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CPB Ghella



SYDNEY METRO - WESTERN SYDNEY AIRPORT - STATION BOXES AND TUNNELLING WORKS - DNVIS Addendum Report - St Marys (STM) TBM Retrieval Works

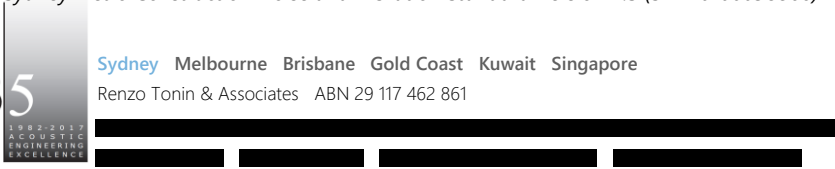
1 Introduction

This technical memorandum is an addendum to the report *Detailed Noise and Vibration Impact Statement: St Marys Station*¹ (St Marys DNVIS). This addendum has been prepared on behalf of CPB Ghella Joint Venture (CPBG) in accordance with the Sydney Metro Construction Noise and Vibration Standard (CNVS)² for the construction of the Sydney Metro: Western Sydney Airport Project – Station Boxes and Tunnelling (SBT) Works (the Project). The DNVIS and this addendum have been prepared to satisfy SSI 10051 Infrastructure Condition of Approval (CoA) E47.

This Addendum has been prepared consistent with the St Marys DNVIS to assess short duration works outside the scope of works assessed in the St Marys DNVIS. This includes additional plant and equipment, and the extension of works outside standard construction hours to include the night period. The works addressed in this Addendum DNVIS are described Section 2.1. Due to works being undertaken during and outside standard construction hours, the estimated timing for the TBM retrieval and disassembly is up to 3 months, which is less than the 4 month estimated for the completion of the works assessed in the DNVIS,

¹ *Sydney Metro – Western Sydney Airport – Station Boxes and Tunnelling Works, Detailed Noise and Vibration Impact Statement: St Marys Station, reference: TM008-02-01F01 SMWSA-SBT_DNVIS-STM, revision 6, dated 18 April 2023*

² *Sydney Metro Construction Noise and Vibration Standard Version 4.3 (SM-20-00098866) – 4 November 2020*



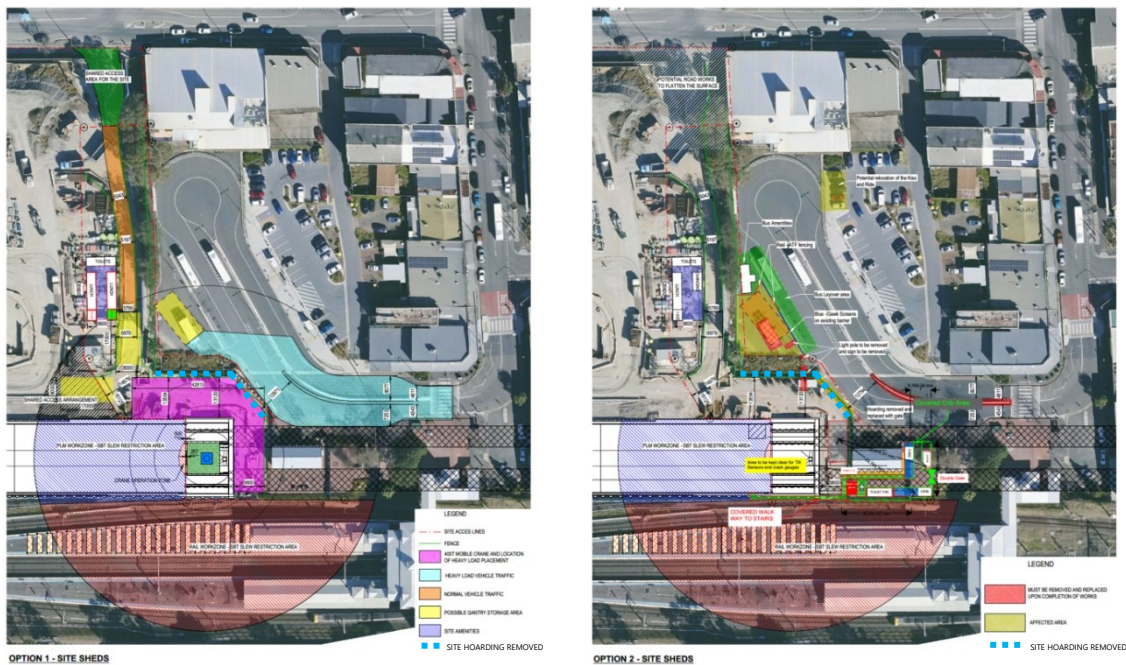
2 Construction works and hours

2.1 Construction works addressed in this Addendum DNVIS

CPBG has proposed undertaking TBM retrieval works at the St Marys Station worksite. The TBM retrieval works will involve installing a tower crane and demobilising the TBM on site. The proposed TBM retrieval works are scheduled to be undertaken during standard construction hours and outside standard construction hours. The proposed works are anticipated to be completed in 11 weeks. The TBM retrieval work areas are shown in Figure 2.1 and in APPENDIX C.

This addendum to the DNVIS has been prepared to address the potential construction noise and vibration impacts from the proposed TBM retrieval works.

Figure 2.1: St Marys TBM retrieval works



Key details regarding the location and layout of the noise generating plant that will operate during these works were informed by the Construction and Environmental Teams. Table 2-1 presents the list of plant proposed to be used for these works and their assumed sound power levels. The location of the works relative to nearby sensitive receivers is shown in APPENDIX C. A section of the 3 m construction hoarding located parallel to the station box running east from the bus interchange will be removed for the duration of the works, to allow access and space to complete the TBM retrieval works (see Figure 2.1).

2.1.1 Construction traffic noise

Based on the proposed activities presented in Table 2-1, the construction traffic is consistent with construction generated traffic noise impacts assessed in the DNVIS. No further assessment is required.

2.1.2 Ground-borne noise and vibration

Based on the proposed activities presented in Table 2-1, there are no vibration intensive activities required to complete the TBM retrieval works at the St Marys worksite. Ground-borne noise and vibration impact will be negligible. No further assessment is required.

2.2 Construction Hours

Construction hours are as reported in the DNVIS Section 2.2. The works assessed in this Addendum will be undertaken within and outside standard construction hours under the Environment Protection License (EPL) number 21672, in accordance with Planning Approval Condition E41(d).

2.2.1 Justification for OOHW

As detailed in Condition of Approval E41(d) and EPL 21672 Condition L5.10, the following prescribed activities are permitted to be undertaken 24 hours a day, 7 days a week:

- Tunnelling and ancillary support activities
- Delivery of material that is required to be delivered outside of standard construction hours

Works that require a Road Occupancy Licence (ROL), may be undertaken outside of standard construction hours should the Relevant Road Network Operator advise that carrying out the works and activities during standard construction hours would result in a high risk to road network operational performance.

The delivery of oversized plant structures or materials determined by the police or other authorised authorities to require special arrangements to transport along public roads may also occur outside of standard construction hours.

All reasonable and feasible mitigation measures will be implemented to reduce noise emissions to be below the NMLs.

Table 2-1: Construction timetable/activities/equipment

St Marys – Aspect	Plant/ Equipment (as provided by client)	Day			Timing of Activity		Sound Power Level (Lw re: 1pW) in Noise Model, dB(A)			High noise plant	Vibration intensive plant	Notes
		7am – 6pm	Evening 6pm – 10pm	Night 10pm – 7am	Start Date	Duration	LAeq	Penalty	LAmx			
Phase 1 – Site access to TBM retrieval area	400t crane	1	-	-	Mar-24	4 days	106	-	110	-	-	On surface: mobilisation of GMK4600 – 2 days
	Delivery trucks	4 per hour	-	-			106	-	111	-	-	On surface: counterweight just to deliver and will park up on site or leave as required. 2 trucks.
	Delivery trucks		-	-			106	-	111	-	-	On surface: to deliver and store steel modules
	7t telehandler	1	-	-			98	-	102	-	-	On surface: surface movements to crane
	5t forklift	1	-	-			99	-	103	-	-	On surface: surface movements to crane
Phase 1.5 – TBI Works	100t crane	1	-	-	Apr 2024	6 days	104	-	108	-	-	On surface: mobile crane on surface for rescue cage setup
	Franna Crane/ 7t telehandler	-	-	2			98	-	102	-	-	On surface
Phase 2 – Tower crane establishment and TBM breakthrough preparation <i>* Tower crane will replace 400t crane, once assembled.</i>	400t crane*	1	1	1	Apr-24	5-8 days	106	-	110	-	-	On surface: mobilisation of GMK4600 – 5-8 days. OOH use to support oversized deliveries.
	Delivery trucks	4 per hour	4 per hour	4 per hour			106	-	111	-	-	On surface: counterweight just to deliver and will park up on site or leave as required. 2 trucks.
	Delivery trucks						106	-	111	-	-	On surface: to deliver towers/car body/slew ring/jib sections/counter weights and other items. Up to 10 trucks per day.
	Delivery trucks						106	-	111	-	-	On surface: to deliver precast concrete blocks. Up to 10 trucks per day.
	7t telehandler	1	-	-			98	-	102	-	-	On surface: surface movements to crane
	7t telehandler	1	1	1			98	-	102	-	-	Within station box: placing modules and stillages
	Power hand tools	5	2	2			108	-	118	-	-	Within station box: building the tower crane
	Compressor	1	1	1			102	-	103	-	-	Within station box: building the tower crane
	5t forklift	1	1	1			99	-	103	-	-	On surface: surface movements to crane
Light vehicle	4 per hour	4 per hour	4 per hour	89	-	100	-	-	On surface: access for work force and supervision. Up to 10 light vehicles per day.			
Phase 3 – Breakthrough and demobilisation of TBM 1340 and 1341	Tower crane 2480D	1	1	1	May-24	7-8 weeks	104	-	119 (109)	-	-	Tower crane in use. Tower crane will be mitigated to achieve a sound power level of 104 dB(A) re: 1 pW. Best practice material handling as described in Table 4-3 would reduce the likelihood of Lmax event occurring. Number in brackets represents estimated Lmax (managed).
	OSOM trucks	4 per hour	4 per hour	4 per hour			106	-	111	-	-	On surface: this will be driven by permit process and may affect durations. 7 OSOM trucks are required.
	Delivery trucks						106	-	111	-	-	On surface: to move TBM gantries for 1338. Up to 10 trucks per day.
	Delivery trucks						106	-	111	-	-	On surface: to move TBM gantries for 1339. Up to 10 trucks per day.
	7t telehandler	1	-	-			98	-	102	-	-	On surface: surface movements to crane
	400t crane	1	1#	1#			106	-	108	-	-	On surface: removal of gantry pieces for transport #Required OOH to assist with loading TBM components onto OSD truck
	7t telehandler	1	-	-			98	-	102	-	-	On surface: surface to move materials for loading
	7t telehandler	1	1	1			98	-	102	-	-	Within station box: miscellaneous demobilisation movements
	34ft EWP	2	1	1			95	-	98	-	-	On surface: to unhook loads
	34ft EWP	1	1	1			95	-	98	-	-	Within station box
	Power hand tools	5	1	1			108	-	118	-	-	On surface and within station box: to dismantle components on site. No use of power hand tools on surface outside standard construction hours.
	Compressor	1	1	1			102	-	103	-	-	On surface and within station box: to dismantle components on site. No use of compressor on surface outside standard construction hours.
	Oxy torch	5	1	1			96	-	107	-	-	On surface and within station box: to dismantle components on site. No use of power hand tools on surface outside standard construction hours.
	5t forklift	1	-	-			99	-	103	-	-	On surface: to move materials for loading
Light vehicle	4 per hour	4 per hour	4 per hour	89	-	100	-	-	On surface: access for work force and supervision. Up to 10 light vehicles per day.			
Phase 4 – Tower crane demobilisation and handover	400t crane	1	-	-	May-24	5 days	106	-	110	-	-	On surface: mobilisation of GMK4600 – use of crane 5 days
	Delivery trucks	2	2	2			106	-	111	-	-	On surface: counterweight just to deliver and will park up on site or leave as required. 2 trucks.
	7t telehandler	1	-	-			98	-	102	-	-	On surface: movements to crane
	bobcat	1	1	1			102	-	107	-	-	Within station box
	7t telehandler	1	-	-			98	-	102	-	-	On surface: to move materials for loading
	5t forklift	1	-	-			99	-	103	-	-	On surface: to move materials for loading
	Power hand tools	5	1	1			108	-	118	-	-	Within station box: to dismantle components on site. No use of power hand tools on surface outside standard construction hours.
	Compressor	1	1	1			102	-	103	-	-	Within station box: to dismantle components on site. No use of compressor on surface outside standard construction hours.
Light vehicle	4 per hour	4 per hour	4 per hour	89	-	100	-	-	On surface: access for work force and supervision. Up to 10 light vehicles per day.			

3 Construction noise objectives

The DNVIS Section 3 describes the Land Use Survey and Noise Catchment Areas used to identify sensitive receivers potentially impacted by the Project and establish receiver groups for the purpose of assessment and management of impact.

Construction airborne noise objectives are detailed in the CNVS Section 2. A summary of the objectives as applicable to the Aerotropolis worksite is provided in Table 4.1 of the DNVIS. Construction noise objectives specific to these works are presented in Table B1 in APPENDIX B.

4 Construction noise and vibration assessment

The airborne noise prediction methodology is consistent with the DNVIS (Section 5.1)

4.1 Predicted noise levels

Predicted construction noise levels at the closest noise sensitive receivers are summarised in Table 4.1 and Table 4.2 and compared to the ICNG NMLs (see APPENDIX B). Detailed noise predictions are compared to ICNG NMLs and presented in APPENDIX D. Note that predictions are based on the worst-case scenario and actual noise levels are likely to be lower than the predicted noise levels.

4.1.1 Standard construction hours

The results presented in Table 4.1 show that the residential receivers are predicted to experience noise levels above the corresponding NMLs during standard construction hours. Predicted noise levels are below the 'highly noise affected' threshold of 75 dB(A) at all residential receivers. As such, at-property treatment to satisfy requirements as per CoA E49 is not required.

The noise predictions in Table 4.2 show that one other sensitive receiver (4 Queen Street, St Marys) is predicted to experience noise levels above the corresponding NMLs when the commercial receiver is in use. Other sensitive receivers are predicted to experience noise levels below the corresponding NMLs.

4.1.2 Out of hours work

The noise predictions in Table 4.1 show that the residential receivers are predicted to experience noise levels above the corresponding NMLs outside standard construction hours. All reasonable and feasible mitigation and management measures presented in Section 0 shall be implemented to reduce the potential noise impacts during OOHW.

Actual noise levels can often be less than the predicted levels presented in this addendum when measured over the assessment period, depending on the location of the works relative to the receivers.

4.1.3 Sleep disturbance

The noise predictions in Table 4.1 show the residential receivers are predicted to experience noise levels above the corresponding sleep disturbance noise goals during the night period. Further review (see APPENDIX D) finds that predicted instantaneous noise levels are below the (external) awakening events noise level L_{Amax} 65 dB(A).

All reasonable and feasible mitigation and management measures presented in Section 0 shall be implemented to reduce the potential sleep disturbance during the night period.

4.2 Noise mitigation and management

In accordance with SSI 10051 CoA 43, the CNVS, and the St Marys DNVIS all feasible and reasonable work practices and mitigation measures will be applied to reduce the potential noise impacts from the TBM retrieval works. In addition to the measures adopted in the DNVIS, the following mitigation and management measures specific to the TBM retrieval works are provided.

4.2.1 Consultation with affected receivers

As outlined in the St Marys DNVIS, CPBG has consulted with potentially affected stakeholders including business and residential receivers regarding specific mitigation and management measures applicable to the bulk excavation and tunnelling works at St Marys. This consultation has continued for the TBM retrieval works, notably for the proposed out of hours works associated with TBM retrieval and a summary of the consultation is provided in APPENDIX E.

Community will be regularly updated on the progress of the project as described in the CPBG SBT Community Communication Strategy (SMWSASBT-CPG-1NL-NL000-CY-PLN-000002).

4.2.2 Site noise control measures

In addition to the noise mitigation measures identified in the St Marys DNVIS (see Section 5.3), Table 4-3 presents additional noise control measures recommended to reduce and manage potential noise impacts from the TBM retrieval works. As described in the DNVIS, Toolbox Talks will be part of the suite of noise management measures on site. All personnel working on site will be informed of critical noise mitigation and management measures to be implemented to reduce noise, especially during OOHW.

Table 4.1: Number of receiver buildings over the noise management level (all NCAs) – residential receivers

Worksite	Construction activity	Assessment reference	Highly noise affected ²	Day (standard hours)				Day (outside standard hours)				Evening				Night				Sleep disturbance	
			L _{Aeq}	L _{Aeq}				L _{Aeq}				L _{Aeq}				L _{Aeq}				L _{Amax}	L _{Amax}
			> 75 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	> 52 or RBL+15 dB(A)	> 65 dB(A)
St Marys TBM Retrieval works	Phase 1 - Site access to TBM retrieval area	P1M	0	24	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phase 1.5 - TBI works	P1.5M	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	3	0	0	0	0	0	0
	Phase 2 - Tower crane establishment and breakthrough preparation	P2M	0	70	11	0	0	112	14	0	0	112	14	0	0	140	17	0	0	45	0
	Phase 3 - Breakthrough and demobilisation of TBM 1340 and 1341	P3M	0	52	6	0	0	91	43	0	0	91	8	0	0	115	9	0	0	36	0
	Phase 4 - Tower crane demobilisation and handover	P4M	0	89	11	0	0	43	7	0	0	43	7	0	0	51	8	0	0	21	0

- Note:
- Proposed works are to be undertaken during the night period only.
 - Construction noise level cells are shaded based upon the predicted worst case NML exceedance in accordance with the key presented in the DNVIS.
 - Highly noise affected applies to residential receivers, as per the ICNG.

Table 4.2: Number of other sensitive receivers over the noise management levels (all NCAs)

Worksite	Construction activity	Assessment reference	Commercial				Childcare				Educational				Recreational				Places of worship				Hotel/Motel/ Hostel				Industrial										
			1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)	1 – 10 dB(A)	11 – 20 dB(A)	21-30 dB(A)	> 30 dB(A)							
St Marys TBM Retrieval works	Phase 1 - Site access to TBM retrieval area	P1M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phase 1.5 - TBI works	P1.5M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Phase 2 - Tower crane establishment and breakthrough preparation	P2M	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Phase 3 - Breakthrough and demobilisation of TBM 1340 and 1341	P3M	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Phase 4 - Tower crane demobilisation and handover	P4M	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

- Note:
- Commercial, industrial, recreational and other sensitive receivers have been assessed against the respective NMLs, and exceedances have been presented in the count table.
 - Impacts only applicable when facility is in use.
 - Highly noise affected does not apply to OSRs, as per the ICNG.

Table 4-3: Site noise mitigation and management measures

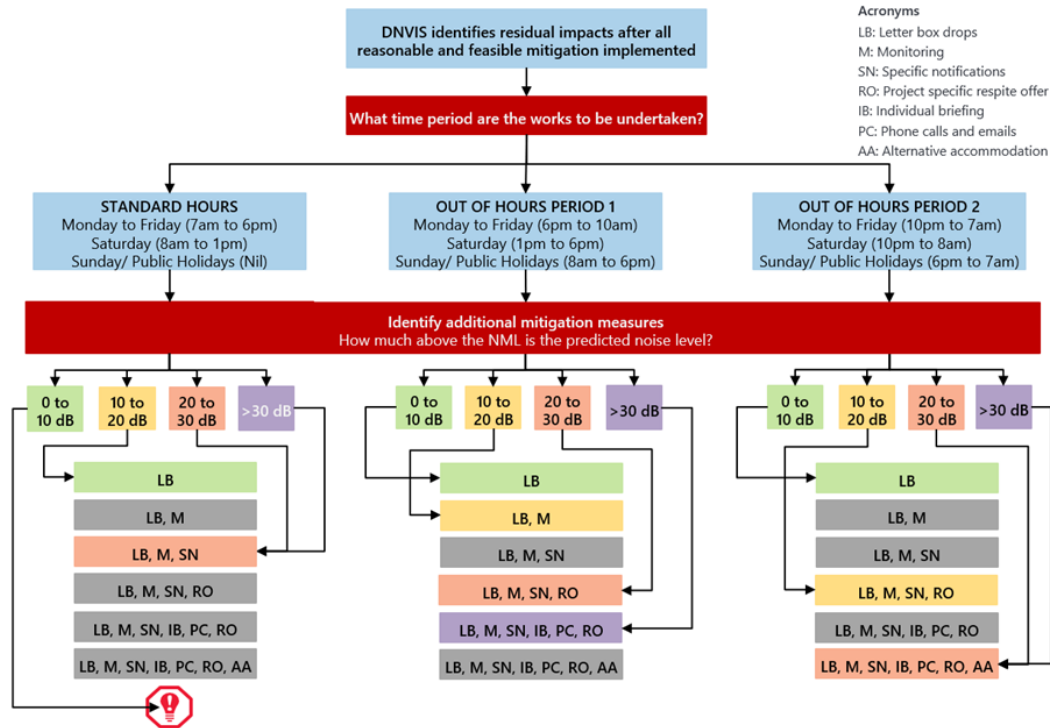
Control measure	Description of the control measure	Feasible mitigation test	Deemed feasible?	Reasonable mitigation test	Deemed reasonable?	Adopted?	Justification and commentary
At source control measures							
Limit work area location and plant location within work area	The OOHW area location should be limited to the work areas in shown in Figure 2.1. Plant and equipment locations should be limited to as described in Table 2-1.	This measure could be feasibly implemented.	Yes	This measure could be reasonably implemented.	Yes	Yes	The OOHW area should be limited to the work areas in shown in Figure 2.1. Plant and equipment locations should be limited to as described in Table 2-1.
Mitigating tower crane noise source	An attenuated diesel tower cranes to be used on site, mitigated to achieve the nominated sound power level presented in Table 2-1 (i.e. L_{Aeq} 104 dB(A) re: 1 pW), considering all crane operating conditions and all operating crane noise sources, and achieve any other specific performance requirements. The crane supplier should provide documentation confirming the tower crane can achieve the nominated noise level.	Crane supplier has advised that this measure could be feasibly implemented.	Yes	Up to 10 dB(A) noise reduction (compared with unattenuated diesel tower crane) could be achieved by mitigating the tower crane.	Yes	Yes	This measure will be implemented for the duration of the TBM retrieval works. Verification noise monitoring would be undertaken to confirm the sound power level of the tower crane. The crane supplier should provide documentation confirming the tower crane can achieve the nominated sound power level L_{Aeq} 104 dB(A) re: 1 pW.
Limit OOH plant and equipment	Plant and equipment operating outside standard construction hours will be limited as much as practicable to allow the retrieval to progress.	This measure could be feasibly implemented.	Yes	5-10 dB(A) noise reduction could be achieved depending on the plant in use/ switched off.	Yes	Yes	Plant items in use OOHW should be limited to the plant items indicated in Table 2-1, or better where practicable.
Noise barriers or temporary noise screens	Any removal of construction hoardings will be replaced by temporary fencing/gate. Furthermore, the temporary fencing/gate shall be fitted with noise blankets.	Potential benefit of 5-10 dB(A). Could be feasibly implemented.	Yes	5-10 dB(A) noise reduction could be achieved if line of sight is broken.	Yes	Yes	This measure will be implemented for the duration of the TBM retrieval works.
Switching off any equipment not in use	Switching off any equipment not in use for extended periods e.g. crane/ heavy vehicles engines will be switched off while not loading/ being loaded. No idling of delivery trucks.	This measure could be feasibly implemented.	Yes	This measure could be reasonably implemented. Routine measure for Project team.	Yes	Yes	Any equipment not in use for extended periods shall be switched off to reduce the potential noise impacts.
Noise management measures							
Respite coordination	Consult with other construction works in the vicinity of the worksite and take reasonable steps to coordinate works to minimise cumulative impacts of noise and vibration.	This measure could be feasibly implemented.	Yes	This measure could be reasonably implemented. Routine measure for Project team.	Yes	Yes	Respite coordination shall be conducted with other construction works in the vicinity of the worksite.

Control measure	Description of the control measure	Feasible mitigation test	Deemed feasible?	Reasonable mitigation test	Deemed reasonable?	Adopted?	Justification and commentary
Material handling	<p>During OOHW, avoid unnecessary maximum instantaneous emissions when carrying out manual operations and when operating plant such as (but not limited to):</p> <ul style="list-style-type: none"> • No dropping material at height, throwing of metal items and slamming of doors • Ensuring material is placed and not dropped into awaiting trucks or other plant/vehicles • Careful use of chains/equipment to avoid metal-on-metal bangs 	This measure could be feasibly implemented.	Yes	<p>5-15 dB(A) noise reduction could be achieved with good materials handling practice.</p> <p>This measure could be reasonably implemented.</p>	Yes	Yes	Training workers and contractors (such as the site induction and toolbox talks) on the importance of minimising emissions and how to use equipment in ways to minimise noise. Great care shall be undertaken when handling material during the night period to minimise the potential sleep disturbance impact.
Traffic flow	Planning traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.	This measure could be feasibly implemented.	Yes	This measure could be reasonably implemented.	Yes	Yes	Traffic flow, parking and loading/unloading areas shall be designated to minimise reversing movements within the site.
Truck drivers training	Ensuring truck drivers are informed of designated vehicle routes, parking locations and acceptable delivery hours for the site.	This measure could be feasibly implemented.	Yes	Sufficient noise reduction could be This measure could be reasonably implemented.	Yes	Yes	Training truck drivers on the importance of designated vehicle routes, parking locations and acceptable delivery hours for the site to minimise noise emissions.

4.2.3 Additional mitigation measures

As specified in section 5.3.3 of the St Marys DNVIS, Figure 4.1 will be used to advise the appropriate additional mitigation during the proposed works.

Figure 4.1: Additional airborne noise mitigation measures



APPENDIX E presents a summary of the additional noise mitigation measures applicable for the proposed works where, after application of all reasonable and feasible mitigation options, construction noise levels are still above the corresponding NMLs.

4.2.4 Noise monitoring

Attended noise monitoring will be undertaken to verify that the proposed TBM retrieval works is consistent with the assessed noise modelling scenarios and that noise levels resulting from construction works are not higher than the levels predicted in this addendum.

Attended noise monitoring will be undertaken in the NCAs most impacted by the works. The nominated monitoring locations are identified in Table 4-4, and have been selected as they present the best opportunity to validate the predicted noise levels.

The real time monitoring installed for the bul earthworks at St Marys was removed prior to handover of the station box. A new fixed, real time monitoring location is proposed to be installed on site at the nominated location in Table 4-4, subject to confirmation the location is suitable and safe for the monitor. Once the monitoring location is confirmed, Table D1 will be updated with predicted noise levels to the real-time monitor, for the purpose of verification monitoring.

Attended noise monitoring will be completed at the nominated receiver locations, subject to gaining access to properties. Where access to properties is denied, monitoring will be undertaken in publicly accessible areas on or near the nominated receivers.

Table 4-4: Nominated verification monitoring locations

Type of monitoring	NCA	Nominated receiver address	Monitoring location at 1 m from
Fixed real time	N/A	On-site monitor (E: 294020, N: 6261915, to be confirmed subject to suitability of location on site)	N/A
Attended	NCA03	3 Station Street, St Marys	Western facade
Attended	NCA03	30 Phillip Street, St Marys	Northern facade
Attended	NCA03	31 Phillip Street, St Marys	Northern facade
Attended	NCA03	34-36 Philip Street, St Marys	Northern facade

Note: Monitoring on private property is subject to owner consent and where relevant, occupier consent. If property access is denied, monitoring will still be carried out outside property boundaries.

If verification monitoring shows that the external noise levels from the construction works are above the predicted levels, investigation will be undertaken to understand the cause of the exceedance and relevant reasonable and feasible mitigation measures will be implemented.

5 Impact classification

The impact classification from the in Section 10 of the DNVIS has been reviewed taking into consideration the outcomes of this Addendum assessment report. The impact classification for the ST Marys TBM retrieval works are considered **moderate**, consistent with the classification in the DNVIS.

All reasonable and feasible mitigation and management measures addressed in the St Marys DNVIS shall be implemented to minimise the potential noise impacts during the proposed TBM retrieval works. It is noted that whilst the works exceed the NMLs outside standard construction hours, the duration of the works is up to 11 weeks.

6 Conclusion

This technical memorandum is an addendum to the report St Marys DNVIS to review the potential noise and vibration impacts for the proposed TBM retrieval works at the St Marys worksite.

Construction airborne noise

During standard construction hours, the noise predictions in this addendum show that the residential receivers are predicted to experience noise levels above the corresponding NMLs during standard construction hours. However, predicted noise levels are below the 'highly noise affected' threshold of 75 dB(A) at all residential receivers.

Outside standard construction hours, the noise predictions in this addendum show that the residential receivers are predicted to experience noise levels above the corresponding NMLs outside standard construction hours. During the night period, the noise predictions show the residential receivers are predicted to experience noise levels above the corresponding sleep disturbance noise goals during the night period.

It is noted that the noise predictions in this addendum represent a worst-case scenario when the works occur at worst-case intensity and the worst-case location throughout the assessment period. Actual noise levels can often be less than the predicted levels presented in this addendum when measured over the assessment period, depending on the location of the works relative to the receivers. Additional mitigation measures will be implemented in accordance with the SSI 10051 CoA 43 and the CNVS. Noise monitoring will be undertaken to verify compliance with the predicted noise levels.

Construction ground-borne noise and vibration

There are no vibration intensive activities required to complete the TBM retrieval works at the St Marys worksite. Ground-borne noise and vibration impacts are unchanged from the impacts presented in the DNVIS.

Construction traffic noise

The findings within the St Marys DNVIS for construction related traffic is unchanged (i.e. no adverse impacts).

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
01.03.2023	Initial issue	0	1	██████████	██████████	██████████
14.03.2024	Report revised to address client's comments	-	2	██████████	██████████	██████████
19.03.2024	Update to include OSD Phase 2	-	3	██████████	█	██████████
08.04.2024	Respond to Auditor comments	-	4	██████████	██████████	██████████

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Important Disclaimers:

The work presented in this document was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian/New Zealand Standard AS/NZS ISO 9001.

This document is issued subject to review and authorisation by the suitably qualified and experienced person named in the last column above. If no name appears, this document shall be considered as preliminary or draft only and no reliance shall be placed upon it other than for information to be verified later.

This document is prepared for the particular requirements of our Client referred to above in the 'Document details' which are based on a specific brief with limitations as agreed to with the Client. It is not intended for and should not be relied upon by a third party and no responsibility is undertaken to any third party without prior consent provided by Renzo Tonin & Associates. The information herein should not be reproduced, presented or reviewed except in full. Prior to passing on to a third party, the Client is to fully inform the third party of the specific brief and limitations associated with the commission.

In preparing this report, we have relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, we have not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

We have derived data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination and re-evaluation of the data, findings, observations and conclusions expressed in this report.

We have prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

The information contained herein is for the purpose of acoustics only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the specialist field of acoustics engineering including and not limited to structural integrity, fire rating, architectural buildability and fit-for-purpose, waterproofing and the like. Supplementary professional advice should be sought in respect of these issues.

External cladding disclaimer: No claims are made and no liability is accepted in respect of any external wall and/or roof systems (eg facade / cladding materials, insulation etc) that are: (a) not compliant with or do not conform to any relevant non-acoustic legislation, regulation, standard, instructions or Building Codes; or (b) installed, applied, specified or utilised in such a manner that is not compliant with or does not conform to any relevant non-acoustic legislation, regulation, standard, instructions or Building Codes.

APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of every day sounds: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 120dB Deafening
dB(A)	A-weighted decibels. The A-weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L _{Max}	The maximum sound pressure level measured over a given period.
L _{Min}	The minimum sound pressure level measured over a given period.

L ₁	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L ₁₀	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L ₉₀	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L _{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain L _{eq} sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B Noise management levels

Table B1: Noise Sensitive Receivers and Construction Noise Management Levels (airborne noise)

ST MARYS STATION

NCA	Receiver Type	Reference RBL	Existing Noise Levels, dB(A)						Airborne NMLs based on ICNG (external)				Sleep Dist. L _{Amax}		Comments	
			RBL Day	RBL Evening	RBL Night	L _{Aeq_D}	L _{Aeq_E}	L _{Aeq_N}	NMLDS	NMLDO	NMLE	NMLN	L _{Aeq(15min)}	L _{AFmax}		
Residential receivers																
NCA01	Predominantly Residential	NM01	38	38	38	53	53	50	48	43	43	43	43	53		
NCA02	Predominantly Residential	NM02	37	37	36	55	59	51	47	42	42	41	41	52		
NCA03	Predominantly Residential	NM02	37	37	36	55	59	51	47	42	42	41	41	52		
NCA04	Predominantly Residential	NM14	35	32	31	48	47	43	45	40	37	36	40	52		
NCA05	Predominantly Residential	NM05	40	40	40	54	51	50	50	45	45	45	45	55		
Other sensitive receivers																
	Studio building (music recording studio)								45	45	45	45	-	-		Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss
	Studio building (film or television studio)								50	50	50	50	-	-		Source: AS2107 'maximum', assuming 20 dB(A) facade loss
	Theatre/ Auditorium (Drama Theatre)								50	50	50	50	-	-		Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss
	Cinema space, theatre, auditorium								55	55	55	55	-	-		Source: AS2107 'maximum', assuming a conservative façade loss of 20 dB(A)
	Classrooms at schools and other educational institutions								55	55	55	55	-	-		Source: ICNG, assuming a conservative façade loss of 10 dB(A)
	Childcare centre (indoor sleeping areas)								55	55	55	55	-	-		Source: CNVS Section 2.2.1, assuming a conservative façade loss of 10 dB(A)
	Childcare centre (play areas)								65	65	65	65	-	-		Source: CNVS Section 2.2.1
	Hospital wards and operating theatres								65	65	65	65	-	-		Source: ICNG, assuming a conservative façade loss of 20 dB(A)
	Places of worship								55	55	55	55	-	-		Source: ICNG, assuming a conservative façade loss of 10 dB(A)
	Library (reading areas)								65	65	65	65	-	-		Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss
	Hotel (Sleeping areas: Hotels near major roads)								60	60	60	60	-	-		Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss
	Hotel (bars and lounges)								70	70	70	70	-	-		Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 20 dB(A) facade loss
	Community centres – Municipal Buildings								60	60	60	60	-	-		Source: AS2107 'maximum', assuming a conservative façade loss of 10 dB(A)
	Bar/ Restaurant (Bars and lounges/ Restaurant)								60	60	60	60	-	-		Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 10 dB(A) facade loss
	Café/ Coffee bar								60	60	60	60	-	-		Source: CNVS Section 2.2.1 & AS2107 'maximum', assuming 10 dB(A) facade loss
	Railway platform and concourse areas								75	75	75	75	-	-		Source: AS2107 'maximum', assuming a conservative façade loss of 20 dB(A)
	Passive recreation areas (e.g. area used for reading, meditation)								60	60	60	60	-	-		Source: ICNG
	Active recreation areas (e.g. sports fields)								65	65	65	65	-	-		Source: ICNG
	Commercial premises (including offices and retail outlets)								70	70	70	70	-	-		Source: ICNG
	Industrial premises								75	75	75	75	-	-		Source: ICNG

Notes: D(S): standard construction hours from 7 am to 6 pm Monday to Friday and from 8 am to 6 pm Saturday
 D(O): out-of-hours day period from 8 am to 6 pm Sunday and Public holidays - OOHW P1
 E: evening period from 6 pm to 10 pm Monday to Sunday - OOHW P1
 N: night-time period from 10 pm to 7 am Monday to Friday, from 10 pm am to 8 am Saturday, Sunday and Public holidays - OOHW P2

Table B2: Noise Sensitive Receivers and Construction Noise Management Levels (groundborne noise)

ST MARYS STATION

NCA	Receiver Type	Groundborne NMLs based on ICNG (internal)				Comments
		NMLDS	NMLDO	NMLE	NMLN	
Residential receivers						
All	All residential receivers	Human comfort vibration	40	35		Source: ICNG
Other sensitive receivers						
	Studio building (music recording studio)	25	25	25	25	Source: CNVS Section 2.2.1 & AS2107 'maximum'
	Studio building (film or television studio)	30	30	30	30	Source: AS2107 'maximum'
	Theatre/ Auditorium (Drama Theatre)	30	30	30	30	Source: CNVS Section 2.2.1 & AS2107 'maximum'
	Cinema space, theatre, auditorium	35	35	35	35	Source: AS2107 'maximum'
	Classrooms at schools and other educational institutions	45	45	45	45	Source: ICNG
	Childcare centre (indoor sleeping areas)	45	45	45	45	Source: CNVS Section 2.2.1
	Childcare centre (play areas)	65	65	65	65	Source: CNVS Section 2.2.1
	Hospital wards and operating theatres	45	45	45	45	Source: ICNG
	Places of worship	45	45	45	45	Source: ICNG
	Library (reading areas)	45	45	45	45	Source: CNVS Section 2.2.1 & AS2107 'maximum'
	Hotel (Sleeping areas: Hotels near major roads)	40	40	40	40	Source: CNVS Section 2.2.1 & AS2107 'maximum'
	Hotel (bars and lounges)	50	50	50	50	Source: CNVS Section 2.2.1 & AS2107 'maximum'
	Community centres – Municipal Buildings	40	40	40	40	Source: AS2107 'maximum'
	Bar/ Restaurant (Bars and lounges/ Restaurant)	50	50	50	50	Source: CNVS Section 2.2.1 & AS2107 'maximum'
	Café/ Coffee bar	50	50	50	50	Source: CNVS Section 2.2.1 & AS2107 'maximum'
	Railway platform and concourse areas	55	55	55	55	Source: AS2107 'maximum'

Notes: D(S): standard construction hours from 7 am to 6 pm Monday to Friday and from 8 am to 6 pm Saturday
D(O): out-of-hours day period from 8 am to 6 pm Sunday and Public holidays - OOHW P1
E: evening period from 6 pm to 10 pm Monday to Sunday - OOHW P1
NS: night shoulder period from 10 pm to 12 am Monday to Sunday - OOHW P1

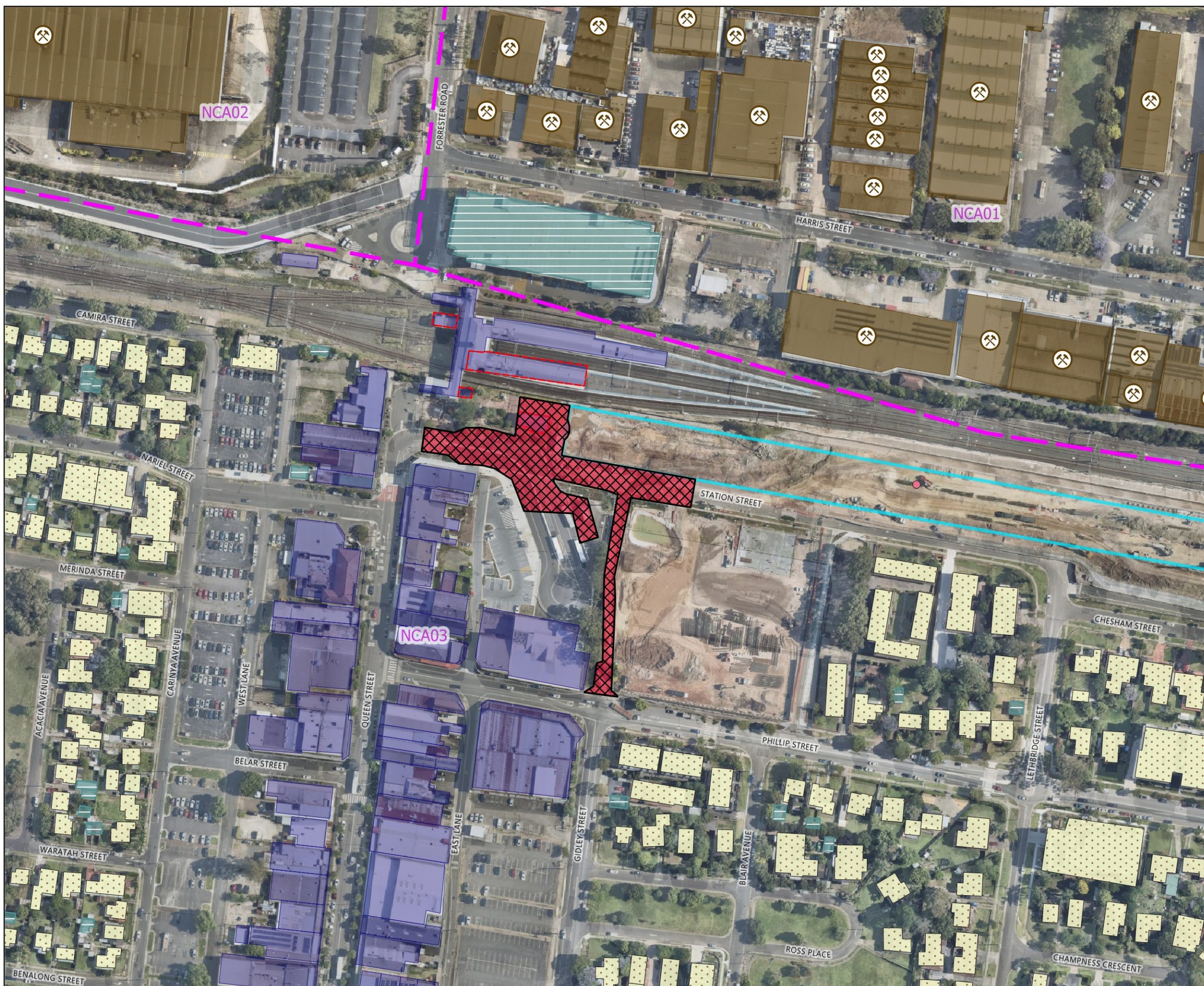
APPENDIX C Construction work areas and landuses

270 m

180

90

0

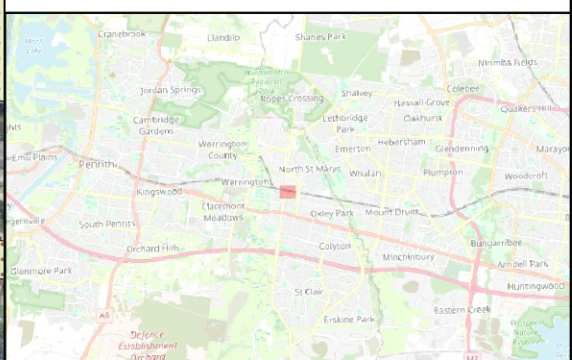


LEGEND

Receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

Project NCA
 TBM Retrieval Work Area



WESTERN SYDNEY AIRPORT - SBT WORKS ST MARYS TBM RETRIEVAL

Landuse, NCA and work area

REV	BY	DATE	DESCRIPTION	APPROVER
r1	SS	12/03/24	Updated workareas	RZ
r0	SS	29/02/24	Prepare figures	RZ

A3 Original
 Co-ordinates: GDA94 / MGA zone 56 (EPSG:28356)

0 30 60 90 120 m

1:2,000

ORIGINAL SCALE FOR A3 SIZE PAPER

NOTES: Do not scale from this drawing

CLIENT

CPB CONTRACTORS

Ghella
 5 Generations of Tunnelers

ACOUSTIC CONSULTANT

RENZO TONIN & ASSOCIATES
 inspired to achieve

Ph (02) 8218 0500 Fax (02) 8218 0501

APPENDIX D Detailed predicted construction noise levels

The detailed predicted levels have been provided to CPBG in a spreadsheet table in order to more adequately mitigate and manage potential noise impacts.

APPENDIX E Additional noise mitigation

E.1 Additional mitigation measures

The additional mitigation measures have been provided to CPBG in a spreadsheet table in order to more adequately mitigate and manage potential noise impacts.

E.2 Summary of TBM work consultation

The TBM work consultation record has been provided by CPBG as a spreadsheet table for inclusion in this Addendum DNVIS.