





Independent Environmental Audit on JHCPBG JV

Final Report

Contract works: Enabling Demolition Scope: Noise, Vibration & Waste Management

Reference: SM17.18-032-TSE-JHCPBG-ENV CWG Audit ID: TSE-031

January 2018







1. Executive Summary

1.1 Introduction

In accordance with Planning Approvals issued by the Department of Planning & Environment and related Compliance Tracking Program requirement, Sydney Metro Delivery Office (SMDO) Safety, Sustainability & Environment (SSE) commissioned QEM Consulting Pty Ltd to conduct an Independent Environmental Audit to assess compliance with Planning Approvals associated with enabling project demolition works.

1.2 Background

A demolition contract for Enabling Works was awarded to Delta Pty Ltd comprising demolition and site preparation works for six Sydney Metro City & Southwest Project stations and dive sites comprising Chatswood, Crows Nest, Victoria Cross, Pitt Street, Waterloo and Marrickville. This contract was novated to the Tunnels & Station Excavation (TSE) works Principal Contractor, John Holland CPB Ghella Joint Venture (JHCPBG JV) in June 2017. As further background, the Critical State Significant Infrastructure (CSSI) Chatswood to Sydenham Planning Approval SSI 15_7400 condition A39 requires that independent environmental audits assess the environmental performance of the project, its effects on the surrounding environment and compliance with terms of the approval.

1.3 Objective and Scope

The objective of the audit was to assess the implementation and effectiveness of systems, processes, procedures and controls implemented to mitigate noise and vibration impacts and waste management for enabling demolition works managed by TSE and conducted by their subcontractor Delta Pty Ltd (hereafter referred to as Delta). The audit included a review of the Delta's Construction Noise & Vibration Management Plan (CNVMP) and Construction Noise & Vibration Impact Statement (CNVIS) as applicable to the Waterloo Station site. Audit Criteria included relevant conditions from the Chatswood to Sydenham Planning Approval (SSI 15_7400) and related requirements documented in the Sydney Metro Construction Noise and Vibration Strategy (CNVS). Specifically, the Audit Scope included the following processes and activities:

- Noise & Vibration (N & V) assessment and performance objectives;
- Site management and N & V mitigation measures;
- Sensitive Receiver notifications and targeted mitigation measures;
- N & V impact monitoring and improvement actions;
- Waste management process; and
- Project N & V compliance records.







1.4 Summary of Findings

The table below provides a summary of key findings noted in this audit and the priority assigned to these findings.

Ref	Description	Priority*
NP 1-4	 There were a number of strengths and notable practices implemented by the Principal and Demolition contractors, including: Easily accessable real-time noise and vibration monitoring data; Implementation, level of assessment and involvement by Sydney Metro and their Principal Contractor in the Out-of-Hours approval process; Implementation of alternative demolition techniques to traditionally noisy jack-hammering, by using a much quieter pulveriser; and Creative planning around demolition sequencing, retaining perimeter building walls as sound barriers for as long as possible. 	Observation
1.	Noise mitigation measure implementation (hoardings). Site planning processes did not ensure that noise attenuating barriers or hoardings were installed in a timely manner, required to mitigate noise from progressive and changing demolition stages.	Low
2.	Noise mitigation measure implementation (plant and equipment). Plant & equipment checks and site surveillance systems did not detect that an excavator was being used at Waterloo without having a required non-tonal reverse alarm (quacker) fitted.	Medium
3.	N&V monitoring equipment calibration. Procedures and systems did not ensure that required calibration certificates / records of noise & vibration monitoring equipment used were maintained on project files, and that the validity of said calibrations were assessed prior to equipment use.	Low
4.	Plant noise assessment. A Register of Equipment Sound Power Levels had not been implemented to confirm that actual equipment supplied to site was below regulatory noise levels and not exceeding SPLs used in the CNVIS and subsequent noise assessments.	Low
5.	Rating Background Levels for noise adopted by Waterloo were based on Botany Road background levels (the noisiest catchment area of site as a result of traffic), with the decision not to use the RBL data from the EIS monitoring site B.06 (located on a quieter street with both residential and commercial receivers) needed formal clarification and/or changed practice.	Low
6.	There was no Noise Monitoring Form to ensure that adequate and consistent data was captured during operator-attended noise monitoring conducted during out-of-hours works and potentially as a result of complaints.	OFI







Ref	Description	Priority*
7.	Weather condition details were not captured in project noise monitoring reports as suggested by the Sydney Metro N&V Strategy Monitoring Guideline.	OFI
8.	Standard noise mitigation measures (inductions). The demolition contractor's induction material did not fully address minimum noise mitigation and compliance requirements defined in the Sydney Metro N&V Strategy developed to address Planning Condition E32.	OFI

* Piority Definition enclosed as Appendix 2

1.5 **Overall Assessment**

This Independent Environment Audit comprised a desktop review of strategies, management plans and noise & vibration impact statements prior to a project compliance audit conducted on 20th November 2017. Given potential noise disruption associated with the demolition works immediately adjacent to the Waterloo site office on the day, the audit relocated from the project site to the TSE Project Office (Sydney) after assessment of site-based hardcopy records and a brief perimeter site walk.

In summary, review of the Construction Noise & Vibration Management documentation developed to meet Minsters Conditions of Approval such as E32, E33 and C3a) correlated with compliance obligations and provided practical detail of strategies, protocols, procedures, mitigation measures and guidelines aimed at achieving required outcomes. The audit evidenced implementation and compliance with the Construction Noise & Vibration Impact Statement and Construction Noise & Vibration Management Plan, being reflective of systems of management, mitigation, monitoring and control implemented by the demolition subcontractor and their specialist noise and vibration management consultant. Additionally, the Sydney Metro Construction Noise & Vibration Strategy provided comprehensive detail on Planning Approval obligations, industry standards and best practice requirements. There were a few specifics requiring improvement by both the Principal Contractor and Demolition subcontractor however, but this did not appear to affect project outcomes and pose significant risks at the time. Of note though was the implementation, level of assessment and involvement by Sydney Metro and Principal Contractor, John Holland CPB Ghella Joint Venture in the Out-of-Hours approval process, which could be a project strength if consistently implemented for other works and sites.

From a practical site perspective, the audit determined that there was good awareness of actual and potential noise and vibration impacts predicted by the abovementioned documentation. Real-time noise and vibration monitoring obligations had been implemented and used, as well as requirements to use alternative demolition techniques. The latter included the use of a pulveriser rather than jack-hammering for a significant quantum of works, this resulting in significantly lower noise impacts. The site had been particularly creative in retaining perimeter building walls as sound barriers for as long as possible prior to demolition. Additionally, even though vibration impacts to the heritage listed church were assessed as being low risk, progressive concrete cuts of surrounding slabs were also being considered as a precautionary mitigation measure. At Principal Contractor Management level, the Senior Environment Coordinator demonstrated a commensurate supervisory knowledge of the demolition subcontractors operation, impacts and controls and similarly the Stakeholder & Community Manager had a good working knowledge of sensitive receivers and their concerns. Project records were also available to demonstrate lawful disposal of waste material.

Notwithstanding the above-mentioned, the audit identified five (5) Findings requiring formal action, 1 deemed to be of Medium priority with the remaining of Low priority, these classifications based on risk, compliance obligations and actual or potential community impact. In summary, these included lapses in minimum standard mitigation measures (noise attenuating hoarding and non-tonal mobile plant reversing alarms), as well as records pertaining to plant noise monitoring, equipment calibration and







use of site background noise levels. It should be acknowledged that there had been relatively few noise and vibration complaints for the site at the time of audit, demonstrating that performance had been good to date. Opportunities for Improvement were also raised for consideration, the Principal Contractor formally confirming that actions will be undertaken regarding induction material and implementation thereof.

As concluding comment, and given the single site selected for audit, it is suggested that audit findings be considered in the broader context of other project demolition works.

Report certified by:

1 Wein

Larry Weiss Exemplar Global accredited Lead Auditor (12355).







2. Detailed Findings and Action Plan

The following section of this report provides details of findings and the agreed action plan, including allocation of responsibility and timeframes.

Ref	Finding	Risk/Impact	Priority*	Action Plan
	There were a number of notable practices implemented by the demolition contractor and site in particular, these including:			
NP 1	As required by MCoA C11 real-time noise and vibration monitoring had been installed, successfully providing data used to inform site activities and ensure compliance;	N/A (positive)	Observation	N/A
NP 2	The implementation, level of assessment and involvement by Sydney Metro and Principal Contractor in the Out-of-Hours approval process was commendable and could be a project strength if consistently implemented for other sites	N/A (positive)	Observation	N/A
NP 3	Delta had implemented alternative demolition techniques per REMM NV7 to minimise noise and vibration levels, by procuring and successfully using a hydraulic concrete sheer (pulveriser) with demonstrated improvement in noise levels over traditionally noisy jack-hammering.	N/A (positive)	Observation	N/A
NP 4	Sequencing works to shield noise sensitive receivers by retaining perimeter building wall elements as sound barriers for as long as possible.	N/A (positive)	Observation	N/A
1.	Noise mitigation measure implementation (hoardings) Some sections of noise attenuating hoarding (requiring implementation by Construction Noise & Vibration Impact Statements addressing Ministers Condition of Approval E33, as well as Revised Environmental Mitigation Measure NV1) was absent on the day of the audit due to the delays in erection of these controls following the demolition of street frontages.	Failure to comply with Planning Approvals in implementation of required mitigation measures may result in avoidable noise impacts to the community as well as increasing complaints.	Low	Agreed Action:. Provide evidence demonstrating that noise barriers were being progressively installed around the construction site when feasible and reasonable. Responsible person: Demolition Manager
	Sensitive noise receivers along Botany Road and Cope Street (Refer to photographs in Appendix 3 page 14) were directly exposed to source noise levels from plant working in the area not being mitigated by these barrier controls.	oomplainto.		Timeline: By 22/12/2017







Ref	Finding	Risk/Impact	Priority*	Action Plan
	It was acknowledged that some hoarding was in place and that alternative technological solutions and demolition sequencing to date had minimised high impact noise generation at this site to date.			
2.	 Noise mitigation measure implementation (plant and equipment) A replacement 47T Excavator actively used on the day had not been fitted with a non-tonal reverse alarm (quacker) as required by the Construction Noise & Vibration Strategy developed to address Ministers Condition of Approval E32 as well as Revised Environmental Mitigation Measure NV1. (Refer to photographs in Appendix 3 page 14) Quackers were noted on other plant and equipment, however verification systems had failed as this deficiency was not detected through plant and equipment pre-start checks, routine site surveillance observations or inspections. 	Failure to comply with Planning Approvals in implementation of required mitigation measures may result in avoidable noise impacts to the community as well as increasing complaints.	Medium	Completed Actions JHCPBG confirmed that the non-compliant replacement Excavator had been removed from site Agreed Actions i. Provide Plant Hire Agreements to demonstrate that non-tonal reversing alarms (Quackers) are specified, plus supporting evidence of implementation; ii. Provide representative evidence of using Plant Hire Checklists and/or Pre- Start Checklists, demonstrating that non-tonal reversing alarms (Quackers) are checked prior to accepting plant onto site, or prior to use. Responsible person: Environment Manager, JHCPBG Timeline: By 28/02/2018
3.	 Noise monitoring equipment calibration Systems did not ensure that noise monitoring equipment calibration certificates and subsequent verifications were on project files to demonstrate implementation and compliance with the Construction Noise & Vibration Strategy developed to address Ministers Condition of Approval E32, in particular that N&V monitoring instruments: carry a current National Association of Testing Authorities (NATA) or manufacturer calibration certificate; and be checked before and after each measurement survey, with the variation in calibrated levels to not exceed ±0.5 dBA. Post audit verification (and findings): Calibration certificates for 5 of 7 instruments used for continuous monitoring at nominated sensitive receivers around the site by specialist service provider Osterman 	Damaged and/or uncalibrated N&V monitoring instrumentation could affect performance assessment results plus resulting decision making and compliance reporting	Low	 Agreed Actions NATA calibration certificates to be provided for remaining 2 continuous monitoring instruments being used, noted as being S50 10884 & 10883; Provide calibration certificates for portable sound meters used for attended monitoring and/or Out-of-Hours works, where noise monitoring was a nominated mitigation measure. Responsible person: Plant Manager, JHCPBG Timelines: By 22/01/2018 By 28/02/2018







Ref	Finding	Risk/Impact	Priority*	Action Plan
	 Consulting were provided one week after this audit, the other 2 remain outstanding. ii. The Calibration certificate supplied for the portable noise level meter loaned to Delta for out-of-hours operator-attended noise monitoring indicated this instrument was out of the recommended calibration validity, this also evidenced practically by the photograph in Appendix 3, page 14. 			
4.	Plant noise assessment There was no evidence that a Sound Power Level register had been implemented for actual plant & equipment used. This was required by the Delta Construction Noise & Vibration Management Plan to confirm compliance with the maximum levels stated in the Construction Noise & Vibration Impact Statement which had been developed to address Ministers Condition of Approval E33. Delta stated that historical information indicated compliant SPL's,	Noisy plant and equipment (if undetected) could compromise achievement of noise management levels, associated mitigation strategies and impacts to sensitive receivers.	Low	Agreed Action: Implement and maintain a Register of Plant & Equipment Sound Power Levels, as required by the Delta Construction Noise & Vibration Management Plan Responsible person: Delta Safety & Environment Manager
	but could not evidence this for actual equipment used at Waterloo site.			Timeline: By 22/01/2018
5.	Rating Background Levels documented in the Construction Noise & Vibration Impact Statement were not consistent with those derived in the Construction Noise & Vibration Management Plan (required by ministers condition of approval E33 and C3a respectively). The Impact Statement adopted NMLs based on Botany Road RBLs (the noisiest catchment area of site), differing in location to the B.06 site which was used in the EIS to determine representative RBLs for catchments away from Botany Road.	Non-representative (high) RBL's may result in overstating Noise Management Goals, and compromise required mitigation measures and strategies	Low	Agreed Actions: In consultation with the Acoustics Advisor determine and document representative RBL locations to be used for catchment specific noise assessments typically that of OOHWs Responsible person: Environment Manager, JHCPBG Timeline: By 2/02/2018







Ref	Finding	Risk/Impact	Priority*	Action Plan
6.	There was no Noise Monitoring Form to ensure that adequate and consistent data was captured during operator-attended noise monitoring, such as that conducted during out-of-hours works or as a result of complaint investigation. (This could prompt better practice in recording LA _{eq(15 minute)} durations and instrument calibration date, per Audit Findings above).	The absence of procedural prompts in the field may compromise the consistency and validity of results	OFI	Suggested Action: Create a Noise Monitoring form to prompt procedural requirements such as actual LA _{eq(15 minute)} and other readings, predicted noise impacts, NML's, calibration, weather etc.
7.	Weather condition details were not described in weekly project noise monitoring reports, this information suggested as being recorded by the Construction Monitoring Guideline section 1.3, appended to the Sydney Metro N&V Strategy.	The absence of recorded site climatic conditions may compromise the thoroughness of complaint investigations	OFI	Suggested Action: Capture weather condition details in weekly project noise monitoring reports,
8.	 Standard noise mitigation measures (inductions). Delta's induction material did not fully address environmental topics defined in the Construction Noise & Vibration Strategy developed to address Ministers Condition of Approval E32, in particular that all employees, contractors and subcontractors were to receive an environmental induction including but not limited to: Relevant project specific and standard noise & vibration mitigation measures; Permissible hours of work and site opening / closing times (including deliveries); Any limitations on high noise generating activities; Location of nearest sensitive receiver; and Designated loading/unloading areas and procedures Furthermore, systems did not ensure or detect non-compliance with subcontractors working on-site without said induction taking place. Upon request during the audit, the Delta Site Engineer correlated the names written down on the Wilken's Toolbox / Prestart Talk record for 7-8/11/2017 night works, with the vast majority of the 20 persons not inducted, with only 3 being inducted, two on 1/8/17 and the other on 20/7/17. It was discussed that the aforementioned Toolbox / Pre-start talk had touched on out-of-hours permit requirements though. 	Non-implementation of standard or minimum mitigation measures (inductions) may result in additional noise impacts to the community and increased complaints	OFI	 Suggested Actions: i. Amend Site Induction material or process to ensure that environmental inductions address content and commitments defined in the Sydney Metro N&V Strategy section 7.2; and ii. Provide records of system checks that project inductions have been undertaken prior to workers, subcontractors or service providers being allowed to conduct work on site or surrounds;

* Priority Definition enclosed as Appendix 2







Appendix 1: Personnel Consulted and Timeline

We would like to extend our appreciation to the following individuals involved this audit:

Name	Title
Elliot Nuberg	Project Manager Delta
Brendan Jolliffe	Site Engineer Delta
Kevan Zulu	Safety & Environment Manager Delta
Kelvin Ritchie	Senior Environmental Coordinator JHCPBG
Faye Rescigno	Stakeholder & Community Manager, South JHCPBG JV
Damian Evans	Quality Manager JHCPBG
Matthew Marrinan	Manager, Environment SSE
Craig Tucker	Senior Environment Manager C&SW
Joe Rivas	Manager, Audit & Reporting SSE
Dave Anderson	Independent Acoustics Advisor
Georgina Luck	Environmental Coordinator TSE IG
The timeline is shown in the table below.	

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Milestone	Date
Issuance of Terms of Reference	6 November 2017
Briefing Meeting	8 November 2017
Desktop Audit	13 November 2017
Site Audit Opening Meeting	20 November 2017
Fieldwork	20 November 2017
Issuance of Draft Report	7 December 2017
Circulation of Final Report	22 December 2017
Issuance of Final Report	31 January 2018

(Uncontrolled when printed)



Appendix 2: Priority Definition

The priority for findings raised in this report is described in the table below.

Priority	Definition	Guidelines for Implementing Actions
Very High	A significant control weakness / issue or fundamental non-compliance that exposes the project or area under review to a very high level of risk	Requires immediate management attention, with actions plans to be developed and enforced within an agreed time frame. The matter will be escalated immediately to senior management from all parties
High	A control weakness / issue or non-compliance that may expose the project or area under review to a high level of risk	Action plans to be developed and implemented within an agreed time frame. The matter will be escalated to relevant senior executives where it is deemed necessary
Medium	A control weakness / issue or non-compliance that may expose the project or area under review to a moderate level of risk	Action plans to be developed and implemented within an agreed time frame
Low	A control weakness / issue or non-compliance that may expose the project or area under review to a low level of risk	Action plans to be developed and implemented within an agreed time frame
OFI	Opportunity For Improvement (OFI) – opportunity to implement a good or better practice to improve efficiency or further reduce exposure to risk	Suggestion to be considered for implementation
Observation	Good Practice – process / system in place and implemented effectively across business.	Maintain to current standard. Share with other areas of business.







Appendix 3: Audit information

The following indicates key systems, documents, reports information and records that were reviewed, accessed od sighted during the audit process:

Documentation	Information / Records
Chatswood to Sydenham Planning Approval SSI 15_7440 dated 9/1/2017	Delta Induction Package, Sign-on sheets and Induction Register
SPIR Revised Environmental Mitigation Measures Table 11.1, NV1-7	Wilken OH&S 013 Toolbox / Pre-start talk records of 6 - 9/11/2017
Sydney Metro CN&V Strategy SM ES-ST-210	OOHW Application updated 1/11/17, endorsed 6/11/17
Waterloo CN&V Impact Statement rev E dated 20/8/17 (see note below)	Handwritten OOHW noise monitoring data from 6 - 8/11/2017
Delta Construction N & V Management Plan rev H dated 16/8/17	Real-time INFRA N&V monitoring data
EIS Chapter 10, section 10.4.11 Waterloo Station	Sigicom Calibration Certificates, various dates from 2015 to 2017
Sigicom Geophone Calibration Information sheet dated 18/8/2014	Delta's Svantek and ACU-VIB Electronics calibration records
	Delta N & V Summary Reports dated 21/10/17 and 10/11/17
	Delta Material Disposal Running Sheets
Note:	Delta Tipping & Greenstar Report dated October 2017
Appended email dated 3/8/17 from James Taylor and Associates, Delta's Civil and Structural Consulting Engineers confirming Waterloo Chapel building and footing soundness with respect to vibration impacts	EPA Consignment Note and Pure Contracting / Suez Kemps Creek Delivery Docket receipts (8 transfers over July / August 2017)
	JHCPBG correspondence and endorsement of vibration monitor relocation dated 10/11/17
	JHCPBG complaint investigations nos. 5,1 67 ,69, 73, 75 & 77
	JHCPBG Community Liaison Records including notification material and emails**
	City of Sydney Interface Meeting minutes dated 16/8/17 & 25/10/17

**Note that Consultation Manager could not be accessed during the audit due to WI-FI issues







Site visit (and post audit) information:



1 of 2 sections along Cope Street without hoardings.



Long length along Botany Road without hoarding.



Excavator not fitted with quacker (non-tonal alarm), view from Cope Street.

Out-of Calibration noisemeter used (RHS)









Appendix 4: Audit attendance register

QEM AUDIT ATTENDANCE REGISTER

NAME (print)	POSITION & ORGANIZA	TION	ENTRY	EXIT	
Larry Weiss	Team Leader & Environment Auditor	QEM	Moin	Sprey	
Hallew Harrinan	Sudnay Petro Tonner LIU.	TENSW		- Mi	
DAVE ANDERSON	ALOUTIC ADVISOR	Acoustic studio	Ben 9	A	
DAMIAN EVANS	QUALITY MANAGER JACKB6	JHC/BG	A.	D,	
Kevan Zuln	QSE Manager	DEUTA	AAA	HA-	
Gaig Tocked	Env. Manager	TINSW	LER	.,	
ELLIOT NUBERG	PROJECT MANAGE	DEUTA	OAM EENthy		
KEWIN RITCHCE	JHCPBG. ENV, COORDINATOR	JHCPBG.	R		
5 Jacobie	brendan jolliffe Previce Eur	Dez 194.	dia	1.	
JOE RIVAL	Stodoy METES/ Suditing	TANAU	VS I	0	
Georgina Lucke	Envira co-ordinator	TSE IG		ge .	
KELVIN KITCHIE	SENIOR ENVIRO GORD.	JACPBG.		2	
			0	Cen	







Appendix 5: Audit Credentials

Audit process

The Independent Environment Audit comprised an off-ste desktop review and subsequent site audit of one (1) day duration and was conducted by Larry Weiss, of QEM Consulting Pty Ltd. The audit comprised a brief site (limited by safety risks) followed by an assessment of documentation and records conducted at the Principal Contractors project office. The audit utilised an assignment specific Audit Checklist based on project Management Plans and related documentation, focussing on relevant Planning Conditions and Revised Environmental Mitigation Measures. Requirements were then verified as being implemented and/or compliant, based on records and objective evidence, the entire process undertaken in accordance with AS / NZS / ISO 19011:2014 – Guidelines for Auditing Management Systems.

Auditor information

Audit Organisation:	QEM Consulting Pty Ltd
Auditor & Report Author	Larry Weiss
Auditor Qualification	EMS Auditor, Exemplar Global Certification 12355
Affiliations	Member, Engineers Australia 938517

Auditor certification

The Auditor certifies as having undertaken this Independent Audit and preparing the contents of this Independent Audit Report; and that the findings of the audit are reported truthfully, accurately and completely; and that he has exercised due diligence and professional judgement in conducting the audit. The signed Statement of Interests and Association in our terms of engagement with Sydney Metro confirm his independence and absence of pecuniary interest in the audited project.

Audit disclaimer

It should be noted that this report is a snapshot in time, based on selected and supplied evidence, and does not purport to be a definitive confirmation of overall compliance or vice-versa.