	70	70	70	70	54	62	61	52	60	56	60	51	86	86	85	77	79	72	94	74	57	80	61
C11	TBC	Commercial	-	-	-	70	70	70	70	49	57	56	48	57	52	55	46	89	89	77	69	72	68	85	67	58	80	61
C12	TBC	Commercial	-	-	-	70	70	70	70	47	54	53	45	54	49	52	44	76	76	68	60	67	50	77	61	52	72	56
C13	TBC	Commercial	-	-	-	70	70	70	70	42	49	48	41	50	45	47	38	71	71	66	58	64	46	75	58	48	64	51
C14	TBC	Commercial	-	-	-	70	70	70	70	43	50	49	41	50	45	48	40	67	67	64	56	62	46	72	56	48	62	51
C15	TBC	Commercial	-	-	-	70	70	70	70	36	44	43	35	45	39	42	33	63	63	60	52	59	43	69	53	42	59	45
C16	TBC	Commercial	-	-	-	70	70	70	70	34	42	41	32	39	36	40	31	64	64	62	54	58	47	69	53	37	59	40
C17	TBC	Commercial	-	-	-	70	70	70	70	38	46	45	37	43	41	44	34	69	69	65	57	62	54	73	56	42	62	45
C18	TBC	Commercial	-	-	-	70	70	70	70	42	50	49	40	49	44	48	40	72	72	68	60	63	56	76	58	49	66	52
C19	TBC	Commercial	-	-	-	70	70	70	70	46	54	53	44	52	48	52	43	77	77	70	62	66	60	78	61	54	70	57
C20	TBC	Commercial	-	-	-	70	70	70	70	50	57	56	48	55	52	55	47	82	82	76	68	69	66	86	65	66	87	69
C21	TBC	Commercial	-	-	-	70	70	70	70	61	68	67	58	70	62	66	60	78	78	56	48	53	49	85	47	75	91	78
C22	TBC	Commercial	-	-	-	70	70	70	70	58	65	64	56	63	60	63	56	70	70	50	42	49	47	80	42	68	90	71
C23	TBC	Commercial	-	-	-	70	70	70	70	45	51	50	40	49	44	49	42	45	45	41	33	37	40	63	32	52	68	55
C24	TBC	Commercial	-	-	-	70	70	70	70	51	57	56	48	58	52	55	44	51	51	42	34	41	41	64	35	54	73	57
C25	TBC	Commercial	-	-	-	70	70	70	70	61	68	67	59	61	63	66	56	60	60	51	43	48	47	69	41	62	78	65
C26	TBC	Childcare Centre	-	-	-	60	60	-	-	49	56	54	47	60	51	53	37	42	36	42	34	41	33	40	32	56	54	57

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver.

01 - SE - Site Establishment
02 - 1A - Main Car Park - Potholing
03 - 1A - Main Car Park - Demo Carpark AC
04 - 1B - Main Carpark - Pavement Box Out
05 - 1B - Main Carpark - Service Installation
06 - 2A - Main Carpark - Sub-Base Installation & Kerbs
07 - 2B - Main Car Park - Mill & Correct
08 - 3 - Stamped Asphalt
09 - EW - 1A Nariel St & Queen St - Potholing
10 - EW - 1A Nariel St & Queen St - Remove Parking Lanes
11 - EW - 1A Nariel St & Queen St - Kerb Demolition
12 - EW - 1A Nariel St & Queen St - Kerb-Pram Ramp Construction
13 - EW - 1A Nariel St & Queen St - Raised Crossing Construction
14 - EW - 1A Nariel St & Queen St - Tree Removal
15 - EW - 1B Nariel & Philip St- Night Works
16 - EW - 2A Nariel & Philip St - Night Works
17 - EW - 2C- Nariel and Phillip St - Service Installation
18 - EW - 2C Nariel & Philip St - Ashhalt Works
19 - EW- 3 Main Compound- F Type Barrier Installation, Median on Station St & Stamped Asphalt along East Lane & Main Car Park

Table D-3 $L_{Aeq,15min}$ Construction Noise Predictions – Standard Hours NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	4	10	9	1	6	5	8	-	-	-	-	-	-	-	-	-	8	19	11
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	4	10	9	1	8	5	8	-	-	-	-	-	-	-	-	-	3	21	7
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	1	7	6	-	7	2	5	-	-	-	-	-	-	-	-	-	1	13	6
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	3	2	-	2	-	1	-	-	-	-	-	-	-	-	-	-	8	1
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	3	2	-	1	-	1	-	-	-	-	-	-	-	-	-	-	6	1
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	4	3	-	2	-	2	-	-	-	-	-	-	-	-	-	-	7	0
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	1	6	5	-	-	2	4	-	-	-	-	-	-	-	-	-	-	10	0
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	16	23	22	15	23	19	21	-	-	-	-	-	-	-	-	-	17	31	20
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	4	11	10	2	10	6	9	-	-	-	-	-	-	-	-	-	7	21	10
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	17	3
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	2
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	9	17	15	8	17	12	14	-	-	-	-	-	-	-	-	-	11	23	16
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	4	11	10	2	13	6	9	-	-	-	-	-	-	-	-	-	6	13	12
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	3	2	-	7	-	1	-	-	-	-	-	-	-	-	-	-	5	4
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	7	14	12	5	18	9	11	-	-	-	-	-	-	-	-	-	14	12	15
R27	1 Station St	Residential	37	37	36	47	42	42	41	5	11	10	2	14	6	9	-	-	-	-	-	-	-	-	-	10	7	13
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	-	2	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	3
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	2
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	7	15	14	5	13	9	13	4	-	-	-	-	-	-	-	-	10	33	14

Yellow = LB

Amber = LB, M

Red = LB, M, SN

Purple = LB, M, SN

Table D-4 $L_{Aeq,15min}$ Construction Noise Predictions – Out-of-Hours Daytime NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	-	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R27	1 Station St	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41		20																

Yellow = LB, M

Amber = LN, M, SN

Red = LB, M, SN, RO

Purple = LB, M, SN, IB, PC, RO, SN

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the $L_{Aeq,15min}$ NMLs. To determine whether it is justified to provide Respite Offer measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts would occur for only one or two shifts at any one location before they are completed, and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO would not be justified.

Table D-5 $L_{Aeq,15min}$ Construction Noise Predictions – Out-of-Hours Evening NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	-	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R27	1 Station St	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41		20																	

Yellow = LB, M

Amber = LN, M, SN

Red = LB, M, SN, RO

Purple = LB, M, SN, IB, PC, RO, SN

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the $L_{Aeq,15min}$ NMLs. To determine whether it is justified to provide Respite Offer measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts would occur for only one or two evenings at any one location before they are completed, and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO would not be justified.

Table D-6 $L_{Aeq,15min}$ Construction Noise Predictions – Out-of-Hours Night NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	32	31	30	22	24	26	37	20	-	-	17
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	16	-	-	-	-	-	-	33	32	32	24	28	29	35	22	-	-	13
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	13	-	-	-	-	-	-	29	28	23	15	19	25	30	13	-	-	12
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-	16	15	11	3	9	12	20	3	-	-	7
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-	15	14	10	2	9	10	19	3	-	-	7
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	1	-	-	-	-	-	8	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	4	-	-	-	-	-	-	15	14	8	0	7	11	16	1	-	-	4
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	10	-	-	-	-	-	-	16	13	16	8	15	10	16	7	-	-	6
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	12	-	-	-	-	-	-	21	20	21	13	11	16	28	11	-	-	6
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	29	-	-	-	-	-	-	15	15	5	-	1	3	31	-	-	-	26
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	17	-	-	-	-	-	-	11	11	2	-	1	1	22	-	-	-	16
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	6	-	-	-	-	-	-	7	7	-	-	-	-	19	-	-	-	9
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	0	0	-	-	-	-	15	-	-	-	6
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	4
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	1
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	0
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	1	1	-	-	-	-	12	-	-	-	4
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-	-	8
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	23	-	-	-	-	-	-	13	13	8	0	5	3	16	-	-	-	22
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	17	-	-	-	-	-	-	12	12	8	-	3	4	16	-	-	-	18
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-	8	6	8	0	7	3	11	-	-	-	10
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	2	-	-	-	-	-	-	5	5	-	-	-	-	8	-	-	-	3
R26	3 Station St	Residential	37	37	36	47	42	42	41	-	20	-	-	-	-	-	-	6	-	6	-	5	-	4	-	-	-	21
R27	1 Station St	Residential	37	37	36	47	42	42	41	-	17	-	-	-	-	-	-	6	5	6	-	5	-	4	-	-	-	19
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-	3	3	-	-	-	-	-	-	-	-	9
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	5	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	8
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	21	-	-	-	-	-	-	45	45	44	36	38	31	53	33	-	-	20

Yellow = LB, M

Amber = LN, M, SN, RO

Red = LB, M, SN, IB, PC, RO, AA

Purple = LB, M, SN, IB, PC, RO, SN, AA

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the $L_{Aeq,15min}$ NMLs. To determine whether it is justified to provide Respite Offers and Alternative Accommodation measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts would occur for only one or two nights at any one location before they are completed, and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO and AA would not be justified.

Table D-7 $L_{Aeq,15min}$ Construction Noise Predictions – Standard Hours NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Non-Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
C01	-	Commercial	-	-	-	70	70	70	70	10	18	17	4	8	8	16	12	-	-	-	-	-	-	-	-	8	-	11
C02	-	Commercial	-	-	-	70	70	70	70	5	13	12	1	7	5	11	5	-	-	-	-	-	-	-	-	17	6	20
C03	-	Commercial	-	-	-	70	70	70	70	3	11	10	1	11	5	9	2	-	-	-	-	-	-	-	-	11	-	14
C04	-	Commercial	-	-	-	70	70	70	70	5	13	12	5	17	9	11	1	-	-	-	-	-	-	-	-	18	-	21
C05	-	Commercial	-	-	-	70	70	70	70	6	14	13	4	14	8	12	-	-	-	-	-	-	-	-	-	7	1	10
C06	-	Commercial	-	-	-	70	70	70	70	2	9	8	0	4	4	7	-	-	-	-	-	-	-	-	-	1	3	4
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	5	12	8
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-
C10#	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	21	8
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	1
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results.
Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB
Amber = LB, M
Red = LB, M, SN
Purple = LB, M, SN

Table D-8 $L_{Aeq,15min}$ Construction Noise Predictions – Out-of-Hours Daytime NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Non- Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
C01	-	Commercial	-	-	-	70	70	70	70	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results.
Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB, M
Amber = LN, M, SN
Red = LB, M, SN, RO
Purple = LB, M, SN, IB, PC, RO, SN

Table D-9 $L_{Aeq,15min}$ Construction Noise Predictions – Out-of-Hours Evening NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Non-Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
C01	-	Commercial	-	-	-	70	70	70	70	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results.
Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB, M
Amber = LN, M, SN
Red = LB, M, SN, RO
Purple = LB, M, SN, IB, PC, RO, SN

Table D-10 $L_{Aeq,15min}$ Construction Noise Predictions – Out-of-Hours Night NML Exceedances for Sub-Stages 1-19 and Additional Mitigation – Non-Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
x	-	Commercial	-	-	-	70	70	70	70	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
C02	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	20
C03	-	Commercial	-	-	-	70	70	70	70	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
C04	-	Commercial	-	-	-	70	70	70	70	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21
C05	-	Commercial	-	-	-	70	70	70	70	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
C06	-	Commercial	-	-	-	70	70	70	70	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	14	6	13	5	12	-	15	5	-	-	8
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	24	15	24	16	20	12	22	13	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	21	20	21	13	11	12	28	8	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	16	16	15	7	9	2	24	4	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	19	19	7	-	2	-	15	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	6	6	-	-	-	-	7	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	1	1	-	-	-	-	5	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	2	2	-	-	-	-	6	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	7	7	-	-	-	-	8	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	12	12	6	-	-	-	16	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	8	8	-	-	-	-	15	-	-	-	8
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	1
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results.
Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB, M

Amber = LN, M, SN, RO

Red = LB, M, SN, IB, PC, RO, AA

Purple = LB, M, SN, IB, PC, RO, SN, AA

Table D-11 $L_{A1,1min}$ Maximum Construction Noise Predictions – Out-of-Hours Night - for Sub-Stages 1-19 – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	RBL+15 NML	NPfl	RNP	-	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
R01	69 Carinya Ave	Residential	-	-	36	51	52	65	-	-	62	-	-	-	-	-	-	80	80	78	68	73	77	86	70	-	-	66
R02	65-67 Carinya Ave	Residential	-	-	36	51	52	65	-	-	62	-	-	-	-	-	-	81	81	80	70	77	80	84	72	-	-	62
R03	59 Carinya Ave	Residential	-	-	36	51	52	65	-	-	59	-	-	-	-	-	-	77	77	71	61	68	76	79	63	-	-	61
R04	43 Carinya Ave	Residential	-	-	36	51	52	65	-	-	55	-	-	-	-	-	-	64	64	59	49	58	63	69	53	-	-	56
R05	41 Carinya Ave	Residential	-	-	36	51	52	65	-	-	55	-	-	-	-	-	-	63	63	58	48	58	61	68	53	-	-	56
R06	9 Kungala St	Residential	-	-	36	51	52	65	-	-	44	-	-	-	-	-	-	47	47	47	37	47	45	57	41	-	-	43
R07	13 Benalong St	Residential	-	-	36	51	52	65	-	-	45	-	-	-	-	-	-	49	49	47	37	46	48	57	41	-	-	45
R08	7 Waratah St	Residential	-	-	36	51	52	65	-	-	50	-	-	-	-	-	-	63	63	56	46	56	62	65	51	-	-	53
R09	17 Araluen St	Residential	-	-	36	51	52	65	-	-	56	-	-	-	-	-	-	64	62	64	54	64	61	65	57	-	-	55
R10	14 Nariel St	Residential	-	-	36	51	52	65	-	-	58	-	-	-	-	-	-	69	69	69	59	60	67	77	61	-	-	55
R11	34-36 Phillip St	Residential	-	-	36	51	52	65	-	-	75	-	-	-	-	-	-	63	64	53	43	50	54	80	46	-	-	75
R12	36A Phillip St	Residential	-	-	36	51	52	65	-	-	63	-	-	-	-	-	-	59	60	50	40	50	52	71	44	-	-	65
R13	30 Phillip St	Residential	-	-	36	51	52	65	-	-	52	-	-	-	-	-	-	55	56	46	36	44	50	68	40	-	-	58
R14	7 Lethbridge St	Residential	-	-	36	51	52	65	-	-	46	-	-	-	-	-	-	48	49	42	32	41	46	64	36	-	-	55
R15	16 Phillip St	Residential	-	-	36	51	52	65	-	-	45	-	-	-	-	-	-	48	49	41	31	38	45	62	34	-	-	53
R16	8 Phillip St	Residential	-	-	36	51	52	65	-	-	44	-	-	-	-	-	-	48	48	44	34	41	47	60	36	-	-	50
R17	109 Glossop St	Residential	-	-	36	51	52	65	-	-	41	-	-	-	-	-	-	45	45	44	34	42	44	58	37	-	-	47
R18	1 Phillip St	Residential	-	-	36	51	52	65	-	-	37	-	-	-	-	-	-	45	46	43	33	40	37	56	36	-	-	47
R19	9 Phillip St	Residential	-	-	36	51	52	65	-	-	41	-	-	-	-	-	-	47	48	38	28	37	36	58	32	-	-	49
R20	19A Phillip St	Residential	-	-	36	51	52	65	-	-	45	-	-	-	-	-	-	49	50	41	31	39	44	61	34	-	-	53
R21	29 Phillip St	Residential	-	-	36	51	52	65	-	-	46	-	-	-	-	-	-	46	47	44	34	44	43	66	39	-	-	57
R22	2 Gidley St	Residential	-	-	36	51	52	65	-	-	69	-	-	-	-	-	-	61	62	56	46	54	54	65	49	-	-	71
R23	1 Ross Pl	Residential	-	-	36	51	52	65	-	-	63	-	-	-	-	-	-	60	61	56	46	52	55	65	47	-	-	67
R24	43 Little Chapel St	Residential	-	-	36	51	52	65	-	-	55	-	-	-	-	-	-	56	55	56	46	56	54	60	49	-	-	59
R25	20 Blair Ave	Residential	-	-	36	51	52	65	-	-	48	-	-	-	-	-	-	53	54	48	38	46	47	57	42	-	-	52
R26	3 Station St	Residential	-	-	36	51	52	65	-	-	66	-	-	-	-	-	-	54	49	54	44	54	48	53	46	-	-	70
R27	1 Station St	Residential	-	-	36	51	52	65	-	-	63	-	-	-	-	-	-	54	54	54	44	54	44	53	47	-	-	68
R28	1A Chesham St	Residential	-	-	36	51	52	65	-	-	54	-	-	-	-	-	-	51	52	48	38	48	38	49	40	-	-	58
R29	6 Chesham St	Residential	-	-	36	51	52	65	-	-	50	-	-	-	-	-	-	47	48	45	35	41	44	47	37	-	-	55
R30	10A Chesham St	Residential	-	-	36	51	52	65	-	-	51	-	-	-	-	-	-	45	46	43	33	43	42	51	38	-	-	57
C10#	St Mary's Hotel	Residential	-	-	36	51	52	65	-	-	67	-	-	-	-	-	-	91	91	90	82	84	77	99	79	-	-	66

The predicted $L_{A1,1min}$ levels shown are considered to be approximately equivalent to L_{Amax} levels.
The amber shaded cells indicate exceedances of L_{Amax} 52 dBA recognised by the NPfl
The red shaded cells indicate levels in excess of the L_{Amax} 65 dBA level recognised by the NSW Road Noise Policy, based on a synopsis of research on sleep disturbance and awakenings.

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APPENDIX E

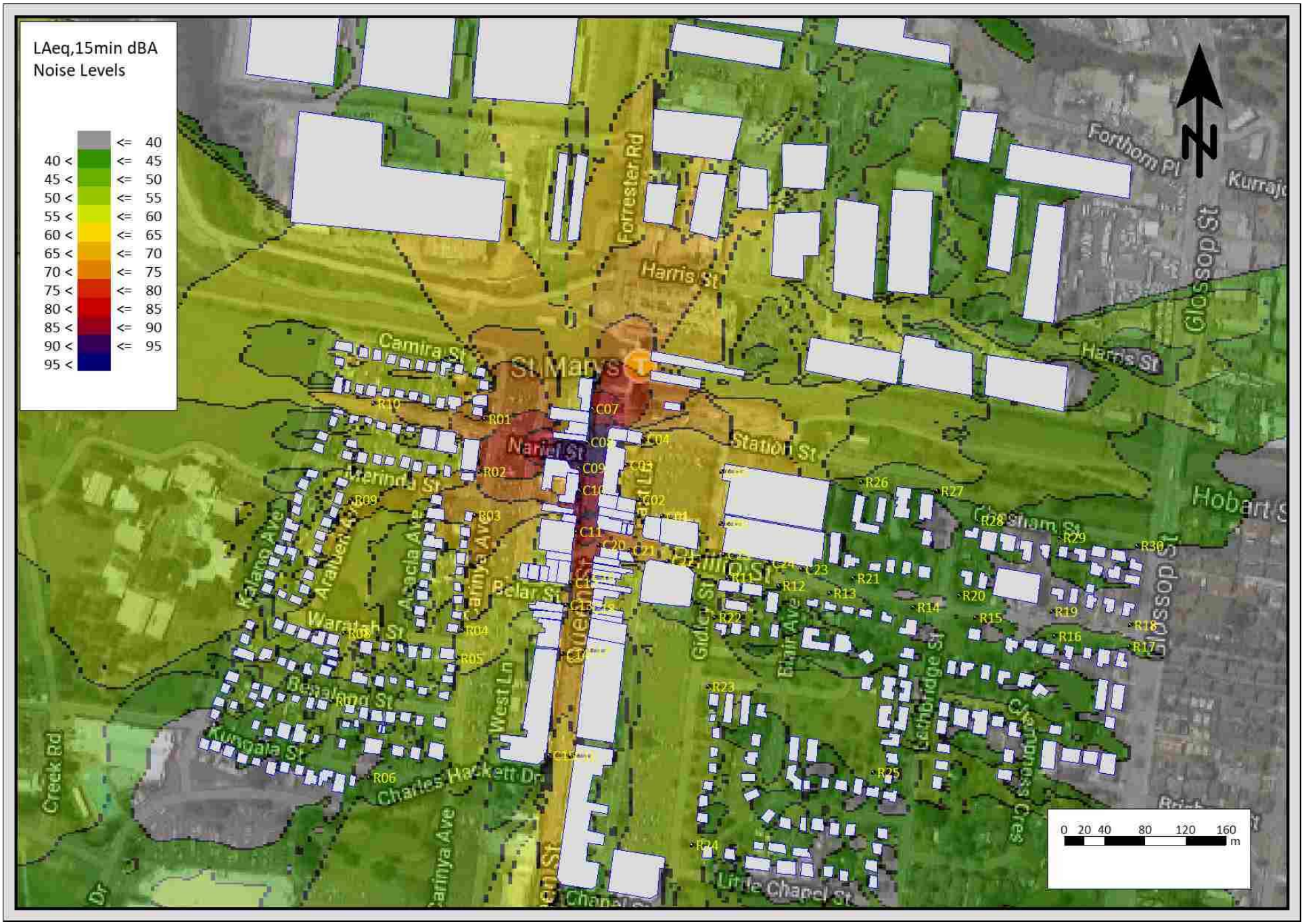
Predicted Construction Noise Contours

Noise Model Scenario 02 - 1A - Main Car Park – Potholing

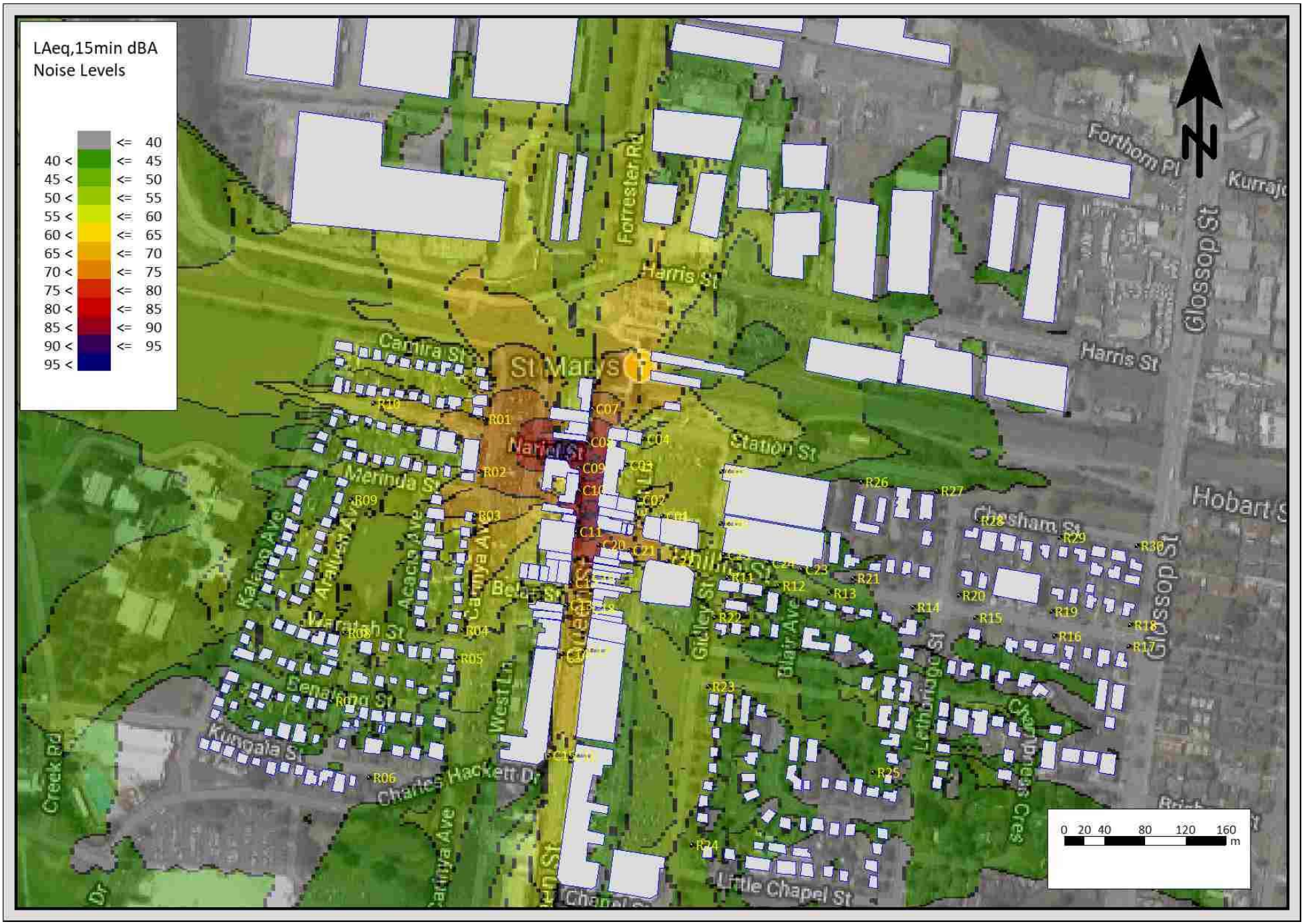
Noise Model Scenario 03 - 1A - Main Car Park - Demo Carpark AC

Noise Model Scenario 05 - 1B - Main Carpark - Service Installation

Noise Model Scenario 09 - EW - 1A Nariel St & Queen St – Potholing



Noise Model Scenario 10 - EW - 1A Nariel St & Queen St - Remove Parking Lanes



Noise Model Scenario 11 - EW - 1A Nariel St & Queen St - Kerb Demolition

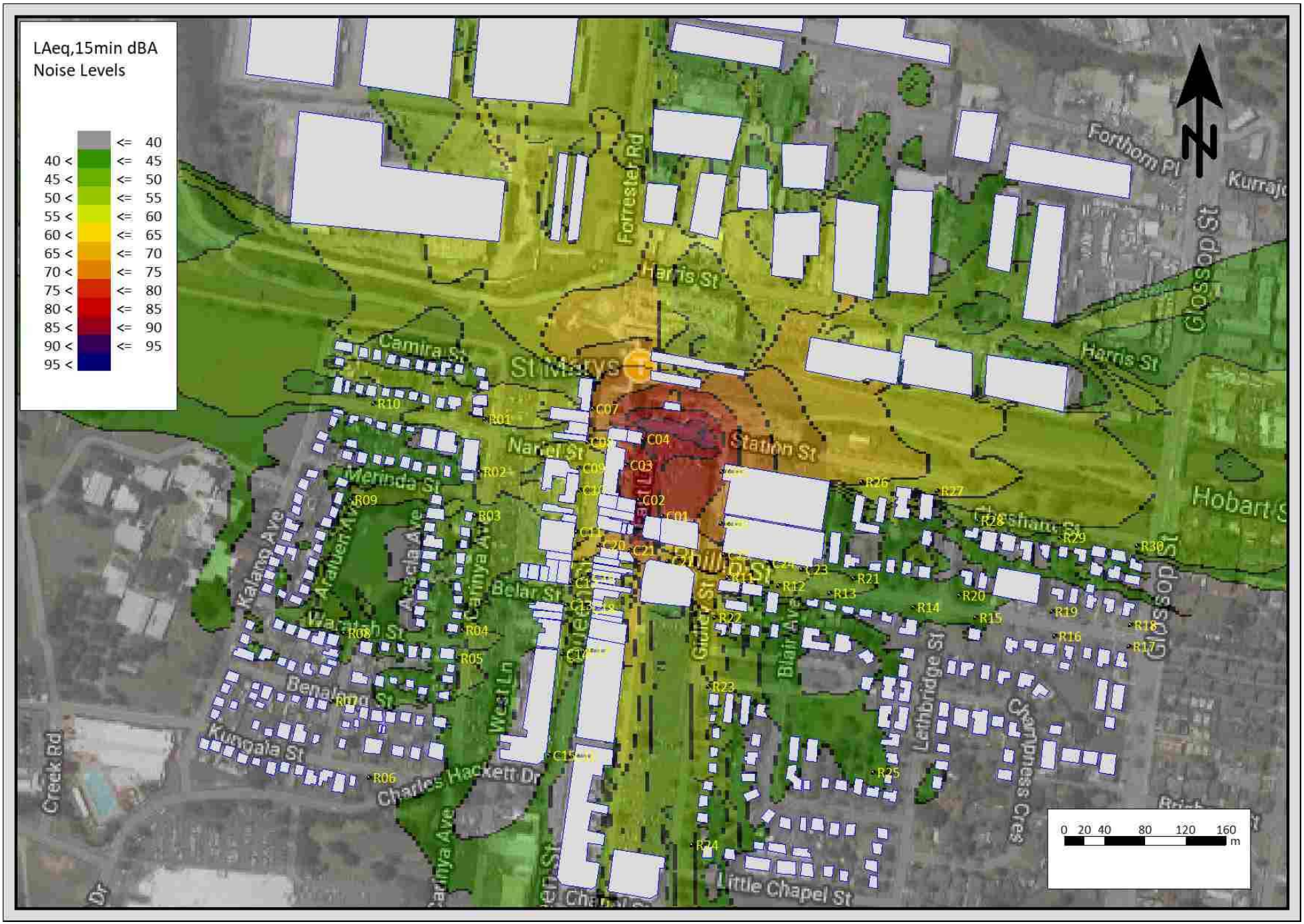
Noise Model Scenario 14 - EW - 1A Nariel St & Queen St - Tree Removal

Noise Model Scenario 15 - EW - 1B Nariel & Philip Street- Night Works

Noise Model Scenario 17 - EW - 2C- Nariel and Phillip Street - Service Installation

Noise Model Scenario 18 - EW - 2C Nariel & Philip Street - Asphalt Work

Noise Model Scenario 19 - EW- 3 Main Compound- F Type Barrier Installation, Median on Station St & Stamped Asphalt along East Lane & Main Car Park



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APPENDIX F

Construction Noise & Vibration Monitoring Program

Construction Noise & Vibration Monitoring Program

Conditions C13 - C15 specify in detail requirements for monitoring. These matters are addressed in the following sections. **Section 8.2.5** and **Appendix D** of the DNVIS will inform the most impacted receivers that trigger monitoring requirements.

The construction noise and vibration monitoring program will apply for the duration of works that pose a risk of exceeding set criteria. Monitoring is not required where activities to be undertaken do not pose risk of exceeding set criteria from the project planning approval.

Condition C13 requires consultation with relevant government agencies during preparation of the program. A risk assessment (see Section 7.1 of the CEMP) has assessed the works as low to moderate impact. In consultation with SM-WSA and the ER, based on the limited extent and duration of the works and their assessed low to moderate impact (as assessed in the DNVIS) further consultation was determined not to be required.

The Construction Noise and Vibration Monitoring Program results will be submitted to the EPA and relevant Councils, as required.

Noise and vibration monitoring will be undertaken to verify compliance with the noise and vibration objectives and/or the predicted levels in the DNVIS.

Baseline Noise Monitoring Data

Baseline noise monitoring data was reported in the CSSI EIS. A summary of the relevant noise monitoring results is provided in **Table 7-1** of the DNVIS and reproduced below. No further baseline data is required to be obtained.

DNVIS Table 7-1 NCA3 Unattended Noise Monitoring Results – Determined by EIS

Location	Rating Background Level - RBL (L_{A90} dBA)			Ambient Noise Level (L_{Aeq} dBA)		
	Day	Evening	Night	Day	Evening	Night
NM02	37	37	36	55	59	51

Time periods defined as follows – Day: 7.00am to 6.00pm Monday to Saturday, 8.00am to 6.00pm Sunday; Evening: 6.00pm to 10.00pm; and Night: 10.00pm to 7.00am Monday to Saturday, 10.00pm to 8.00am Sunday.

Consistent with the EIS study, the Rating Background Noise Levels (RBLs) shown have been considered in determining the construction noise criteria, as discussed in **Section 8** of the DNVIS.

Attended Airborne Noise Monitoring in the Community

Attended monitoring of construction noise levels will be undertaken as follows:

- As described in this DNVIS to ensure that noise and vibration levels in the adjacent community remain consistent with the requirements of the project planning approval conditions. Attended

monitoring will be completed during each work stage, to ensure appropriate management measures are implemented for the corresponding works.

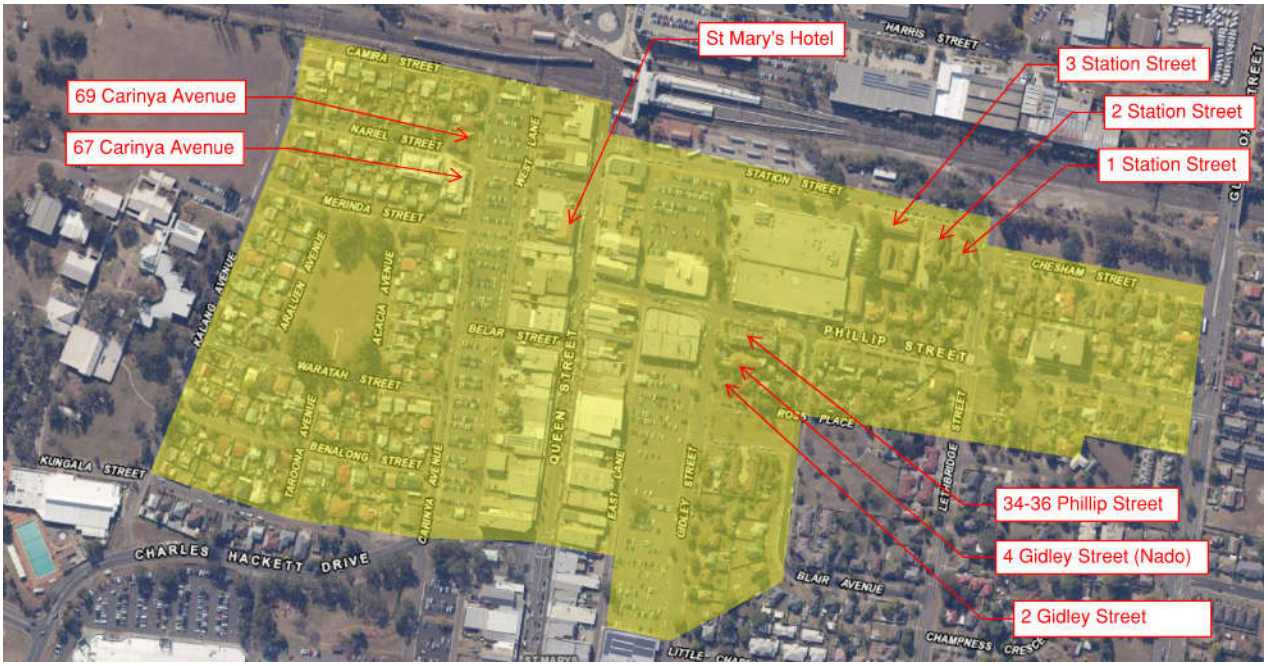
- Where appropriate in response to a noise related complaint(s) (determined on a case-by-case basis).

Attended monitoring will be undertaken at a location representative of the most affected noise sensitive receiver(s) in proximity to construction activities. Noise monitoring locations will consider factors including:

- The location of previous monitoring sites;
- The proximity of the receiver to the Project works area;
- The sensitivity of the receiver to noise;
- Background noise levels;
- The expected duration of the impact.

Subject to site conditions, attended noise monitoring will be undertaken at the representative locations identified in **Figure 8-1** (reproduced below) to verify predictions and ensure suitable management measures are in place. Depending on the locations of works, the monitoring locations identified may be varied in consultation with the ER.

DNVIS Figure 8-1 Nominated Noise Monitoring Locations



Monitoring may also be undertaken in response to a complaint. Where any investigation identifies works or activities being undertaken on the subject worksite as the likely source of the complaint, the proponent must offer to undertake attended noise or vibration monitoring at the complainant's premises. The attended measurements will need to be carried out by an appropriately trained person

in the measurement and assessment of construction noise, who is familiar with the requirements of the relevant standards and procedures.

Where noise monitoring indicates that the activity, work or combination of simultaneous activities or works has caused or is causing noise or vibration levels higher than the predicted levels at any noise sensitive receiver, Ward must review and where possible, modify the work or activity to prevent any recurrence.

Records of community enquiries and complaints, and Wards response will be managed via the project Community Communications Strategy.

Real time noise and vibration monitoring is not currently proposed, but shall be considered on a case-by-case basis, in response to any community concerns or complaints.

Parameters to be Monitored

A Type-1 integrating sound level meter should be used for attended noise monitoring. Measurements should be undertaken generally at the worst affected location on the residential boundary of an affected receiver, with the microphone at approximately 1.5m above ground and away (>3 m, where practicable) from any other reflecting surfaces. The sound level meter should be set to A-weighting frequency response and generally fast time response. Any deviations from this should be noted and reported.

As a minimum, when assessing construction noise levels, the $L_{Aeq,15min}$ and L_{Amax} (fast response) shall be measured and reported.

As a minimum, when assessing construction vibration levels, the Peak Particle Velocity - PPV (mm/s) in three orthogonal directions will be simultaneously measured.

Plant & Equipment Noise

Regular inspection of each item of plant will include listening for excessive noise from sources such as poorly performing mufflers, loose engine cowling and moving parts needing lubrication. Plant maintenance records are to be checked where excessive noise production is identified.

If subjective evaluation indicates excessive noise from any plant item(s), subject to safety, plant noise measurements shall be undertaken to confirm plant noise levels do not exceed the maximum permissible levels allowable, as set out in Table 13 of the Sydney Metro CNVS. If attended noise monitoring demonstrates exceedance of the maximum allowable plant noise level(s), corrective actions are to be identified to eliminate excessive noise and these are to be implemented as soon as practicable.

Attended Vibration Monitoring

Attended vibration monitoring is to be undertaken at the commencement of operation for each plant or activity on site, which has the potential to generate significant vibration levels, where the vibration screening criteria is likely to be exceeded. The results of the attended monitoring are to be used to confirm minimum safe working distances from the vibration generating plant.

Heritage-Listed Structures

Section 9.1.5 of the DNVIS identifies local heritage listed structures, none of which have been assessed as being structurally unsound and therefore are not considered particularly vibration

sensitive on account of their heritage classifications. Anticipated vibration levels are significantly lower than any threshold or criteria for commercial buildings, or for that matter heritage items. As such, no specific vibration monitoring of heritage structures is proposed.

In the event measurements become necessary (e.g. complaints), Ward would seek the advice of a Heritage consultant on methods and locations for installing equipment used for vibration monitoring of heritage-listed structures as required.

Where an exceedance of the vibration screening criterion is identified, the responsible works will cease, and the corresponding methodology will be reviewed and reassessed before recommencing works.

Reporting

The results of noise and vibration monitoring shall be documented in monthly construction noise and vibration monitoring reports and submitted to the Secretary for information, as required after ER endorsement.

In accordance with Condition C15, the results of the monitoring must be readily available to the construction team, the Proponent and ER. The Planning Secretary and EPA must be provided with access to the results on request.

The monthly reports shall contain:

- Details of the type of monitoring completed and a brief statement of the measurement method;
- Relevant noise and vibration planning approval conditions and management objectives;
- Monitoring equipment specifications and locations;
- Description of works, construction equipment, meteorological conditions and nearest affected sensitive receivers;
- Unattended monitoring results (if undertaken);
- Attended monitoring results; and
- Statements of compliances and non-compliances against noise and vibration planning approval conditions and management objectives, including reasons for any identified non-compliances and strategies for minimising further occurrence of identified non-compliances.

APPENDIX G

Relevant Conditions of Approval

The Sydney Metro Western Sydney Airport Approval includes several Conditions that relate to noise and vibration. These are set out below.

E37 - Land Use Survey

A detailed land use survey must be undertaken to confirm sensitive land use(s) (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 Detailed Noise and Vibration Impact Statements required under Condition E47.

E38 - Construction Hours

Work must only be undertaken during the following hours:

(a) 7:00am to 6:00pm Mondays to Fridays, inclusive;

(b) 8:00am to 1:00pm Saturdays; and

(c) at no time on Sundays or public holidays.

E39 - Highly Noise Intensive Work

Except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42, highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:

(a) between the hours of 8:00 am to 6:00 pm Monday to Friday;

(b) between the hours of 8:00 am to 1:00 pm Saturday; and

(c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour.

For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.

E41- Variation to Work Hours

Notwithstanding Conditions E38 and E39 work may be undertaken outside the hours specified in the following circumstances:

(a) Safety and Emergencies, including:

(i) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or

(ii) where it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm; or

(b) Low impact, including:

(i) construction that causes LAeq(15 minute) noise levels:

• no more than 5 dB(A) above the rating background level at any residence in accordance with the ICNG, and

• no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s); and

(ii) construction that causes:

• continuous or impulsive vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), or

• intermittent vibration values measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or

(c) By Approval, including:

(i) where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or

(ii) works which are not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by Condition E42; or

(iii) negotiated agreements with directly affected residents and sensitive land user(s); or

E42 - Out-of-Hours Work Protocol – Work not subject to an EPL

An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of work (not subject to an EPL) that is outside the hours defined in Conditions E38 and E39. The Protocol must be approved by the Planning Secretary before commencement of the out-of-hours work. The Protocol must be prepared in consultation with the ER. The Protocol must provide:

(a) justification for why out-of-hours work need to occur;

(b) identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where:

(i) the ER reviews all proposed out-of-hours activities and confirms their risk levels;

(ii) low risk activities that can be approved by the ER; and

(iii) high risk activities that are approved by the Planning Secretary;

(c) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria;

(d) a process for selecting and implementing mitigation measures for residual impacts in consultation with the community at each affected location, including respite periods consistent with the requirements of Condition E56. The measures must take into account the predicted noise levels and the likely frequency and duration of the out-of-hours works that sensitive land user(s) would be exposed to, including the number of noise awakening events;

(e) procedures to facilitate the coordination of out-of-hours work including those approved by an EPL or undertaken by a third party, to ensure appropriate respite is provided; and

(f) notification arrangements for affected receivers for all approved out-of-hours works and notification to the Planning Secretary of approved low risk out-of-hours works.

This condition does not apply if the requirements of Condition E41 are met.

Note: Out-of-hours work is any work that occurs outside the construction hours identified in Condition E38 and E39.

E43 - Construction Noise Management Levels and Vibration Criteria

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) preferred 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).

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 that in accordance with the Sydney Metro Staging Plan, a noise and vibration sub-plan is not required for this scope of works. Noise and vibration impacts will be managed under the Project CEMP and relevant management procedures.

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.

***E44** - 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 E42.

***E45** - 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.*

E46 - Construction Noise and Vibration Mitigation and Management

Industry best practice construction methods must be implemented where reasonably practicable to ensure that noise and vibration levels are minimised around sensitive land use(s). Practices may include, but are not limited to:

(a) use of regularly serviced low sound power equipment;

(b) at source control, temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting;

(c) use of non-tonal reversing alarms; and

(d) use of alternative construction and demolition techniques.

***E47 - 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 E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. 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 ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.*

***E48** - 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 must 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 Sub-plan.*

***E49** - Where sensitive land use(s) are identified in Appendix B as exceeding the highly noise affected criteria during typical case construction, mitigation measures must be implemented with the objective of reducing typical case construction noise below the highly noise affected criteria at each relevant sensitive landuse(s). Activities that would exceed highly noise affected criteria during typical case construction must not commerce until the measures identified in this condition have been implemented, unless otherwise agreed with the Planning Secretary.*

Note: Mitigation measures may include path barrier controls such as acoustic sheds and/or noise walls, at-property treatment, or a combination of path and at-property treatment.

E50 *- For all construction sites where acoustic sheds are installed, the sheds must be designed, constructed and operated to minimise noise emissions. This would include the following considerations:*

(a) all significant noise producing equipment that would be used during the night-time would be inside the sheds, where feasible and reasonable;

(b) noise generating ventilation systems such as compressors, scrubbers, etc, would be located inside the sheds and external air intake/discharge ports would be appropriately acoustically treated; and

(c) the doors of acoustic sheds would be kept closed during the night-time period. Where night-time vehicle access is required at sites with nearby residences, the shed entrances would be designed and constructed to minimise noise breakout.

E51 *- Where Condition E49 determines that at-property treatment (temporary or permanent) is the appropriate measure to reduce noise impacts, this at-property treatment must be offered to landowners of residential properties for habitable living spaces, unless other mitigation or management measures are agreed to by the landowner.*

Landowners must be advised of the range of options that can be installed at or in their property and given a choice as to which of these they agree to have installed.

A copy of all guidelines and procedures that will be used to determine at-property treatment at their residence must be provided to the landowner.

E52 *- Any offer for at-property treatment or the application of other noise mitigation measures in accordance with Condition E51, does not expire until the noise impacts specified in Condition E49, affecting that property are completed, even if the landowner initially refuses the offer.*

Note: If an offer has been made but is not accepted, this does not preclude the commencement of construction under Condition E49.

E53 *- The implementation of at-property treatment does not preclude the application of other noise and vibration mitigation and management measures including temporary and long-term accommodation.*

E54 *- Construction Vibration Mitigation – Heritage Items*

Vibration testing must be conducted during vibration generating activities that have the potential to impact on Heritage items to verify 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.

E55 *- 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.*

E56 *- Utility Coordination and Respite*

All work undertaken for the delivery of the CSSI, including those undertaken by third parties (such as utility relocations), must be coordinated to ensure respite periods are provided. The Proponent must:

(a) reschedule any work to provide respite to impacted noise sensitive land use(s) so that the respite is achieved in accordance with Condition E57; or

(b) consider the provision of alternative respite or mitigation to impacted noise sensitive land use(s); and

(c) provide documentary evidence to the ER in support of any decision made by the Proponent in relation to respite or mitigation.

The consideration of respite must also include all other approved Critical SSI, SSI and SSD projects which may cause cumulative and / or consecutive impacts at receivers affected by the delivery of the CSSI.

***E57** – Out-of-Hours Works – Community Consultation on Respite*

In order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work must be identified in consultation with the community at each affected location on a regular basis. This consultation must include (but not be limited to) providing the community with:

(a) a progressive schedule for periods no less than three (3) months, of likely out-of-hours work;

(b) a description of the potential work, location and duration of the out-of-hours work;

(c) the noise characteristics and likely noise levels of the work; and

(d) likely mitigation and management measures which aim to achieve the relevant NMLs under Condition E43 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers).

The outcomes of the community consultation, the identified respite periods and the scheduling of the likely out-of-hour work must be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.

Note: Respite periods can be any combination of days or hours where out-of-hours work would not be more than 5 dB(A) above the RBL at any residence.

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APPENDIX H

Community Consultation Report

St Mary's nightwork - consultation report

Prepared by Kath Elliott, Director, 15 November 2021

Overview

KEC sent two staff to door knock residents regarding three different construction activities:

- Stormwater works on Station St from Queen to Philip streets
- Pedestrian works at the intersection of Queen and Nariel streets
- Works in Eastern Lane, St Mary's, off Philip St

Talking points were prepared and approved prior to door knocking and were used to discuss the details of the works with residents. (Appendix A)

Door knocking took place on the afternoon of Wednesday 10 November 2021 between 4pm and 7pm and Saturday 13 November 2021, between 10am and 2pm.

Three units at 23 Station St were in a isolated block which was locked and we were unable to gain entry.

65-67 Carinya Avenue was not accurate. The following Nariel Street addresses were actually on Carinya Avenue but part of a larger complex, with their address on the side street. We also knocked extra houses on Carinya Avenue that would be similarly affected to their neighbours who were on the list.

Residences knocked were:

- 3 Station Street – 18 units
- 2 Station Street – 8 units
- 1 Station Street / 3 Lethbridge Street – 7 units
- 1-6 Chesham Street – 6 houses
- 34-26 Phillip Street – 12 units
- 69 Carinya Avenue – 1 house
- 65-67 Carinya Avenue – 5 units
- 37 Queen Street (St Mary's Hotel)

Summary outcomes

There were few concerns regarding noise. Almost all were accepting that construction was taking place and did not object to nightworks. Understood it was necessary.

Some were concerned about the access and parking issues, particularly in the flats at 3 Station Street where there are quite a few people who park on Station Street.

We discovered a small number of particular personal circumstances and issues that are noted in the key issues section of this report.

Key Issues

Parking and access

- Several residents from Station Street, park on the street regularly. Timely advice about road closures may avoid delays to work.

- Several residents in Station Street work shift work and come or go at odd times late at night or very early in the morning. Timely advice about access limitations will be needed.

Health and welfare

- Mr Ray Smith, Unit 17/3 Station St (Phone 0408 113 551; Email rayatriveroak@outlook.com) has had repeated shoulder surgery this year and is still significantly limited in his ability to do things. As a result, his car has been parked on the street for some months and has a flat battery. Ray will need assistance to start his car and to have it moved to a different place.

The wife of Mr Rukhsana Anjum Unit 2/2 Station St (Phone 0433 661 984; email rukhsanaanjum@yahoo.com) has hearing issues and finds sharp and loud noises distressing. Mrs Anjum may benefit from noise-cancelling earphones.

- Mr Phillip Jose, U3/1 Station St (Phone 0469 723 772) is very concerned about dust as he has respiratory issues. This issue may require medical advice.

- Resident at Unit 12, 3-5 Nariel Street (name refused) was anxious about noise interfering with baby's sleep but would not provide contact details.

- Ms Pat McNair (5 Chesham Street, Ph 02 9626 5631) is elderly and seems to live alone. She should not be troubled, but it may be suitable to be aware of her vulnerability and check that the work is not impacting her as it approaches the Chesham end of Station Street.

Local knowledge

- Several people expressed a general concern to know what will happen after Coles and the Child Care Centre closes. It might be helpful for local residents to have posters put up in the shopping centre to assuage their anxiety about future amenity. Ms Hoivath at U12/3 asked to be contacted about this.

- Some people expressed the hope that 3 Station Street (apartments appear to be privately owned) might be bought and demolished – presumably for future gain.

- Some people wanted to know more about the general plans for the area and for future stations. Posters in the shopping centre might be a positive step.

Recommendations

- Prepare and distribute information regarding parking and access arrangements to residents on Station St.
- Contact Mr Ray Smith and assist him to move his car.

- Provide noise canceling headphones to Ms Anjum due to her hearing difficulties.
- Follow up with Ms Hoivath with information on shopping Centre changes/timing.

Appendix A – talking points

Talking points- St Marys resident consultation, Station St stormwater - November 2021

Introduce ourselves by first name.

We are working with Ward Civil who are doing early construction works on the St Marys Temporary Bus Interchange for Transport for NSW.

Wanting to give you some information about some night construction work that is coming up nearby and get your thoughts on how that might impact you.

Do you have a few minutes?

Station Street Stormwater Drainage Works

We are intending to dig a stormwater drain along Station Street. We expect the work might impact you because it will be noisier than what you are normally used to.

We are planning on doing some of the work at night to avoid conflicts with road traffic.

This will involve nightshift work for 12 weeks, 5 nights a week with a break on Fridays and Saturdays. We will also be working every day from 7am and 6pm. We won't on public holidays.

The works will start on **Monday, 29 November.**

We expect the noise impact you will experience will be classified as moderate. It will be about 60 decibels which will feel like consistent traffic travelling at 40km per hour, about 7m away from your residence.

Every night we will do about 10 metres of work each night. We will be working from east to west (from the Queen St end first), using

- sawcutting equipment,
- a jackhammer
- a 5 tonne excavator (looks like a big bobcat) to dig out dirt
- a dry vac
- tipper trucks to remove soil
- followed by a cement pour and asphalting the road (brought in by trucks) and
- tamped down with a plate compactor.
- Some vehicles may have "quacker" which you might hear

We will mitigate the noise by:

- Saw cutting prior to 10pm and other higher noise works by 11pm.
- Switching off jackhammers every 3 hours for 1 hour,
- Turning off machinery when not in use

Do you have any questions? Do you think the nightworks will affect you very much?

(wanting to get an idea of how we might provide some respite).

Talking points- St Marys resident consultation, Quenn/Nariel works - November 2021

Introduce ourselves by first name.

We are working with Ward Civil who are doing early construction works on the St Marys Temporary Bus Interchange for Transport for NSW.

Wanting to give you some information about some night construction work that is coming up nearby and get your thoughts on how that might impact you.

Do you have a few minutes?

We're building a new pedestrian crossing on Queen Street near the intersection of Queen and Nariel Streets, as well as removing some sections of kerb and footpath and replacing with new kerb and footpath

We expect the work might impact you because it will be noisier than what you are normally used to.

We are planning on doing some of the work at night to avoid conflicts with road traffic.

This will involve nightshift work for 3 weeks, 5 nights a week with a break on Fridays and Saturdays. We will also be working every day from 7am and 6pm. We won't work on public holidays.

The works will start on **29 November 2021.**

We expect the noise impact you will experience will be classified as moderate. It will be about 60 decibels which will feel like consistent traffic travelling at 40km per hour, about 7m away from your residence.

5 St Mary's door knocking report - 15 November 2021

We will use:

- sawcutting equipment,
- a jackhammer
- a 14 tonne excavator (looks like a big bobcat) to dig out dirt
- a dry vac truck
- tipper trucks to remove soil
- a cement pour from an agitator truck chute
- temporary asphalting of the pavement (brought in by trucks) and
- asphalt roller
- tamping down with a plate compactor
- Line marking vehicles
- Some vehicles may have "quackers" which you might hear

We will mitigate the noise by:

- Saw cutting prior to 10pm and other higher noise works by 11pm
- Switching off jackhammers every 3 hours for 1 hour
- Turning off machinery when not in use

Do you have any questions? Do you think the nightworks will affect you very much?

(wanting to get an idea of how we might provide some respite).

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ST MARY'S TEMPORARY BUS INTERCHANGE EARLY WORKS ADDENDUM DETAILED NOISE & VIBRATION IMPACT STATEMENT (DNVIS) – STORMWATER VARIATION

Report 11.00323R_AD-03

prepared for Ward Civil Engineering Pty Ltd
on 25/11/2021

REPORT PREPARED BY

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BASIS OF REPORT

This report has been prepared by **Acoustics Consultants Australia (ACA)** with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with the Client. Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from ACA. ACA disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

REFERENCE	DATE	PREPARED	REVIEWED	AUTHORISED
11.00323R_AD-01	05/11/2021	SF	MdlM	SF
11.00323R_AD-02	08/11/2021	SF	MdlM	SF
11.00323R_AD-03	25/11/2021	SF	MdlM	SF

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Report 11.00323R_AD-03

1. INTRODUCTION

Acoustics Consultants Australia (ACA) has been engaged by Ward Civil & Engineering Pty Ltd (Ward) to prepare a Detailed Noise and Vibration Impact Statement (DNVIS) for the Advanced and Enabling Works (AEW) in relation to the St Marys Temporary Bus Interchange (TBI), which form part of the Sydney Metro Western Sydney Airport (SMWSA) Project (SSI 10051).

Details of the DNVIS assessment are set out in ACA report 11.00323R-04.

Subsequent to the issue of the DNVIS assessment (ACA report 11.00323R-04), this report provides an addendum assessment in relation to the following additional scope items:

- Operation of a materials laydown and amenities compound on Station Street.
- Civil works scope variation – Stormwater drainage and pavement works on Station Street.
- Civil works scope variation – CCTV trench works on Station Street.

This addendum report should be read in conjunction with the main DNVIS (Report 11.00323R-04).

The included assessments have been undertaken in accordance with the provisions of the NSW Interim Construction Noise Guideline – (ICNG), the Sydney Metro – Western Sydney Airport Construction Noise & Vibration Strategy (Ver 4.2, 8 September 2020) – (CNVS) and relevant Conditions of Approval as set out in the Department of Planning, Industry and Environment's Critical State Significant Infrastructure Approval for Sydney Metro – Western Sydney Airport (SSI 10051).

The AEW – St Marys TBI scope is not subject to an Environment Protection Licence (EPL).

This document details Noise Management Level (NML) exceedances and mitigation requirements for the identified civil works scope variation.

The main objectives of this addendum DNVIS are to minimise unreasonable noise and vibration impacts on residents and businesses, and to avoid structural damage to buildings or heritage items as a result of construction vibration.

This addendum DNVIS aims to support active community communication and maintain positive, cooperative relationships with local residents, businesses and building owners. The mitigation measures proposed in this DNVIS have been determined in consultation with the potentially affected members of the community.

It is noted that ongoing community engagement and management of such relationships is primarily managed via the Sydney Metro – Western Sydney Airport Community Communications Strategy.

A copy of this addendum NVIS must be provided to the ER before commencement of the works.

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2. DESCRIPTION OF PROPOSED WORKS

Figure 2-1 shows the locations of the materials laydown and amenities compound, the stormwater drainage and pavement reconstruction works alignment and the CCTV trench location.

Figure 2-1 Station Street Additional Works

Materials Laydown and Amenities Compound

The materials laydown and amenities compound as shown in **Figure 2-1** would be used principally for stockpiling materials and would also accommodate amenities and a small crib room for workers to use during breaks.

A 5-14-tonne excavator and truck may operate occasionally within the compound for the purposes of loading materials.

It has been assumed that loading may occur within the compound at any time during standard hours or out-of-hours, however, the loading activities are anticipated to be relatively infrequent and for much of the time the compound would generate no notable noise emissions.

Sound curtains would be installed on the chain-link fencing facing onto Station Street to minimise any noise breakout from the compound.

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Station Street Stormwater Drainage Works

The stormwater drainage works on Station Street will be required to be undertaken outside standard hours to avoid conflicts with road traffic.

The work would need to be undertaken progressively, working from east to west along Station Street. It is anticipated that approximately 10m of drainage will be completed each night, with the following methodology for each out-of-hours work shift:

- Establish temporary traffic control as per the approved Traffic Guidance System (TGS).
- The section of road surface to be removed will be saw cut – this activity would be undertaken for each shift prior to 10.00pm and would typically take less than 30 minutes to complete.
- A 5-14t excavator will then excavate the utility trench to the required depth and the spoil will be direct loaded onto a rigid truck for offsite disposal at appropriately licensed landfill facility. It is noted that the asphalt is ~150mm thick and will be able to be removed with an excavator ripper / bucket attachment. Stormwater pipes will then be placed within the trench.
- The trench will then be backfilled with select material and compacted using a jumping jack / plate compactor.
- Pits will be installed (if pre-cast off site) or constructed in-situ from reinforcing and concrete. Reinforcing will be delivered in rigid trucks and lifted into position using an excavator. Concrete will be poured direct from the back of the chute.
- The road surface will then be reinstated with hot mix. The hot mix would be delivered by a rigid truck, placed using the 14t excavator with bucket attachment and then be compacted using a plate compactor.

It is expected that approximately 40 out-of-hours shifts would be required to complete the stormwater drainage installation, assuming that each shift would commence at approximately 8.00pm and be completed by approximately 5.00am.

Station Street Pavement Reconstruction Works

Once the stormwater drainage is installed, the Station Street pavement would be reconstructed. The pavement works would be undertaken progressively from east to west along Station Street. It is anticipated that approximately 20 m^2 of pavement would be reconstructed each night (10 linear metres per shift), with the following methodology for each out-of-hours work shift:

- Establish temporary traffic control as per the approved Traffic Guidance System (TGS).
- The section of road surface to be removed will be saw cut – this activity would be undertaken prior to 10.00pm each shift and would typically take less than 30 minutes to complete.

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- A 5-14t excavator will then excavate the pavement to the required depth (~500mm below existing surface). Spoil will be direct loaded onto a rigid truck for temporary stockpiling within the TBI for later offsite disposal at appropriately licensed landfill facilities.

- Select materials will be placed within the excavation and compacted using a jumping jack / plate compactor.

- The road surface will then be reinstated with hot mix. The hot mix would be delivered by a rigid truck, placed using the 14t excavator with bucket attachment and then be compacted using a plate compactor.

- Kerbs, pram ramps which were removed as part of the drainage / pavement works would then be rectified, which would involve pouring concrete directly from a concrete agitator chute.

It is expected that approximately 30 out-of-hours shifts would be required to complete the pavement reconstruction, assuming that each shift would commence at approximately 8.00pm and be completed by approximately 5.00am.

Station Street Asphalt Works (Milling and Re-Sheeting)

Once the pavement reconstruction is complete, asphalting would be undertaken along Station Street, as follows:

- Mill nominal 50mm of asphalt of project footprint using a 2m profiler

- Install spray seal on the exposed milled surface.

- Lay replacement nominal 50mm of asphalt. Compaction to be achieved using a 7t smooth drum static roller as well as a 7t multi tyre static roller.

- Line marking to be completed using line marking / spray truck.

It is expected that approximately 2 out-of-hours shifts would be required to complete the asphalting (milling and resheeting).

CCTV Trench Works

The CCTV trench works on Station Street would not require occupation of the public road but will need to be done at night as the trench crosses through the train station pedestrian areas. The trenching works along the alignment as indicated in **Figure 2-1** will involve:

- Lifting the existing pavers by hand, creating a trench with a 5-7 tonne excavator (max trench size: 500mm x 200mm), installing cabling and then back filling and compacting with a plate compactor.

It is expected that approximately 5 out-of-hours shifts would be required to complete the CCTV works.

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Construction Hours

Standard construction hours defined by Condition E38, consistent with the CNVS, are:

(a) 7:00am to 6:00pm Mondays to Fridays, inclusive;

(b) 8:00am to 1:00pm Saturdays; and

(c) at no time on Sundays or public holidays.

The proposed out-f-hours works will be managed under the Sydney Metro Out of Hours Works Protocol as required under CSSI Condition E42, which applies to out of hours work not subject to an EPL. Note that this Protocol was still in development during the development of this DNVIS.

Where works are proposed to be undertaken outside of the standard hours, specific respites and management measures for those works have been considered in consultation with the community.

In accordance with the Sydney Metro Out of Hours Work Protocol, an out of hours application will be submitted to Sydney Metro, and independent Environmental Representative for relevant endorsements and approval when out of hours works are planned.

The Community Communication Strategy will also support Ward's application for commencing out of hours work. It will detail how the community will be notified in advance of planned activities, kept informed of works progress and how potential noise impacts will be managed.

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3. RELEVANT CONDITIONS OF APPROVAL

The Sydney Metro Western Sydney Airport Approval includes several Conditions that relate to noise and vibration. These Conditions are interrelated with the requirements of the DNVIS and accordingly have been considered by this assessment.

The specific requirements of the DNVIS are set out under Condition E47, as follows:

E47 - 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 E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. 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 ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.*

Table 3-1 summarises the DNVIS requirements set out in the CNVS and **Table 3-2** summarises the various noise and vibration Approval Conditions and where reference to these is made by this DNVIS.

Table 3-1 DNVIS Requirements per CNVS

DNVIS Requirements	Where Addressed
Identify all Noise and Vibration Sensitive Receivers (NSRs) which may be affected by the project.	Section 4
Conduct background noise monitoring at representative NSRs to determine the rating background noise levels (RBLs) in accordance with the procedures presented in the EPA's Noise Policy for Industry, where RBLs have not been established in previous project stages.	Section 5
Determine the appropriate noise and vibration management levels of each NSR.	Section 6 / 7
Determine the source noise levels (Sound Power Levels) of each noise generating plant and equipment item required to undertake the construction scenario. Note: Sound Power Levels for each plant and equipment would be less than the maximum allowable levels found in Table 13 and Table 14.	Section 6
Clearly indicate which mitigation measures identified in Section 4 have been/are to be incorporated into the noise assessment. Noise mitigation measures to be implemented will vary for reasons such as safety and space constraints, these are to be identified and the calculations adjusted accordingly.	Section 6

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DNVIS Requirements	Where Addressed
For location specific construction scenarios and where applicable for generic scenarios, include the effects of noise shielding provided by site offices, residential fences, noise barriers or natural topographic features.	Section 6
Where applicable include the effects of noise reflections and ground attenuation.	Section 6
Calculate the LAeq noise or range of levels from construction scenarios at sensitive receiver groups, with the use of noise contour maps where appropriate and/or at 10 m, 25 m, 50 m, 75 m,100 m and 200 m for more general construction activities.	Section 6 Appendix B Appendix C
Compare these against the goals identified for each NSR and identify predicted exceedances.	Appendix B
For night-time activities, calculate exceedances over the: *o LAeq,15min 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and* *o LAFmax 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.* *Where exceedances are predicted to occur, undertake a detailed maximum noise level event assessment in accordance with the Noise Policy for Industry (EPA, 2017).*	Appendix B
On completion of all DNVIS reports for the subjective classification of the noise impact is to be evaluated and documented as: *o Low Impact* *o Moderate Impact* *o High Impact*	Section 10
As a result of noise classification and/or the noise level exceedances at sensitive receivers provided by the DNVIS reports, appropriate reasonable and feasible noise mitigation is to be adopted and implemented. For sites where works are predicted to significantly exceed noise goals and impact on receivers for a significant period of time, additional reasonable and feasible noise mitigation measures such as those outlined in Section 5 would be considered if practical to reduce the noise levels and impact on sensitive receivers.	Section 9/10 Appendix B

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Table 3-2 Approval Conditions Relating to Noise and Vibration

Approval Conditions	Where Addressed
E37 - Land Use Survey *A detailed land use survey must be undertaken to confirm sensitive land use(s) (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 Detailed Noise and Vibration Impact Statements required under Condition E47.*	Section 4
E38 - Construction Hours *Work must only be undertaken during the following hours:* *(a) 7:00am to 6:00pm Mondays to Fridays, inclusive;* *(b) 8:00am to 1:00pm Saturdays; and* *(c) at no time on Sundays or public holidays.*	Section 2
E39 - Highly Noise Intensive Work *Except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42, highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:* *(a) between the hours of 8:00 am to 6:00 pm Monday to Friday;* *(b) between the hours of 8:00 am to 1:00 pm Saturday; and* *(c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour.* *For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.*	Section 6

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Approval Conditions	Where Addressed
E41- Variation to Work Hours *Notwithstanding Conditions E38 and E39 work may be undertaken outside the hours specified in the following circumstances:* *(a) Safety and Emergencies, including:* *(i) for the delivery of materials required by the NSW Police Force or other authority for safety reasons; or* *(ii) where it is required in an emergency to avoid injury or the loss of life, to avoid damage or loss of property or to prevent environmental harm; or* *(b) Low impact, including:* *(i) construction that causes LAeq(15 minute) noise levels:* *• no more than 5 dB(A) above the rating background level at any residence in accordance with the ICNG, and* *• no more than the 'Noise affected' NMLs specified in Table 3 of the ICNG at other sensitive land user(s); and* *(ii) construction that causes:* *• continuous or impulsive vibration values, measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.2 of Assessing Vibration: a technical guideline (DEC, 2006), or* *• intermittent vibration values measured at the most affected residence are no more than the preferred values for human exposure to vibration, specified in Table 2.4 of Assessing Vibration: a technical guideline (DEC, 2006); or* *(c) By Approval, including:* *(i) where different construction hours are permitted or required under an EPL in force in respect of the CSSI; or* *(ii) works which are not subject to an EPL that are approved under an Out-of-Hours Work Protocol as required by Condition E42; or* *(iii) negotiated agreements with directly affected residents and sensitive land user(s);*	Section 6

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Approval Conditions	Where Addressed
E42 - Out-of-Hours Work Protocol – Work not subject to an EPL *An Out-of-Hours Work Protocol must be prepared to identify a process for the consideration, management and approval of work (not subject to an EPL) that is outside the hours defined in Conditions E38 and E39. The Protocol must be approved by the Planning Secretary before commencement of the out-of-hours work. The Protocol must be prepared in consultation with the ER. The Protocol must provide:* *(a) justification for why out-of-hours work need to occur;* *(b) identification of low and high-risk activities and an approval process that considers the risk of activities, proposed mitigation, management, and coordination, including where:* *(i) the ER reviews all proposed out-of-hours activities and confirms their risk levels;* *(ii) low risk activities that can be approved by the ER; and* *(iii) high risk activities that are approved by the Planning Secretary;* *(c) a process for the consideration of out-of-hours work against the relevant NML and vibration criteria;* *(d) a process for selecting and implementing mitigation measures for residual impacts in consultation with the community at each affected location, including respite periods consistent with the requirements of Condition E56. The measures must take into account the predicted noise levels and the likely frequency and duration of the out-of-hours works that sensitive land user(s) would be exposed to, including the number of noise awakening events;* *(e) procedures to facilitate the coordination of out-of-hours work including those approved by an EPL or undertaken by a third party, to ensure appropriate respite is provided; and* *(f) notification arrangements for affected receivers for all approved out-of-hours works and notification to the Planning Secretary of approved low risk out-of-hours works.* *This condition does not apply if the requirements of Condition E41 are met.* *Note: Out-of-hours work is any work that occurs outside the construction hours identified in Condition E38 and E39.*	Section 6 Section 7

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Approval Conditions	Where Addressed
E43 - Construction Noise Management Levels and Vibration Criteria *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) preferred 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).* *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 that in accordance with the Sydney Metro Staging Plan, a noise and vibration sub-plan is not required for this scope of works. Noise and vibration impacts will be managed under the Project CEMP and relevant management procedures.* *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 6/7
E44 *- 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 E42.*	Section 9 Section 10

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Approval Conditions	Where Addressed
E45 *- 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.*	Section 4
E46 - Construction Noise and Vibration Mitigation and Management *Industry best practice construction methods must be implemented where reasonably practicable to ensure that noise and vibration levels are minimised around sensitive land use(s). Practices may include, but are not limited to:* *(a) use of regularly serviced low sound power equipment;* *(b) at source control, temporary noise barriers (including the arrangement of plant and equipment) around noisy equipment and activities such as rock hammering and concrete cutting;* *(c) use of non-tonal reversing alarms; and* *(d) use of alternative construction and demolition techniques.*	Section 9/10
E47 *- 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 E43 and E44 at any residence outside construction hours identified in Condition E38, or where receivers will be highly noise affected or subject to vibration levels above those otherwise determined as appropriate by a suitably qualified structural engineer under Condition E87. 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 ER before the commencement of the associated works. The Planning Secretary and the EPA may request a copy (ies) of the DNVIS.*	Throughout
E48 *- 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 must 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 Sub-plan*	Section 7

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Approval Conditions	Where Addressed
E49 *- Where sensitive land use(s) are identified in Appendix B as exceeding the highly noise affected criteria during typical case construction, mitigation measures must be implemented with the objective of reducing typical case construction noise below the highly noise affected criteria at each relevant sensitive landuse(s). Activities that would exceed highly noise affected criteria during typical case construction must not commerce until the measures identified in this condition have been implemented, unless otherwise agreed with the Planning Secretary.* *Note: Mitigation measures may include path barrier controls such as acoustic sheds and/or noise walls, at-property treatment, or a combination of path and at-property treatment.*	Section 6/9
E50 *- For all construction sites where acoustic sheds are installed, the sheds must be designed, constructed and operated to minimise noise emissions. This would include the following considerations:* *(a) all significant noise producing equipment that would be used during the night-time would be inside the sheds, where feasible and reasonable;* *(b) noise generating ventilation systems such as compressors, scrubbers, etc, would be located inside the sheds and external air intake/discharge ports would be appropriately acoustically treated; and* *(c) the doors of acoustic sheds would be kept closed during the night-time period. Where night-time vehicle access is required at sites with nearby residences, the shed entrances would be designed and constructed to minimise noise breakout.*	n/a
E51 *- Where Condition E49 determines that at-property treatment (temporary or permanent) is the appropriate measure to reduce noise impacts, this at-property treatment must be offered to landowners of residential properties for habitable living spaces, unless other mitigation or management measures are agreed to by the landowner.* *Landowners must be advised of the range of options that can be installed at or in their property and given a choice as to which of these they agree to have installed.* *A copy of all guidelines and procedures that will be used to determine at-property treatment at their residence must be provided to the landowner.*	n/a
E52 *- Any offer for at-property treatment or the application of other noise mitigation measures in accordance with Condition E51, does not expire until the noise impacts specified in Condition E49, affecting that property are completed, even if the landowner initially refuses the offer.* *Note: If an offer has been made but is not accepted, this does not preclude the commencement of construction under Condition E49.*	n/a

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Approval Conditions	Where Addressed
E53 *- The implementation of at-property treatment does not preclude the application of other noise and vibration mitigation and management measures including temporary and long-term accommodation.*	Section 6/9
E54 - Construction Vibration Mitigation – Heritage Items *Vibration testing must be conducted during vibration generating activities that have the potential to impact on Heritage items to verify 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 7
E55 *- 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 7
E56 - Utility Coordination and Respite *All work undertaken for the delivery of the CSSI, including those undertaken by third parties (such as utility relocations), must be coordinated to ensure respite periods are provided. The Proponent must:* *(a) reschedule any work to provide respite to impacted noise sensitive land use(s) so that the respite is achieved in accordance with Condition E57; or* *(b) consider the provision of alternative respite or mitigation to impacted noise sensitive land use(s); and* *(c) provide documentary evidence to the ER in support of any decision made by the Proponent in relation to respite or mitigation.* *The consideration of respite must also include all other approved Critical SSI, SSI and SSD projects which may cause cumulative and / or consecutive impacts at receivers affected by the delivery of the CSSI.*	Section 6/9

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Approval Conditions	Where Addressed
E57 – Out-of-Hours Works – Community Consultation on Respite *In order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work must be identified in consultation with the community at each affected location on a regular basis. This consultation must include (but not be limited to) providing the community with:* *(a) a progressive schedule for periods no less than three (3) months, of likely out-of-hours work;* *(b) a description of the potential work, location and duration of the out-of-hours work;* *(c) the noise characteristics and likely noise levels of the work; and* *(d) likely mitigation and management measures which aim to achieve the relevant NMLs under Condition E43 (including the circumstances of when respite or relocation offers will be available and details about how the affected community can access these offers).* *The outcomes of the community consultation, the identified respite periods and the scheduling of the likely out-of-hour work must be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.* *Note: Respite periods can be any combination of days or hours where out-of-hours work would not be more than 5 dB(A) above the RBL at any residence.*	Section 6

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4. SENSITIVE RECEIVERS

Figure 4-1 shows the representative residential receivers surrounding the works areas previously considered by the DNVIS assessment and **Figure 4-2** shows the representative non-residential (commercial) receivers surrounding the works areas.

For consistency with the DNVIS predictions have been undertaken for all representative receivers. However, for the identified works, the representative receivers potentially most impacted may be expected to be the Station Street receivers in the vicinity of R26.

Figure 4-1 Representative Residential Receivers Surrounding the Works

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Figure 4-2 Representative Non-Residential Receivers Surrounding the Works

Note: Receiver C10 is the St Mary's Hotel which includes a residential component on the first floor. For the purposes of assessment, the first floor has been considered a residential use. Receiver C26 is a Childcare Centre located within the Station Plaza building – this has a semi-enclosed play area to the east of the building.

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5. EXISTING NOISE ENVIRONMENT

The noise and vibration assessment undertaken as part of the Sydney Metro - Western Sydney Airport Environmental Impact Statement (EIS) is documented in the EIS Technical Paper 2 (*Sydney Metro - Western Sydney Airport Technical Paper 2: Noise and Vibration*).

The EIS study defined Noise Catchment Areas (NCAs) for the wider project. The sensitive receivers potentially affected by the St May's Bus Exchange Early Works are located with NCA3.

Table 5-1 sets out the existing ambient and background noise levels considered by this assessment. The levels for the Day, Evening and Night periods are consistent with the survey results identified by the EIS.

Table 5-1 Summary of NCA3 Unattended Noise Monitoring Results – Determined by EIS

Location	Rating Background Level - RBL (L_{A90} dBA)			Ambient Noise Level (L_{Aeq} dBA)		
	Day	Evening	Night	Day	Evening	Night
NM02	37	37	36	55	59	51

Time periods defined as follows – Day: 7.00am to 6.00pm Monday to Saturday, 8.00am to 6.00pm Sunday; Evening: 6.00pm to 10.00pm; and Night: 10.00pm to 7.00am Monday to Saturday, 10.00pm to 8.00am Sunday.

Consistent with the EIS study, the Rating Background Noise Levels (RBLs) shown have been considered in determining the construction noise criteria, as discussed in **Section 6**.

Whilst the EIS background noise levels have been applied for the purposes of assessment, it has been noted during daytime site inspections that the RBLs in the vicinity of the Station Street works are notably higher than L_{A90} 37 dBA during the daytime.

In this regard, ACA report (ACA 11.00323L-01, dated 15 October 2021) sets out the results of daytime supplementary attended noise monitoring of pre-construction noise levels within St Marys, at locations potentially affected by the TBI Early Works. Of particular note, the supplementary noise monitoring determined that the closest residential receivers to the Station Street works (R26), are ordinarily subjected to daytime background noise levels of L_{A90} 53 dBA due to the influence of the Station Plaza shopping centre's mechanical services (car park exhaust fans). Additionally, residential receivers on Chesham Street (R29), are ordinarily subjected to daytime background noise levels of L_{A90} 51 dBA due to the influence of Glossop Street traffic and another (non-project related) construction compound.

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6. AIRBORNE CONSTRUCTION NOISE

Airborne Construction Noise Criteria

The CNVS notes that Construction Noise Management Levels (NMLs) for all Sydney Metro projects should be determined in accordance with the procedures nominated in the DECCW's "*Interim Construction Noise Guideline*" dated July 2009 (ICNG).

The noise criteria set out in the ICNG have been considered in the assessment of potential impacts from the project works. **Table 6-1** summarises the construction noise criteria recommended by the ICNG for residential receivers and **Table 6-2** summarises the criteria for non-residential receivers. **Table 6-2** additionally includes the construction noise criteria for relevant special use receivers (other sensitive land uses) not identified by the ICNG.

With consideration to the out of hours periods identified by the Sydney Metro Construction Noise and Vibration Standard, the resultant project specific NMLs set out in **Table 6-3**.

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Table 6-1 ICNG Airborne Construction Noise Criteria – Noise at Residences[1]

Time of Day	Management Level $L_{Aeq,15min}$	How to Apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq,15min}$ is greater than the noise affected level, the proponent would apply all feasible and reasonable work practices to minimise noise. The proponent would 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 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent would consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent would communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.
Outside recommended standard hours	Noise affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. The proponent would apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent would negotiate with the community. For guidance on negotiating agreements see Section 7.2.2 of the ICNG

Note 1: Adopted from the *ICNG*.
Note 2: Noise levels apply at the property boundary that is most exposed to construction noise (or receiver building façade that is most exposed to construction noise, noting that noise levels may be higher at upper floors of the noise affected receiver buildings). 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.

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Table 6-2 ICNG Airborne Construction Noise Criteria – Other Sensitive Land Uses

Land Use	Management Level $L_{Aeq, 15min}$ (applies when properties are being used)	Reference
Classrooms at schools and other educational	Internal noise level: 45 dBA[1]	ICNG[5]
Hospital wards and operating theatres	Internal noise level: 45 dBA [2]	ICNG[5]
Places of worship	Internal noise level: 45 dBA [3]	ICNG[5]
Active recreation areas	External noise level: 65 dBA	ICNG[5]
Passive recreation areas	External noise level: 60 dBA	ICNG[5]
Commercial premises (offices, etc)	External noise level: 70 dBA	ICNG[5]
Industrial premises	External noise level: 75 dBA	ICNG[5]
Childcare Centres (Sleeping areas)	Internal noise level: 35 dBA [4]	AAAC[6]
Childcare Centres (External areas)	Internal noise level: 55 dBA [4]	AAAC[6]

Notes: 1, 2, 3: External Noise Management Levels (NML) of $L_{Aeq,15min}$ 55 dBA are considered by this assessment, assuming 10dB attenuation achieved by façades with open window(s);
4: Based on visual inspection of the childcare centre on Station Street, external Noise Management Levels (NML) of $L_{Aeq,15min}$ 60 dBA are considered by this assessment, assuming 25 dB attenuation achieved by the building elements with closed/fixed window(s) for the indoor sleeping areas and 5 dB attenuation for the external play area;
5: Management Levels specified by Interim Construction Noise Guideline;
6: Management Level based on Australian Acoustical Consultants (AAAC) Technical Guideline on Child Care Centre Noise Assessments.

Table 6-3 Airborne Noise Management Levels (External Levels)

Location	Standard Hours (Day)		OOHW (Day)		OOHW (Evening)		OOHW (Night)	
	RBL	NML	RBL	NML	RBL	NML	RBL	NML
Residential	37	47	37	42	37	42	36	41
School (Classrooms)	n/a	55	n/a	55	n/a	55	n/a	55
Commercial (Offices)	n/a	70	n/a	70	n/a	70	n/a	70
Childcare Centre (External Play Areas)	n/a	60	n/a	60	n/a	60	n/a	60
Childcare Centre (External to Sleeping Areas)	n/a	60	n/a	60	n/a	60	n/a	60

Notes: RBL - Rating Background Noise Level; NML - Noise Management Level; Non-residential criteria only apply when receiver building is in use. Noise levels apply at the property boundary that is most exposed to construction noise (or receiver building façade that is most exposed to construction noise). 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. It is anticipated that the recommended internal noise levels would be readily achieved at the Station Street childcare centre if the identified external levels are achieved.

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Sydney Metro Construction Noise & Vibration Standard (CNVS)

In addition to the ICNG, the noise criteria set out in the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (CNVS) have been considered.

The CNVS recognises that works requiring the use of heavy machinery can generate high noise and vibration levels and in urban areas there is often limited setback distance between these noise sources and nearby buildings and receivers. Under such circumstances, typically there is limited opportunity to practicably mitigate the noise and vibration effects in a cost-effective manner. Therefore, potential disturbance impacts are usually minimised as much as practicable through management techniques. For residential receivers, depending on how far the predicted airborne construction noise level is above RBL, the CNVS recommends the adoption of the management measures set out in **Table 6-4**. Full definitions of the identified management measures are set out in the CNVS.

Table 6-4 Additional Airborne Noise Management Measures (Residential)

Time Period		Mitigation Measures			
		Predicted $L_{Aeq,15min}$ Noise Level Above NML			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard Hours	Mon-Fri (7.00am - 6.00pm)	LB	LB, M	LB, M, SN	LB, M, SN
	Sat (8.00am - 1.00pm)				
	Sun/Pub Hol (Nil)				
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)	LB, M	LB, M, SN	LB, M, SN, RO	LB, M, SN, IB, PC, RO, SN
	Sat (1.00pm - 10.00pm)				
	Sun/Pub Hol (8.00am - 6.00pm)				
OOH (Night)	Mon-Fri (10.00pm - 7.00am)	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, SN, AA
	Sat (10.00pm - 8.00am)				
	Sun/Pub Hol (6.00pm - 7.00am)				

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020).

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Highly Noise Intensive Work

Condition E39 requires the following regarding highly noise intensive work:

Except as permitted by an EPL or approved in accordance with the Out-of-Hours Works Protocol required by Condition E42, highly noise intensive work that result in an exceedance of the applicable NML at the same receiver must only be undertaken:

> *(a) between the hours of 8:00 am to 6:00 pm Monday to Friday;*
>
> *(b) between the hours of 8:00 am to 1:00 pm Saturday; and*
>
> *(c) if continuously, then not exceeding three (3) hours, with a minimum cessation of work of not less than one (1) hour.*

For the purposes of this condition, 'continuously' includes any period during which there is less than one (1) hour between ceasing and recommencing any of the work.

Sleep Disturbance at Residences

Section 4.3 of the ICNG provides the following with respect to sleep disturbance at residences:

Where construction works are planned to extend over more than two consecutive nights, and a quantitative assessment method is used, the analysis should cover the maximum noise level, and the extent and the number of times that the maximum noise level exceeds the RBL. Some guidance indicating the potential for sleep disturbance is in the NSW Environmental Criteria for Road Traffic Noise (EPA 1999) (ECRTN).

Section 2.9 of the CNVS sets out the Sydney Metro sleep disturbance and maximum noise event requirements, as follows:

Maximum noise level events from construction activities during the night-time period can trigger both awakenings and disturbance to sleep stages. The approach to managing events that cause sleep disturbance shall be consistent with the Noise Policy for Industry (EPA, 2017). Where night-time noise levels at a residential location exceed the:

- $L_{Aeq,15min}$ *40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, or the*
- L_{AFmax} *52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*

a detailed maximum noise level event assessment is to be undertaken.

The detailed assessment will cover the maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the number of times this happens during the night-time period.

Maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response. The detailed assessment will consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels for night-time activities.

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ACA notes that the EPA has conducted an independent and comprehensive review of the most recent research on sleep disturbance and maximum noise levels and a synopsis of this research is included in the *NSW Road Noise Policy* (RNP) and previously in the ECRTN. The EPA concluded that from the research on sleep disturbance to date:

- *Maximum internal noise levels below 50-55dBA are unlikely to awaken people from sleep;*
- *One or two noise events per night with maximum internal noise levels of 65-70dBA are not likely to affect health and wellbeing significantly.*

The 55 dBA maximum noise level may be considered to be equivalent to an external maximum noise level of 65 dBA, considering the 10 dB attenuation typically achieved through partially open windows.

Based on the above, this DNVIS considers the external screening level of L_{AFmax} 52 dBA in accordance with the CNVS and additionally considers the external noise criterion of L_{AFmax} 65 dBA referenced by the *RNP*.

Airborne Construction Noise Assessment

Construction Activities

Assessment of airborne noise impacts from the construction activities have been determined by modelling the noise sources, receiver locations, topographical features and buildings.

Key details regarding the construction site layouts, the likely plant and equipment and hours of operation were informed by the construction team.

Table 6-5 provides a summary of the works to be undertaken and the timeframes at which the works would occur.

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Table 6-5 Construction Scenarios (Key Works Stages and Timeframes)

Model ID	Stage	Activity	Standard Hours	Out-of-Hours Day	Out-of-Hours Evening	Out-of-Hours Night
	External Works					
20	Materials Laydown and Amenities Compound	Laydown Operations	Yes	Yes	Yes	Yes
21a	Service Installation Stormwater Drainage and Pavement Reconstruction and Resurfacing Works	Saw Cut Asphalt	No	No	Yes	No
21b		Excavate & Backfill	No	No	No	Yes
21c		Pavement Reconstruction	No	No	No	Yes
21d		Asphalting Works – Milling and Resheeting	No	No	No	Yes
22a	Service Installation CCTV Services	Lift Pavers (with provision for use of Concrete Saw / Small Hydraulic Hammer for Hardstand Breakout)	No	No	Yes	No
22b		Excavate	No	No	No	Yes
22c		Backfill & Compact	No	No	No	Yes

Construction Equipment

For the purposes of this assessment, the construction equipment and sound power levels set out in **Table 6-6** have been considered across the identified works areas as shown in **Figure 2-1**. The sound power levels have been determined by measurements undertaken by ACA on other similar projects, or have been adopted from other similar CSSI projects.

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Table 6-6 Construction Plant Sound Power Levels

Stage	Activity	Construction Equipment	Sound Power Level - SWL (L_{Aeq} dBA)	Assumed Operating Time within 15 Minute Period (Minutes)	Time Adjusted Source SWL	Activity SWL ($L_{Aeq,15min}$ dBA)	Activity SWL ($L_{A1,1min}$ dBA)
20	Materials Laydown and Amenities Compound	Hand Tools	90	5	85	100	115
		2t Tipper	105	5	100		
		14t Excavator	105	5	100		
21a	Service Installation - Stormwater Drainage Services 21a Saw Cut Asphalt	2t Tipper Truck	105	5	100	111	120
		Concrete Saw*	118	3	111		
21b & 21c	Service Installation - Stormwater Drainage Services 21b Excavate & Backfill 21c Pavement Reconstruction Works	Hand Tools	90	5	85	110	115
		Jackhammer	113	5	108		
		14t Excavator with Bucket	105	5	100		
		2t Tipper Truck	105	5	100		
		Rigid Truck / Bogie	105	5	100		
		Plate Compactor	109	5	104		
		Jumping Jack	109	5	104		
		Concrete Truck	109	5	104		
21d	Service Installation - Stormwater Drainage Services 21d	Milling Machine / Profiler	117	5	112	112	119
		Paver	114	5	109		
		7t Smooth Drum Static Roller	107	5	102		
		7t Multi Tyre Static roller.	107	5	102		

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	Asphalting (Milling and Resheeting)	Line Marking Truck	108	5	103		
22a	CCTV Services Lift Pavers (potential brief saw cut or small hydraulic hammer use)	2t Tipper Truck	105	5	100	111	120
		5t Excavator with Bucket	95	5	90		
		Concrete Saw*	118	3	111		
		5t Excavator with Small Hammer*	115	5	110		
22b	CCTV Services Excavate	Hand Tools	90	5	85	104	113
		5t Excavator with Bucket	95	5	90		
		2t Tipper Truck	105	5	100		
		Rigid Truck / Bogie	105	5	100		
22c	CCTV Services Backfill & Compact	Hand Tools	90	5	85	108	115
		5t Excavator with Bucket	95	5	90		
		2t Tipper Truck	105	5	100		
		Plate Compactor	109	5	104		
		Jumping Jack	109	5	104		

Note: Sources marked with an asterisk (e.g. concrete saws, grinders, hydraulic hammers, vibratory rollers) can emit noise with special audible (annoying) characteristics. In accordance with the ICNG and the CNVS, predicted noise levels for these stages incur a +5 dB penalty to for account for the additional annoyance that could arise. This penalty has been applied to the predicted levels. The activity sound power levels for each stage take account of the potential for the coinciding use of plant items – where certain plant items would operate at the same time adjustments have been calculated.
Activity 20 – Compound – The compound would support the out-of-hours works on Station Street and is assumed to operate at any time during standard hours and during the out-of-hours periods.
Activity 21a – Saw cutting – This activity would be restricted to the evening period (prior to 10.00pm). The saw cutting would be undertaken at the start of each shift and the activity would be completed within approximately 30 mins or less.
Activities 21b and 21c – Excavate, Backfill and Pavement Reconstruction – These activities would be undertaken during the night period.
Activities 21d – Asphalting (milling and re-sheeting) activities would be undertaken during the night period.
Activity 22a – Saw cutting and/or small hydraulic hammer use has been included for contingency (it is likely these may not be required). If required these activities would be restricted to the evening period (prior to 10.00pm). These activities would be undertaken at the start of each shift and would be completed within approximately 30 mins or less, if required.
Activities 22b, 22c – CCTV Services (Excavate, Backfill & Compact would be undertaken during the night period.

Construction Noise Modelling

Construction noise emissions from the works have been modelled using the SoundPLAN (Version 8-2) environmental noise prediction software. This program is used and recognised internationally and

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is also recognised by NSW regulatory authorities as a preferred computer noise model. Factors that are addressed in the noise modelling are:

- Construction equipment sound power levels;
- Location of construction equipment;
- Screening from existing structures;
- Receiver locations, including multiple storey receivers;
- Ground topography;
- Noise attenuation due to geometric spreading;
- Ground absorption; and
- Atmospheric absorption.

Construction Noise Predictions

The predicted worst-case construction noise levels at the identified representative receivers for the modelled construction activities are set out in a series of tables in **Appendix B**. Additionally, the Additional Mitigation Measures that are required to be considered by the CNVS are identified in **Appendix B**.

A series of predicted noise contours is provided in **Appendix C**.

The predictions represent the typical-worst case noise levels that may be expected to arise at the external facades of the receiver buildings. It should be noted that construction noise levels would frequently be lower than the worst-case levels considered for significant periods of time. This would be apparent as works move around the work areas and are therefore more distant/more shielded from receivers and when less noisy activities are being undertaken.

The results show the airborne noise NLMs have potential to be exceeded at various localities and times depending on the works schedule. Given the likelihood of exceedances, the Sydney Metro standard mitigation measures will be applied throughout all of the identified work stages and the Additional Mitigation Measures (AMMs) will be considered at the locations indicated.

Highly Noise Affected Receivers

The modelling indicates the potential for some relatively high noise levels during the works. The highest levels and greatest impacts are anticipated at the closest receivers to the night works, principally on Station Street. These receivers may be expected to be highly noise affected at times during the works, that is, noise levels may be expected to exceed the NML by > 20 dB externally to these receivers.

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During the development of the DNVIS Ward has consulted with the most potentially affected receivers and will continue to consult with the community during the works and consider any community feedback during the works scheduling.

Details of the focussed community consultation undertaken is provided in a Community Consultation report (provided in Appendix H of the DNVIS**)**. Notably, the community consultation report has identified very few community concerns have been raised by the local residents consulted.

The report has, however, identified two concerns as follows:

- One resident at Unit 12, 3-5 Nariel Street raised concerns over noise interfering with a baby's sleep. Ward's community engagement consultants will undertake regular follow ups with this resident, prior to and during works that may result in high noise levels at the property and will consider the resident's feedback during programming.

- One resident at Unit 2/2 Station St has reported hearing issues (finds sharp and loud noises distressing). Ward's community engagement consultants will undertake regular follow ups with this resident, prior to and during works that may result in high noise levels at the property and will consider the resident's feedback during programming. Additionally, an offer to provide noise-cancelling /white noise earphones to the resident will be made if required.

Additionally, the community consultation has identified that the potentially most affected receivers are understanding with respect to the potential for increased noise levels during the works. It identifies that almost all receivers consulted accepted that construction was taking place and did not object to nightworks, understanding that the works are necessary.

As permissible under Condition 39, highly noise intensive work that results in an exceedance of the applicable NML at the same receiver must be approved in accordance with the Out-of-Hours Works Protocol required by Condition E42.

Receiver Consultation in Accordance with E57

In accordance with Conditions E57, in order to undertake out-of-hours work outside the work hours specified under Condition E38, appropriate respite periods for the out-of-hours work must be identified in consultation with the community at each affected location on a regular basis.

As identified above, Ward has undertaken consultation with the potentially most impacted receivers. This consultation has included provision of the following information regarding the works:

- schedule for periods of likely out-of-hours work;

- description of the potential work, location and duration of the out-of-hours work;

- the noise characteristics and likely noise levels of the work; and

- mitigation and management measures that will be implemented to minimise noise impacts.

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The Community Consultation report has identified very few community concerns regarding noise and in accordance with E57, Ward will consider the outcomes of the community consultation during scheduling.

Ward has and will continue to consult with highly impacted residential receivers on Station Street and will also consult with the receivers that may be impacted by levels predicted to trigger RO, as indicated in **Appendix B**.

Notably, consultation to negotiate suitable respite requirements to minimise any potential noise impacts to residents has been undertaken with:

- 1-3 Station Street / 3 Lethbridge Street
- 1-6 Chesham Street
- 34-36 Phillip Street
- St Mary's Hotel residents

Ward will consult with these potentially affected receivers and consider any community feedback during the works scheduling.

The outcomes of this community consultation including any identified respite periods will be provided to the ER, EPA and the Planning Secretary prior to the out-of-hours work commencing.

All potentially affected receivers, as previously identified by the TBI DNVIS will be provided with regular letterbox drop notifications regarding the works, as required by the CNVS.

CNVS Additional Mitigation Measures – Respite Offer and Alternative Accommodation

The highlighted Additional Mitigation Measure (AMM) triggers shown in tables set out in **Appendix B** are based on the exceedance of the $L_{Aeq,15min}$ NMLs. The tables identify some AMM triggers of Respite Offer (RO) and Alternative Accommodation (AA).

Whilst the noise levels identified in **Appendix B** are representative of the typical worst case noise levels that may be expected to arise during the works, it is noted that given the scheduling of the works there is potential for the most exposed receivers to be impacted over several consecutive evenings and nights.

Modelling indicates the potential for AA triggers when the night works are undertaken within the easternmost 120 m of the Station Street works areas. **Figure 6-1** indicates the residential receiver buildings affected, these are located at 1 Station Street / 3 Lethbridge Street, 2 Station Street and 3 Station Street.

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Figure 6-1 Residential Buildings where Alternative Accommodation (AA) Trigger Levels Predicted during Night Works

Ward will consult with these receivers to determine any AA requirements on a case-by-case basis and will consider their feedback regarding the works scheduling.

It is not currently proposed to provide AA from the outset; instead a consultative approach would be taken and residents will be informed of the potential for relatively high noise levels to arise during the evening and night for a number of consecutive evenings. AA would then be considered in the event of repeated complaints or non-compliances.

Noise Monitoring

Noise monitoring would be undertaken during the works at the most affected monitoring locations nominated by the DNVIS, based on on-site subjective evaluation.

The results of the noise monitoring at the identified locations would be reviewed as the works proceed and would be compared against the NML. Where necessary the results would be used to inform the construction team of any notable exceedances, over the levels set out in **Appendix B** and would be used to identify any recommended modifications to work methods or to identify the requirements for additional specific amelioration measures.

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Sleep Disturbance

Maximum noise level events from construction activities during the night-time period can trigger both awakenings and disturbance to sleep stages. The CNVS approach to managing events that cause sleep disturbance is consistent with the Noise Policy for Industry (EPA, 2017). A detailed maximum noise level event assessment is to be undertaken where night-time noise levels at a residential location exceed the:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, or the
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.

The CNVS notes the maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response. The detailed assessment will consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels for night-time activities.

To assess the likelihood of sleep disturbance, **Table B-11** (**Appendix B**) sets out the predicted maximum noise levels for each stage and identifies where exceedances may occur during works undertaken in the night period.

It is noted that the CNVS AMMs are based on the degree to which the $L_{Aeq,15min}$ level exceeds the RBL and not the L_{Amax} level. The AMMs based on the $L_{Aeq,15min}$ assessment would be expected to adequately address potential sleep disturbance impacts.

As discussed, this DNVIS considers the external screening level of L_{AFmax} 52 dBA in accordance with the CNVS and additionally considers the external noise criterion of L_{AFmax} 65 dBA referenced by the RNP.

During the out of hours night works on Station Street, the greatest potential sleep disturbance impacts may be expected to occur at R26 (3 Station Street), R27 (1 Station Street) and R28 1A Chesham Street. However, with windows closed, internal noise levels would not be expected to exceed the internal noise levels identified by the RNP at these locations.

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7. GROUNDBORNE CONSTRUCTION NOISE & VIBRATION

Construction Vibration Criteria

The effects of vibration in buildings can be divided into three main categories; those in which the occupants or users of the building are inconvenienced or possibly disturbed (human comfort), those where the building contents may be affected (effects on building contents) and those in which the integrity of the building or the structure itself may be prejudiced (structural damage).

Human Comfort

The DECCW's "*Assessing Vibration: a technical guideline*" (AVTG) dated February 2006 (DEC, 2006) recommends the use of BS 6472-1992 for the purpose of assessing vibration in relation to human comfort.

British Standard 6472-1992 "*Guide to evaluation of human exposure to vibration in building*" nominates guideline values for various categories of disturbance, the most stringent of which are the levels of building vibration associated with a "low probability of adverse comment" from occupants.

BS 6472-1992 provides guideline values for continuous, transient and intermittent events that are based on a Vibration Dose Value (VDV), rather than a continuous vibration level. The vibration dose value is dependent upon the level and duration of the short-term vibration event, as well as the number of events occurring during the daytime or night-time period.

The vibration dose values recommended in BS 6472-1992 for which various levels of adverse comment from occupants may be expected are presented in **Table 7 -1** (based on CNVS Table 4).

Table 7-1 Vibration Dose Values re Expected Adverse Comment in Residential Buildings

Place and Time	Low Probability of Adverse Comment ($m/s^{1.75}$)	Adverse Comment Possible ($m/s^{1.75}$)	Adverse Comment Probable ($m/s^{1.75}$)
Residential buildings 16 hr day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8 hr night	0.13	0.26	0.51

With respect to VDV, ACA notes that there can be practical difficulties in the prediction and measurement of this parameter, particularly given the limited available measured data. ACA considers the Peak Particle Velocity (PPV) levels as recognised by AVTG is an acceptable substitution (as per table C1.1 of the AVTG – i.e. Residential Daytime: 0.28 to 0.56 mm/s PPV; Residential Night: 0.2 to 0.4 mm/s PPV; Commercial: 0.56 to 1.1 mm/s PPV).

This is a common approach in the industry and allows alignment with structural damage vibration guide values and provides an opportunity for the same vibration equipment to measure for comfort and damage.

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Effects on Building Contents

People can perceive floor vibration at levels well below those likely to cause damage to building contents or affect the operation of typical equipment found in most buildings that is not particularly vibration sensitive.

For most receivers, the controlling vibration criterion is the human comfort criterion, and it is therefore not normally required to set separate criteria in relation to the effect of construction vibration on typical building contents.

Where appropriate, objectives for the satisfactory operation of vibration sensitive critical instruments or manufacturing processes should be sourced from manufacturer's data and/or other published objectives.

Structural Damage

Most commonly specified 'safe' structural vibration limits are designed to minimise the risk of threshold or cosmetic surface cracks and are set well below the levels that have potential to cause damage to the main structure.

There are currently no Australian Standards or guidelines to provide guidance on assessing the potential for building damage from vibration. It is common practice to derive goal levels from international standards. British Standard BS7385:1993 and German Standard DIN4150:1999 both provide goal levels, below which vibration is considered insufficient to cause building damage.

It is noted that the CNVS references the British Standard BS7385:1993, however, the Conditions of Approval also specifies German Standard *DIN 4150-3: Structural vibration – Effects of vibration on structures* (DIN 4150). Of these, DIN4150 is the more stringent and has therefore been considered by this DNVIS.

Table 7-2 summarises the recommended limits outlined in DIN 4150 to ensure minimal risk of cosmetic damage to residential and industrial buildings. Achieving the DIN 4150 vibration levels would also result in compliance with the British Standard BS7385:1993.

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Table 7-2 Recommended Vibration Limits for Minimal Risk of Cosmetic Damage

Type of Building	Guideline Values for Velocity, vi, in mm/s Vibration at the Foundation at a Frequency of			Plane of Floor of Uppermost Storey
	1 Hz to 10 Hz	10 Hz to 50Hz	50 Hz to 100 Hz	Frequency Mixture
Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20 - 40	40 - 50	40
Dwellings and buildings of similar design and/or occupancy	5	5 - 15	15 - 20	15
Structures that, because of their particular sensitivity to vibration, cannot be classified and are of great intrinsic value (e.g. listed buildings under preservation order)	3	3 - 8	8 - 10	8

On this basis, conservative general vibration screening levels (Peak Particle Velocity (PPV)) are provided for intermittent vibration sources as follows:

- reinforced or framed structures: 20 mm/s
- unreinforced or light framed structures 5 mm/s.

At locations where the predicted and/or measured vibration levels are greater than shown above, monitoring should be performed during construction. A more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure would also be performed to determine the applicable safe vibration level.

Additionally, Condition E84 requires that before commencement of construction, all buildings identified as being at risk of damage must be inspected and a building condition survey undertaken by a suitably qualified and experienced person.

Due to the current difficulties in conducting internal building inspections due to Covid-19 restrictions, Ward generally proposes to minimise any building inspection requirements by minimising the potential for cosmetic damage effects by selection of low vibration plant.

Guidelines for Heritage Structures

Heritage buildings and structures would be assessed as per the screening criteria as they should not be assumed to be more sensitive to vibration unless they are found to be structurally unsound. If a heritage building or structure is found to be structurally unsound (following inspection) the more conservative cosmetic damage criteria of 2.5 mm/s peak component particle velocity (from DIN 4150) would be considered.

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Table 7-3 outlines the heritage listed items within the vicinity of the project, none of which have been assessed as being structurally unsound.

Table 7-3 Heritage Items

Heritage Item / Location	Register Listings	Significance	Location
St Marys Railway Station	State Heritage Register and State Rail S170 register under the Heritage Act	State	North of Site
St Marys Railway Station Parcel Office	Penrith City Council LEP (01249)	Local	North of Site

Guidelines for Sensitive Scientific & Medical Equipment

Some scientific equipment (e.g. electron microscopes and microelectronics manufacturing equipment) can require more stringent objectives than those applicable to human comfort.

Where it has been identified that vibration sensitive scientific and/or medical instruments are likely to be in use inside the premises of an identified vibration sensitive receiver, objectives for the satisfactory operation of the instrument would be sourced from manufacturer's data.

Where manufacturer's data is not available, generic vibration criterion (VC) curves as published by the Society of Photo-Optical Instrumentation Engineers (Colin G. Gordon - 28 September 1999) may be adopted as vibration goals. These generic VC curves are presented in Table 6 and Figure 3 of the CNVS.

The land use survey undertaken by ward has not identified any uses that may be expected to include sensitive scientific or medical equipment.

Other Vibration Sensitive Structures & Utilities

Where structures and utilities are encountered which may be considered to be particularly sensitive to vibration, a vibration goal which is more stringent than structural damage goals may need to be adopted. Examples of such structures and utilities include:

- Tunnels
- Gas pipelines
- Fibre optic cables

Specific vibration goals would be determined on a case-by-case basis with the structure or utility's owner in order to determine acceptable vibration levels.

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In lieu of specific vibration criteria being provided by the asset owner, screening criteria would be adopted from guidance provided in DIN 4150-3 for buried pipework. The screening criteria are outlined in **Table 7-4**.

Table 7-4 Guideline Values for Vibration Velocity to be used when Evaluating the Effects of Vibration on Buried Pipework

Pipe Material	Guideline Values for Velocity Measured on the Pipe, vi, in mm/s
Steel (including welded pipes)	100
Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80
Masonry, plastic	50

CNVS Additional Mitigation Measures – Groundborne Construction Vibration

In addition to the vibration criteria discussed above, the CNVS requires the consideration of Additional Mitigation Measures, in the case of appreciable levels of vibration occurring at sensitive receivers.

Table 7-7 (based on Table 17 of the CNVS) sets out the Additional Mitigation Measures (AMMs) to be applied in the case of exceedances of the groundborne vibration management levels.

Table 7-5 Additional Mitigation Measures - Ground-Borne Vibration

Time Period		Mitigation Measures: Predicted Vibration Levels Exceed Maximum Levels
Standard Hours	Mon-Fri (7.00am - 6.00pm)	LB, M, RO
	Sat (8.00am - 1.00pm)	
	Sun/Pub Hol (Nil)	
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm)	LB, M, IB, PC, RO, SN
	Sat (1.00pm - 10.00pm)	
	Sun/Pub Hol (8.00am - 6.00pm)	
OOH (Night)	Mon-Fri (10.00pm - 7.00am)	LB, M, IB, PC, RO, SN, AA
	Sat (10.00pm - 8.00am)	
	Sun/Pub Hol (6.00pm - 7.00am)	

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020). The 'maximum' vibration value is taken as the 'Maximum Peak Velocity (mm/s)' value identified in Table C1.1 in the Assessing Vibration: A technical guideline (DEC 2006).

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ICNG Groundborne Construction Noise Criteria

Groundborne (regenerated) noise is noise generated by vibration transmitted through the ground into a structure. Groundborne noise caused, for example by underground works such as tunnelling, can be more noticeable than airborne noise. The following groundborne noise levels for residences are nominated in the ICNG and indicate when management actions would be implemented. These levels recognise the temporary nature of construction and are only applicable when groundborne noise levels are higher than airborne noise levels.

The groundborne noise management levels considered by this assessment are shown in **Table 7-6**.

Table 7-6 Ground-Borne Noise Management Levels

Receiver Type	Standard Hours (Day)	OOHW (Day)	OOHW (Evening)	OOHW (Night)
	$L_{Aeq,15min}$ dBA	$L_{Aeq,15min}$ dBA	$L_{Aeq,15min}$ dBA	$L_{Aeq,15min}$ dBA
Residential	45	40	40	35
Commercial	50 when in use			
Childcare	40 when in use			
School	45 when in use			

Note: The Groundborne Noise Management Levels for non-residential uses only apply when the building is in use.

The daytime criteria are applicable to both residential and commercial receivers, whereas the evening and night-time criteria are only applicable to residential receivers. The Groundborne Noise Management Levels for non-residential uses only apply when the receiver building is in use.

The internal noise levels are to be assessed at the centre of the most-affected habitable room.

With respect to groundborne noise, Condition E44 requires the following:

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 $L_{Aeq(15\ minute)}$: 40 dB(A); and

(b) night (10:00 pm to 7:00 am) — internal $L_{Aeq(15\ minute)}$: 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 E42.

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CNVS Additional Mitigation Measures – Groundborne Construction Noise

Table 7-7 (based on Table 15 of the CNVS) sets out the AAMs to be applied in the case of exceedances of the groundborne noise management levels.

Table 7-7 Additional Groundborne Noise Management Measures (Residential)

Time Period		Mitigation Measures			
		Predicted $L_{Aeq,15min}$ Noise Level Above NML			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard Hours	Mon-Fri (7.00am - 6.00pm) Sat (8.00am - 1.00pm) Sun/Pub Hol (Nil)	LB	LB, M	LB, M, SN	LB, M, SN
OOH (Evening)	Mon-Fri (6.00pm - 10.00pm) Sat (1.00pm - 10.00pm) Sun/Pub Hol (8.00am - 6.00pm)	LB, M	LB, M, SN	LB, M, SN, RO	LB, M, SN, IB, PC, RO, SN
OOH (Night)	Mon-Fri (10.00pm - 7.00am) Sat (10.00pm - 8.00am) Sun/Pub Hol (6.00pm - 7.00am)	LB, M	LB, M, SN, RO	LB, M, SN, IB, PC, RO, AA	LB, M, SN, IB, PC, RO, SN, AA

Notes: AA – Alternative Accommodation; M – Monitoring; IB – Individual Briefings; LB – Letterbox drops; RO – Project Specific Respite Offer; PC – Phone Calls and emails; SN – Specific Notifications. Full definitions of these Additional Mitigation Measures are set out in Table 15 of the Sydney Metro Western Sydney Airport Construction Noise & Vibration Standard (Ver 4.2, 08/09/2020).

Groundborne Construction Noise & Vibration Assessment

Certain construction activities require the use of vibration intensive equipment that have potential to adversely impact the closest sensitive receivers.

With respect to groundborne noise, ACA notes that for the proposed surface works airborne noise levels would dominate over groundborne noise. It is considered that management of airborne noise impacts in addition to management of vibration impacts would satisfactorily manage any groundborne noise effects. Accordingly, this assessment does not consider groundborne noise effects any further.

Minimum working distances to sensitive receivers for cosmetic building damage and human response have been identified for vibration generating plant that may be used during the works. If equipment operates closer to a sensitive receiver, vibration from construction works may potentially exceed the vibration guidelines. It should be noted, however, the minimum working distances are conservative and indicative. Actual distances may be expected to vary depending on the activity/operator, equipment particularities, local ground conditions and receiver conditions (e.g. building footings).

Notwithstanding this, Ward has selected plant and works methods to, as far as practicable, minimise any potential vibration (and noise) effects during the night. In particular, only static (non-vibratory)

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rollers would be used. Out of hours compaction works would be undertaken with less vibration intensive plate compactors and jumping jacks, in lieu of vibratory rollers.

Additionally, hydraulic hammering would be minimised. Some provision has been made for some limited use (for contingency) of a small hydraulic hammer during the CCTV works, but this would only be used prior to 10.00pm if required and whilst observing all safe working distances from structures.

Table 7-8 shows the vibration generating plant that would be used and the associated minimum working distances. The hammer setback distances are noted to be generally consistent with consistent with those recognised by TfNSW. The TfNSW guidelines do not include reference distances for plate compactors or jumping jacks. The distances identified for these items are based on measurements undertaken by the University of Western Australia which are consistent with ACA's experience.

Vibration monitoring trials would be undertaken on site at the commencement of the works to confirm vibration levels and safe working distances for all vibration generating equipment.

Table 7-8 Recommended Minimum Working Distances for Vibration Intensive Equipment

Plant Item	Minimum Distance – Cosmetic Damage (BS 7385)	Cosmetic Damage (DIN 4150) Heritage and other Sensitive Structures	Minimum Distance – Human Response (OE&H Vibration Guideline)
5t Excavator with Small (300kg) Hydraulic Hammer	2	5	7
60kg Plate Compactor	2	4	7
Jumping Jack	2	4	7
Jackhammer	1 m (nominal)	4	3

Note 1: Hydraulic hammer & vibratory roller distances are consistent with the TfNSW Construction Noise and Vibration Strategy (V 4.1).
Note 2: Plate compactor distances are based on measurements undertaken by University of Western Australia.

Hydraulic Hammers

During the service installation works on Station Street if the 5-tonne excavator with small hydraulic hammer is used, a setback distance of >20 m would be maintained from the St Marys Railway Station Parcel Office (Heritage Receiver). At this distance vibration levels from a small hydraulic hammer are predicted to not exceed 1 mm/s PPV. Therefore, no material risk of exceedance of the screening criteria for cosmetic building damage for commercial or heritage receivers is predicted for the identified hydraulic hammering works.

Additionally, it is considered there would be no material risk of human comfort vibration exceedances from the identified potential hammering works.

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Compaction Works

For the compaction works requiring plate compactors or jumping jacks, safe working distances with respect to cosmetic building damage and human comfort will be maintained and there would be no material risk of exceedances of the identified vibration screening criteria.

CNVS Additional Mitigation Measures – Groundborne Noise & Vibration

Given Ward's proposed vibration controls, further specific additional mitigation measures relating to groundborne noise or vibration are not considered necessary, beyond the standard measures defined by the CNVS. Application of the standard measures (outlined in **Section 9**) in addition to the controls discussed above would be expected to be sufficient to ensure vibration effects on the occupants of nearby buildings are satisfactorily managed.

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8. CONSTRUCTION ROAD TRAFFIC NOISE

Construction Road Traffic Noise Guidelines

Criteria for off-site road traffic noise applicable to existing residences affected by additional traffic on existing local roads generated by land use developments are specified in the NSW Road Noise Policy (RNP). Whilst these criteria do not specifically apply to construction traffic movements, they have been conservatively considered and are summarised in **Table 8-1**.

Table 8-1 RNP Criteria for Road Traffic Noise

Type of Development	Daytime (07:00-22:00)	Night (22:00-07:00)
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq,15\ hour}$ 60 (external)	$L_{Aeq,9\ hour}$ 55 (external)
Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq,1\ hour}$ 55 (external)	$L_{Aeq,1\ hour}$ 50 (external)

Note: The identified criteria do not apply to vehicle movements within the Project Site. For the purpose of assessment, any noise generated by on-site vehicle movements is considered as construction noise and assessed holistically with on-site mobile plant in accordance with the ICNG.

As required by the RNP, an initial screening test should first be applied by evaluating whether noise levels would increase by more than 2 dB (an increase in the number vehicles of approximately 60%) due to construction traffic or a temporary reroute due to a road closure.

Where noise levels increase by more than 2 dB further assessment is required using the criteria presented in the RNP, as shown in **Table 8-1**. A 2 dB increase is typically considered not noticeable.

Construction Road Traffic Assessment

Ward estimates that a maximum of 10 heavy vehicle movements per hour would be required during the peak construction phase.

Considering the existing volume of traffic on the adjacent roads, the noise impact generated by construction delivery vehicles arriving and leaving the site would be expected to result in an increase in road traffic noise levels of significantly less than 2 dB which is in compliance with the established criteria.

On this basis, no material construction traffic noise impacts are expected.

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9. CONSTRUCTION NOISE & VIBRATION MITIGATION MEASURES

CNVS Additional Mitigation Measures

The CNVS sets out standard construction noise and vibration mitigation measures to be implemented on all Sydney Metro projects by default in order to minimise the potential noise and vibration impacts at the surrounding Noise Sensitive Receivers. These will be implemented by Ward where feasible and reasonable and are summarised in **Table 9-1**. A summary of roles and responsibilities is provided in **Table 9-2**.

Table 9-1 Standard Mitigation Measures to Reduce Construction Noise and Vibration

Action Required	Applies To	Details
Management Measures		
Implementation of any project specific mitigation measures required	Airborne noise Ground-borne noise and vibration	In addition to the measures set out in this table, any project specific mitigation measures identified in the environmental assessment documentation (e.g. EA, REF, submissions or representations report) or approval or licence conditions must be implemented.
Implement community consultation measures	Airborne noise Ground-borne noise and vibration	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
Site Inductions	Airborne noise Ground-borne noise and vibration	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

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Behavioural practices	Airborne noise	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.
Monitoring	Airborne noise Ground-borne noise and vibration	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	Ground-borne vibration	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.
Source Controls		
Construction hours and scheduling	Airborne noise Ground-borne noise and vibration	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.
Construction respite period	Ground-borne noise and vibration Airborne noise	High noise and vibration generating activities[2] may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block3.
Equipment selection	Airborne noise Ground-borne noise and vibration	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.
Maximum noise levels	Airborne-noise	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	Airborne-noise	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).

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Plan worksites and activities to minimise noise and vibration	Airborne noise Ground-borne vibration	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Non-tonal reversing alarms	Airborne noise	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	Airborne-noise	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	Airborne-noise	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	Airborne-noise	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.

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Table 9-2 Roles and Responsibilities

Role	Definition and Responsibilities
Project Environment Manager	• Oversee the implementation of all noise and vibration management initiatives including coordinating responses to noise and vibration complaints. • Manage review and continual improvement of the DNVIS/CNVMP. • Ensure that sufficient resources are allocated for the implementation of the DNVIS/CNVMP. • Consider and advise senior management on compliance obligations regarding noise and vibration. • Ensure that the outcomes of compliance monitoring / incident reporting are systematically evaluated as part of ongoing management of construction activities. • Ensure all appropriate noise and vibration mitigation measures are implemented.
Site Supervisor	• Ensure that all requirements of the DNVIS/CNVMP are effectively implemented. • Ensure all appropriate noise and vibration mitigation measures are implemented.
EHS Coordinators	• Assist the Project Environment Manager and Construction Managers in implementing the DNVIS/CNVMP. • Oversee noise and vibration training including inductions, toolbox talks and specific technical training on monitoring equipment. • Ensure all appropriate noise and vibration mitigation measures are implemented. • Monitoring and reporting on compliance.
Site Engineers	• Assist the Construction Manager in implementing the DNVIS/CNVMP.
Project Noise and Vibration Consultant	• Provide Ward with specialist noise and vibration input and advice including development of the CNVMP, DNVIS and discussions regarding progressive construction works. • Undertaking noise and vibration monitoring when required. • Assisting in community consultation when required.
Construction Manager	• Manage the delivery of the construction process, in relation to noise and vibration management across the site together with the Environment Manager. • Ensure that all requirements of the DNVIS/CNVMP are effectively implemented, including all subcontractors
Stakeholder and Community Relations Manager	• Manage notifications and consultation for noise and vibration and liaise with the Environment Manager about management of noise and vibration complaints. • Assist in coordinating responses to noise and vibration complaints.

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CNVS Additional Mitigation Measures

Based on the predictions, all reasonable and feasible mitigation measures to minimise noise and vibration from construction will be implemented. This includes the Standard Mitigation Measures (SMM) set out in **Table 9-1** and the Additional Mitigation Measures (AMM) required by the CNVS, as set out in **Section 5** and **Appendix B**.

Construction Noise & Vibration Monitoring Program

Conditions C13 - C15 specify in detail requirements for monitoring. These matters are addressed in the Construction Noise & Vibration Monitoring Program provided in the TBI Early Works DNVIS.

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10. NOISE IMPACT SUBJECTIVE CLASSIFICATION

The out of hours works on Station Street, may be expected to result in residential NML exceedances at times >20dB at the closest receivers on Station Street. However, the construction noise levels would naturally fluctuate during the works being undertaken and for most of the time the levels would be significantly lower than reported.

At these receivers predicted maximum construction noise levels may also exceed the sleep disturbance levels. To mitigate the potential impacts, the use of concrete saws will be limited to prior to 10.00pm. Additionally, the standard and additional mitigation measures identified by this DNVIS will be provided.

The closest commercial receivers would also experience elevated noise levels as the works progress, however, most of the commercial receivers, with the exception of the St Marys Hotel, would not be operational during the out of hours works.

The potentially affected receivers have been consulted regarding the forthcoming works, with Ward's community engagements consultants undertaking door knocking and briefings at the most affected addresses. The community consultation report (included in Appendix H of the DNVIS) summarises the receiver notifications. This identifies that no particular notable concerns regarding noise from the early works was received from the potentially most affected local residents.

Considering the above, the proposed out-of-hours works on Station Street area are generally considered **moderate impact**.

The standard and additional mitigation measures identified by this DNVIS will be provided.

As a result of noise classification and/or the noise level exceedances at sensitive receivers provided by this DNVIS, appropriate reasonable and feasible noise mitigation is to be adopted and implemented during the works. For sites where works are predicted to significantly exceed noise goals and impact on receivers for a significant period of time, additional reasonable and feasible noise mitigation measures such as those outlined in **Appendix B** would be implemented to reduce the noise levels and impact on sensitive receivers.

The following key controls will be implemented:

- High noise works will be restricted to daytime hours as far as practicable.
- Where concrete sawing is required to be undertaken out-of-hours, this activity will be restricted to prior to 10.00pm.
- As far as practicable and safe to do so, sound curtains will be used around works sites to reduce construction noise emissions.
- Noise monitoring will be undertaken throughout the works to verify construction noise levels and inform the construction team where, if necessary, construction methods require modification to reduce noise levels.

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- Vibration monitoring will be undertaken at the commencement of work involving vibration generating equipment to confirm safe working distances and compliance with German Standard DIN4150:1999.
- Static rollers will be used in lieu of vibratory rollers on the external roads to minimise any vibration impacts.
- Periodic letterbox notifications will be provided to update local residents and business owners regarding the progress of the works.
- Community Consultation in accordance with the CNVS and the Out of Hours Works Protocol (SM-21-00306108) will be undertaken at potentially affected receivers and feedback from the receivers will be considered during scheduling of the works.

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11. CONCLUSION

Acoustics Consultants Australia (ACA) has previously prepared on behalf of Ward Civil & Engineering Pty Ltd (Ward) a Detailed Noise and Vibration Impact Statement (DNVIS) for the St Mary's Temporary Bus Interchange (TBI) Early Works, which form part of the Sydney Metro Western Sydney Airport (SMWSA) Project (SSI 10051).

Details of the DNVIS assessment are set out in ACA report 11.00323R-04.

Subsequent to the issue of the DNVIS assessment (ACA report 11.00323R-04), this addendum report has been prepared in relation to the following additional scope items:

- Operation of a materials laydown and amenities compound on Station Street.
- Civil works scope variation – for stormwater drainage and pavement works on Station Street.
- Civil works scope variation – for CCTV trench works on Station Street.

This addendum report should be read in conjunction with the main DNVIS (Report 11.00323R-04).

This addendum assessment has identified further Additional Mitigation Measures required to manage the proposed out of hours works.

During the development of the Addendum DNVIS Ward has undertaken focussed community consultation with the most potentially affected receivers and has considered their feedback. Notably, as identified by the community consultation report, no notable concerns have been raised by the local residents consulted. The community consultation has identified that the potentially most affected receivers are understanding with respect to the potential for increased noise levels during the works.

It is expected that noise and vibration impacts can be effectively managed though the adoption of the measures identified by this DNVIS.

The key conclusions are as follows:

- Construction traffic noise is expected to be no more than 2 dB above current traffic noise levels.
- With the incorporation of specific controls, construction vibration is expected to comply with human comfort values nominated in this assessment and on this basis the risk of building damage (even cosmetic) is negligible to all building structures including heritage.
- Given Ward's proposed vibration controls, no specific additional mitigation measures relating to groundborne noise or vibration are considered necessary, beyond the standard measures defined by the CNVS. Application of the measures outlined by this DNVIS would be expected to be sufficient to ensure vibration effects on the occupants of nearby buildings are satisfactorily managed.

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- Airborne noise levels may be expected to exceed criteria at times at several receivers. These exceedances may be effectively managed through a combination of standard mitigation measures and additional mitigation measures required by the CNVS, principally through letterbox notifications, and verification monitoring. The following key controls will be implemented:

    - High noise works will be restricted to daytime hours as far as practicable.
    - Where concrete sawing is required to be undertaken out-of-hours, this activity will be restricted to prior to 10.00pm.
    - As far as practicable and safe to do so, sound curtains will be used around works sites to reduce construction noise emissions.
    - Noise monitoring will be undertaken throughout the works to verify construction noise levels and inform the construction team where, if necessary, construction methods require modification to reduce noise levels.
    - Vibration monitoring will be undertaken at the commencement of work involving vibration generating equipment to confirm safe working distances and compliance with German Standard DIN4150:1999.
    - Static rollers will be used in lieu of vibratory rollers on the external roads to minimise any vibration impacts.
    - Periodic letterbox notifications will be provided to update local residents and business owners regarding the progress of the works
    - Community Consultation in accordance with the CNVS and the Out of Hours Works Protocol (SM-21-00306108) will be undertaken at potentially affected receivers and feedback from the receivers will be considered during scheduling of the works.

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APPENDIX A: Glossary of Noise & Vibration Terms

1 Sound Level (or Noise Level)

Sound may be defined as any pressure variation that the human ear can detect. The human ear responds to a wide range of changes in sound pressure. As the greatest sound pressures to which the human ear responds are 10,000,000 times greater than the lowest, the decibel (dB) scale, by the use of logarithms is used to express sound pressure levels more conveniently.

The standard reference sound pressure used to define a Sound Pressure Level is 2×10^{-5} Pascals (Pa).

The decibel is defined as ten times the logarithmic ratio of two pressures. The smallest perceptible change is approximately 1 dB.

Sound Pressure Level is typically abbreviated as SPL, L_P, or L.

2 "A" Weighted Sound Pressure Level

The most common frequency rating is 'A-Weighting'. The A-weighting frequency response curve is designed to approximate the sensitivity of the human ear. The symbol L_A represents A-weighted Sound Pressure Level - The overall broadband level of a sound/noise is typically expressed as a dB(A) level.

Human hearing is most sensitive mid frequencies sounds (500 Hz to 4000 Hz), and less sensitive at higher and lower frequencies. Therefore, the level expressed in dB(A) correlates strongly with the perceived loudness of the sound/noise.

A change in sound pressure level of 1-2 dB is barely noticeable to most people, whilst a 3-5 dB change is perceived as a small but noticeable change in loudness. A 10 dB change is perceived as an approximate doubling or halving in loudness. The table below present the sound pressure levels of some common sources.

Sound Pressure Level dB(A)	Noise Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely loud
110	Grinding on steel	
100	Loud car horn at 3 m	Very loud
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

In addition to A-weighting, other less commonly applied frequency weightings include B, C and D weightings. Unweighted or Linear levels are sound levels measured without any weighting. These are expressed as simply dB, or dB(lin) or dB(Z).

3 Sound Power Level

The rate at which a noise source emits acoustic energy is defined by its Sound Power Level. Sound Power Levels are also expressed in decibel units (dB or dB(A)). Sound Power is typically identified as SWL or LW. The standard reference sound power used to define a Sound Power Level is 1×10^{-12} Watts (W).

4 Statistical Noise Levels

Environmental noise levels from various sources in the environment will vary in level over time. Statistical exceedance levels are typically expressed as L_{AN} levels (i.e. the A-weighted sound pressure level exceeded for N% of a specific measurement period.

The most commonly used statistical noise levels are as follows:

L_{Amax} Maximum noise level over a sample period (typically measured on fast time-weighting response).

L_{A1} Noise level exceeded for 1% of a sample period (typically 15-minute interval).

L_{A10} Noise level exceeded for 10% of a sample period (typically 15-minute interval).

L_{A90} Noise level exceeded for 90% of a sample period. This noise level is commonly used to describe the background noise level (in the absence of the source under investigation).

L_{Aeq} A-weighted equivalent noise level. This is equivalent to the steady sound level containing the same amount of acoustical energy as the time-varying sound. Often referred to as the average noise level.

ABL Assessment Background Level. This is the single figure background level representing each assessment period (day, evening and night) for each day. It is determined by calculating the lowest 10th percentile background noise level (LA90) for each period.

RBL Rating Background Level. This is the median value of the ABL values for each period (day, evening, night), determined over several days of measurements.

Common Vibration Terms

Hertz (Hz) – Units in which frequency is expressed. Synonymous with cycles per second.

Decibel – Ratios of identical quantities are expressed in decibel or dB units. The number of dB is “ratio” against some standard or reference value in terms of the base 10 logarithm of that ratio. In measuring acoustic or vibration power (as in PSD or ASD of random vibration), the number of dB = 10 Log10 (P/Po). Po, the reference level, equals 0 dB. In measuring the more common voltage-like quantities such as acceleration, the number of dB = 20 Log10 (E/Eo) Eo, the reference level, equals 0 dB.-

Displacement – A vector quantity that specifies the change of position of a body or particle with respect to a reference frame.

Velocity – A vector quantity that specifies the time derivative of displacement.

Acceleration – Acceleration is rate of change of velocity with time usually along a specified axis, usually expressed in m/s2

Peak – Extreme value of a varying quantity, measured from the zero or mean value. Also, a maximum spectral value.

Peak-to-peak value – The algebraic difference between extreme values (as D = 2X).

Duration of a shock pulse is how long it lasts. Time is usually measured between instants when the amplitude is greater than 10% of the peak value.

Amplitude – The magnitude of variation (in a changing quantity) from its zero value. Always modify it with an adjective such as **peak, RMS, average**, etc. May refer to displacement, velocity, acceleration.

Crest factor – Of an oscillating quantity. The ratio of the peak value to the r.m.s. value.

VDV – The Vibration Dose Value is the accumulation of energy measured over a given time period, proportional to the root mean quad of acceleration. This is usually measured in each of the three axes of motion. In most cases, vibration tends to be higher in the Z (vertical) axis. This is measured with units of m/s1.75.

PPV – Peak Particle Velocity is the instantaneous peak of the resultant vector sum of all three axes of motion. Results are expressed in terms of velocity normally mm/s.

Peak Acceleration – This is the peak acceleration level measured in each of the three axes of motion. In some cases, this can also be combined in a vector sum. This is measured in m/s2.

Accelerometer – A sensor or transducer or pickup for converting acceleration to an electrical signal. Two common types are piezoresistive and piezoelectric.

Charge amplifier – An amplifier which converts a charge input signal (as from an accelerometer) into an output voltage; a charge-to-voltage converter.

Geophone – A sensor or transducer or pickup for converting velocity to an electrical signal.

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APPENDIX B

Construction Noise Prediction Tables and CNVS Additional Mitigation Measures

Table B-1 $L_{Aeq,15min}$ Construction Noise Predictions for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	38	50	44	44	46	53	41	45
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	35	50	44	44	46	53	41	45
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	31	48	42	42	44	51	39	43
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	22	41	35	35	37	44	32	36
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	22	41	35	35	37	42	30	34
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	10	30	24	24	26	31	19	23
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	12	33	27	27	29	36	24	28
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	19	39	33	33	35	44	32	36
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	36	49	43	43	45	45	33	37
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	31	48	42	42	44	39	27	31
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	23	54	48	48	50	57	45	49
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	24	39	33	33	35	48	36	40
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	39	53	47	47	49	35	23	27
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	32	51	45	45	47	34	22	26
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	34	50	44	44	46	36	24	28
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	26	40	34	34	36	35	23	27
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	23	38	32	32	34	30	18	22
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	20	38	32	32	34	31	19	23
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	31	42	36	36	38	29	17	21
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	35	55	49	49	51	36	24	28
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	38	51	45	45	47	34	22	26
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	19	52	46	46	48	49	37	41
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	17	49	43	43	45	43	31	35
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	11	42	36	36	38	40	28	32
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	37	44	38	38	40	39	27	31
R26	3 Station St	Residential	37	37	36	47	42	42	41	58	76	70	70	72	58	46	50
R27	1 Station St	Residential	37	37	36	47	42	42	41	51	76	70	70	72	52	40	44
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	44	63	57	57	59	35	23	27
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	41	57	51	51	53	48	36	40
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	37	53	47	47	49	47	35	39
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	36	51	45	45	47	64	52	56

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver.

20 - Materials Laydown and Amenities Compound

21a - Service Installation - Stormwater Drainage Services - Saw Cut Asphalt (Approx 30 mins)
21b - Service Installation - Stormwater Drainage Services - Excavate & Backfill
21c - Service Installation - Stormwater Drainage Services - Pavement Works
21d - Service Installation - Stormwater Drainage Services - Asphalt Works (Mill & Resheet)

22a - CCTV Services - Lift Pavers (includes provision for Saw Cut Asphalt (Approx 30 mins))
22b - CCTV Services - Excavate
22c - CCTV Services - Backfill & Compact

Table B-2 $L_{Aeq,15min}$ Construction Noise Predictions for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c – Non-Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
C01	TBC	Commercial	-	-	-	70	70	70	70	30	65	59	59	61	69	57	61
C02	TBC	Commercial	-	-	-	70	70	70	70	38	65	59	59	61	68	56	60
C03	TBC	Commercial	-	-	-	70	70	70	70	45	67	61	61	63	62	50	54
C04	TBC	Commercial	-	-	-	70	70	70	70	46	69	63	63	65	75	63	67
C05	TBC	Commercial	-	-	-	70	70	70	70	29	70	64	64	66	70	58	62
C06	TBC	Commercial	-	-	-	70	70	70	70	35	61	55	55	57	66	54	58
C07	TBC	Commercial	-	-	-	70	70	70	70	45	65	59	59	61	77	65	69
C08	TBC	Commercial	-	-	-	70	70	70	70	32	56	50	50	52	73	61	65
C09	TBC	Commercial	-	-	-	70	70	70	70	29	50	44	44	46	67	55	59
C10#	TBC	Commercial	-	-	-	70	70	70	70	36	51	45	45	47	64	52	56
C11	TBC	Commercial	-	-	-	70	70	70	70	21	45	39	39	41	58	46	50
C12	TBC	Commercial	-	-	-	70	70	70	70	21	45	39	39	41	54	42	46
C13	TBC	Commercial	-	-	-	70	70	70	70	18	39	33	33	35	52	40	44
C14	TBC	Commercial	-	-	-	70	70	70	70	16	40	34	34	36	50	38	42
C15	TBC	Commercial	-	-	-	70	70	70	70	15	33	27	27	29	48	36	40
C16	TBC	Commercial	-	-	-	70	70	70	70	15	33	27	27	29	40	28	32
C17	TBC	Commercial	-	-	-	70	70	70	70	18	35	29	29	31	42	30	34
C18	TBC	Commercial	-	-	-	70	70	70	70	17	40	34	34	36	42	30	34
C19	TBC	Commercial	-	-	-	70	70	70	70	23	42	36	36	38	51	39	43
C20	TBC	Commercial	-	-	-	70	70	70	70	22	46	40	40	42	54	42	46
C21	TBC	Commercial	-	-	-	70	70	70	70	19	50	44	44	46	56	44	48
C22	TBC	Commercial	-	-	-	70	70	70	70	20	49	43	43	45	54	42	46
C23	TBC	Commercial	-	-	-	70	70	70	70	29	44	38	38	40	40	28	32
C24	TBC	Commercial	-	-	-	70	70	70	70	22	43	37	37	39	46	34	38
C25	TBC	Commercial	-	-	-	70	70	70	70	22	51	45	45	47	56	44	48
C26	TBC	Childcare Centre	-	-	-	60	60	-	-	55	73	67	67	69	55	43	47

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver.

20 - Materials Laydown and Amenities Compound

21a - Service Installation - Stormwater Drainage Services - Saw Cut Asphalt (Approx 30 mins)
21b - Service Installation - Stormwater Drainage Services - Excavate & Backfill
21c - Service Installation - Stormwater Drainage Services - Pavement Works
21d - Service Installation - Stormwater Drainage Services - Asphalt Works (Mill & Resheet)

22a - CCTV Services - Lift Pavers (includes provision for Saw Cut Asphalt (Approx 30 mins))
22b - CCTV Services - Excavate
22c - CCTV Services - Backfill & Compact

Table B-3 $L_{Aeq,15min}$ Construction Noise Predictions – Standard Hours NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	11	-	-	-	-	-	-	-
R27	1 Station St	Residential	37	37	36	47	42	42	41	4	-	-	-	-	-	-	-
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
C10[#]	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-

Yellow = LB

Amber = LB, M

Red = LB, M, SN

Purple = LB, M, SN

Table B-4 $L_{Aeq,15min}$ Construction Noise Predictions – Out-of-Hours Daytime NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	16	-	-	-	-	-	-	-
R27	1 Station St	Residential	37	37	36	47	42	42	41	9	-	-	-	-	-	-	-
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	2	-	-	-	-	-	-	-
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
C10#	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-

Yellow = LB, M
Amber = LN, M, SN
Red = LB, M, SN, RO
Purple = LB, M, SN, IB, PC, RO, SN

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the $L_{Aeq,15min}$ NMLs. To determine whether it is justified to provide Respite Offer measures, consideration must also be given to the duration of the works.

Table B-5 $L_{Aeq,15min}$ Construction Noise Predictions – Out-of-Hours Evening NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	8	-	-	-	11	-	-
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	8	-	-	-	11	-	-
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	6	-	-	-	9	-	-
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	2	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	2	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	7	-	-	-	3	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	6	-	-	-	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	12	-	-	-	15	-	-
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	6	-	-
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	11	-	-	-	-	-	-
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	8	-	-	-	-	-	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	0	-	-	-	-	-	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	13	-	-	-	-	-	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	9	-	-	-	-	-	-
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	10	-	-	-	7	-	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	7	-	-	-	1	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	2	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	16	34	-	-	-	16	-	-
R27	1 Station St	Residential	37	37	36	47	42	42	41	9	34	-	-	-	10	-	-
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	2	21	-	-	-	-	-	-
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	15	-	-	-	6	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	11	-	-	-	5	-	-
C10[#]	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	9	-	-	-	22	-	-

Yellow = LB, M

Amber = LN, M, SN

Red = LB, M, SN, RO

Purple = LB, M, SN, IB, PC, RO, SN

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the $L_{Aeq,15min}$ NMLs. To determine whether it is justified to provide Respite Offer measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts would occur for only one or two evenings at any one location before they are completed. Additionally, the required saw cutting would be brief (less than 30 minutes per shift) and therefore the actual duration of impact would not be prolonged at any particular receiver location. On this basis, it is considered that offers of RO would not be justified.

Table B-6 $L_{Aeq,15min}$ Construction Noise Predictions – Out-of-Hours Night NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	3	3	5	-	-	4
R02	65-67 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	3	3	5	-	-	4
R03	59 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	1	1	3	-	-	2
R04	43 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R05	41 Carinya Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R06	9 Kungala St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R07	13 Benalong St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R08	7 Waratah St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R09	17 Araluen St	Residential	37	37	36	47	42	42	41	-	-	2	2	4	-	-	-
R10	14 Nariel St	Residential	37	37	36	47	42	42	41	-	-	1	1	3	-	-	-
R11	34-36 Phillip St	Residential	37	37	36	47	42	42	41	-	-	7	7	9	-	4	8
R12	36A Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R13	30 Phillip St	Residential	37	37	36	47	42	42	41	-	-	6	6	8	-	-	-
R14	7 Lethbridge St	Residential	37	37	36	47	42	42	41	-	-	4	4	6	-	-	-
R15	16 Phillip St	Residential	37	37	36	47	42	42	41	-	-	3	3	5	-	-	-
R16	8 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R17	109 Glossop St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R18	1 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R19	9 Phillip St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R20	19A Phillip St	Residential	37	37	36	47	42	42	41	-	-	8	8	10	-	-	-
R21	29 Phillip St	Residential	37	37	36	47	42	42	41	-	-	4	4	6	-	-	-
R22	2 Gidley St	Residential	37	37	36	47	42	42	41	-	-	5	5	7	-	-	-
R23	1 Ross Pl	Residential	37	37	36	47	42	42	41	-	-	2	2	4	-	-	-
R24	43 Little Chapel St	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R25	20 Blair Ave	Residential	37	37	36	47	42	42	41	-	-	-	-	-	-	-	-
R26	3 Station St	Residential	37	37	36	47	42	42	41	17	-	29	29	31	-	5	9
R27	1 Station St	Residential	37	37	36	47	42	42	41	10	-	29	29	31	-	-	3
R28	1A Chesham St	Residential	37	37	36	47	42	42	41	3	-	16	16	18	-	-	-
R29	6 Chesham St	Residential	37	37	36	47	42	42	41	-	-	10	10	12	-	-	-
R30	10A Chesham St	Residential	37	37	36	47	42	42	41	-	-	6	6	8	-	-	-
C10[#]	St Mary's Hotel	Residential	37	37	36	47	42	42	41	-	-	3	3	5	-	-	4

Yellow = LB, M

Amber = LN, M, SN, RO

Red = LB, M, SN, IB, PC, RO, AA

Purple = LB, M, SN, IB, PC, RO, SN, AA

Note, the highlighted Additional Mitigation triggers are based on the exceedance of the $L_{Aeq,15min}$ NMLs. To determine whether it is justified to provide Respite Offers and Alternative Accommodation measures, consideration must also be given to the duration of the works.

Given the scheduling of the works, it would be expected that the identified impacts may occur for several consecutive nights at the impacted locations. On this basis, Ward will consult with the identified residents to determine appropriate mitigation measures, prior to the commencement of the works.

Table B-7 $L_{Aeq,15min}$ Construction Noise Predictions – Standard Hours NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Non-Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
C01	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C10#	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results.
Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB
Amber = LB, M
Red = LB, M, SN
Purple = LB, M, SN

Table B-8 $L_{Aeq,15min}$ Construction Noise Predictions – Out-of-Hours Daytime NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Non- Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
C01	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results.
Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB, M
Amber = LN, M, SN
Red = LB, M, SN, RO
Purple = LB, M, SN, IB, PC, RO, SN

Table B-9 $L_{Aeq,15min}$ Construction Noise Predictions – Out-of-Hours Evening NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Non-Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
C01	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	5	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	7	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	3	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results.
Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB, M

Amber = LN, M, SN

Red = LB, M, SN, RO

Purple = LB, M, SN, IB, PC, RO, SN

Table B-10 $L_{Aeq,15min}$ Construction Noise Predictions – Out-of-Hours Night NML Exceedances for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c & Additional Mitigation – Non-Residential

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	Standard Hours NML	OOH Day NML	OOH Eve NML	OOH Night NML	20	21a	21b	21c	21d	22a	22b	22c
C01	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C02	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C03	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C04	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C05	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C06	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C07	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C08	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C09	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C10	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C11	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C12	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C13	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C14	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C15	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C16	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C17	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C18	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C19	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C20	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C21	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C22	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C23	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C24	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C25	-	Commercial	-	-	-	70	70	70	70	-	-	-	-	-	-	-	-
C26	-	Childcare Centre	-	-	-	60	60	-	-	-	-	-	-	-	-	-	-

C10 is St Mary's Hotel, which includes a residential component on the first floor. Residential criteria are considered for the first floor for this receiver – refer to residential receiver results.
Additional Mitigation Measures are only applicable when the receiver building is in use.

Yellow = LB, M

Amber = LN, M, SN, RO

Red = LB, M, SN, IB, PC, RO, AA

Purple = LB, M, SN, IB, PC, RO, SN, AA

Table B-11 $L_{A1,1min}$ Maximum Construction Noise Predictions – Out-of-Hours Night - for Activities 20, 21a, 21b, 21c, 21d, 22a, 22b, 22c – Residential Receivers

ID	Address	Land Use / Description	RBL Day	RBL Eve	RBL Night	RBL+15 NML	NPfI	RNP	-	20	21a	21b	21c	21d	22a	22b	22c
R01	69 Carinya Ave	Residential	-	-	36	51	52	65	-	43	-	49	49	53	-	46	50
R02	65-67 Carinya Ave	Residential	-	-	36	51	52	65	-	40	-	49	49	53	-	46	50
R03	59 Carinya Ave	Residential	-	-	36	51	52	65	-	36	-	47	47	51	-	44	48
R04	43 Carinya Ave	Residential	-	-	36	51	52	65	-	27	-	40	40	44	-	37	41
R05	41 Carinya Ave	Residential	-	-	36	51	52	65	-	27	-	40	40	44	-	35	39
R06	9 Kungala St	Residential	-	-	36	51	52	65	-	15	-	29	29	33	-	24	28
R07	13 Benalong St	Residential	-	-	36	51	52	65	-	17	-	32	32	36	-	29	33
R08	7 Waratah St	Residential	-	-	36	51	52	65	-	24	-	38	38	42	-	37	41
R09	17 Araluen St	Residential	-	-	36	51	52	65	-	41	-	48	48	52	-	38	42
R10	14 Nariel St	Residential	-	-	36	51	52	65	-	36	-	47	47	51	-	32	36
R11	34-36 Phillip St	Residential	-	-	36	51	52	65	-	28	-	53	53	57	-	50	54
R12	36A Phillip St	Residential	-	-	36	51	52	65	-	29	-	38	38	42	-	41	45
R13	30 Phillip St	Residential	-	-	36	51	52	65	-	44	-	52	52	56	-	28	32
R14	7 Lethbridge St	Residential	-	-	36	51	52	65	-	37	-	50	50	54	-	27	31
R15	16 Phillip St	Residential	-	-	36	51	52	65	-	39	-	49	49	53	-	29	33
R16	8 Phillip St	Residential	-	-	36	51	52	65	-	31	-	39	39	43	-	28	32
R17	109 Glossop St	Residential	-	-	36	51	52	65	-	28	-	37	37	41	-	23	27
R18	1 Phillip St	Residential	-	-	36	51	52	65	-	25	-	37	37	41	-	24	28
R19	9 Phillip St	Residential	-	-	36	51	52	65	-	36	-	41	41	45	-	22	26
R20	19A Phillip St	Residential	-	-	36	51	52	65	-	40	-	54	54	58	-	29	33
R21	29 Phillip St	Residential	-	-	36	51	52	65	-	43	-	50	50	54	-	27	31
R22	2 Gidley St	Residential	-	-	36	51	52	65	-	24	-	51	51	55	-	42	46
R23	1 Ross Pl	Residential	-	-	36	51	52	65	-	22	-	48	48	52	-	36	40
R24	43 Little Chapel St	Residential	-	-	36	51	52	65	-	16	-	41	41	45	-	33	37
R25	20 Blair Ave	Residential	-	-	36	51	52	65	-	42	-	43	43	47	-	32	36
R26	3 Station St	Residential	-	-	36	51	52	65	-	63	-	75	75	79	-	51	55
R27	1 Station St	Residential	-	-	36	51	52	65	-	56	-	75	75	79	-	45	49
R28	1A Chesham St	Residential	-	-	36	51	52	65	-	49	-	62	62	66	-	28	32
R29	6 Chesham St	Residential	-	-	36	51	52	65	-	46	-	56	56	60	-	41	45
R30	10A Chesham St	Residential	-	-	36	51	52	65	-	42	-	52	52	56	-	40	44
C10#	St Mary's Hotel	Residential	-	-	36	51	52	65	-	41	-	50	50	54	-	57	61

The predicted $L_{A1,1min}$ levels shown are considered to be approximately equivalent to L_{Amax} levels.
The amber shaded cells indicate exceedances of L_{Amax} 52 dBA recognised by the NPfI
The red shaded cells indicate levels in excess of the L_{Amax} 65 dBA level recognised by the NSW Road Noise Policy, based on a synopsis of research on sleep disturbance and awakenings.

APPENDIX C

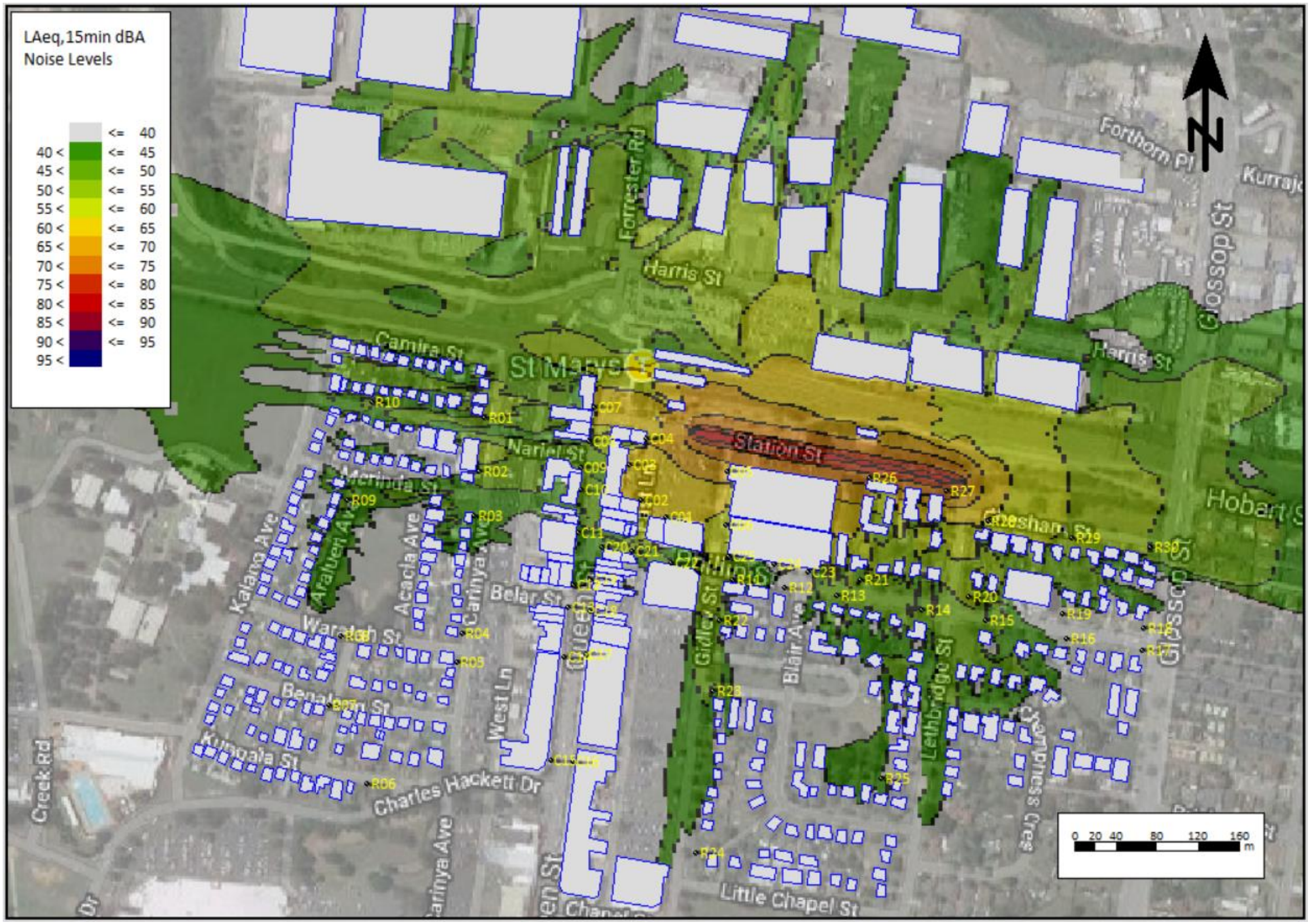
Predicted Construction Noise Contours

Noise Model Scenario 20 - Materials Laydown and Amenities Compound on Station Street

Noise Model Scenario 21b - Stormwater Drainage Works on Station Street

Noise Model Scenario 21c - Pavement Reconstruction Works on Station Street

Noise Model Scenario 21d – Asphalt Works (Mill & Resheet) on Station Street



Noise Model Scenario 22b – CCTV Installation Works on Station Street